Volume 59, No 1. APRIL 1990
ISSN 0041-6193

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THE ULSTER MEDICAL JOURNAL

Published by
THE
ULSTER MEDICAL SOCIETY

The Ulster Medical Journal, Volume 59, No. 1.
April 1990

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this book, first he would undoubtedly have been surprised and yet boyishly flattered that anyone should have thought a biography worthwhile; thereafter, I have little doubt that he would have taken out his pencils and spent hours trying to edit it!

It was his love of people, his willingness to help, his humanity and boyish humour that endeared him to all who were lucky enough to know him. We should be grateful to Muriel for providing for us a fuller and lasting memento of someone who was full of life and truly enjoyed it to the full; and for allowing us to share that life in what is essentially a personal book. Jack Pritchard's spirit is well preserved in these pages and his 'Fullness of life' made him a man greatly loved. There can surely be no better epitaph.

PDA OWENS

The Ulster Medical Journal, Volume 59, No. 1, April 1990.

The Ulster Medical Journal

The Journal of the Ulster Medical Society. First published in 1936.
Successor to the Transactions of the Ulster Medical Society (1844–1929), and the Transactions of the Belfast Clinical and Pathological Society (1854–1862)

The Ulster Medical Society was founded in 1862
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THE ULSTER MEDICAL JOURNAL

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The Ulster Medical Journal

VOLUME 59

PUBLISHED BY
THE ULSTER MEDICAL SOCIETY
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Contributions towards the cost of publishing the Ulster Medical Journal have been made by:

Royal Victoria Medical Staff.
Royal Group of Hospitals Trust Funds.
Northern Ireland Council for Postgraduate Medical Education.
Ulster Hospital, Dundonald.
British Medical Association (Eastern Division).

The Ulster Medical Journal, Volume 59, No. 1, April 1990.

THE ULSTER MEDICAL SOCIETY

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The Ulster Medical Journal, Volume 59, No. 1, pp. 1 – 10, April 1990.

Caesarean birth

John F O'Sullivan

Presidential Address to the Ulster Medical Society, 26 October 1989.

Only 100 years ago, in 1890, the first successful caesarean birth, with survival of both mother and baby, was reported in Ireland. During the following 20 years, the operation was performed nine times in Belfast.

The earliest title for the operation was the caesarean birth. The term "caesarean section" was first used by the French obstetrician Guillimeau in 1598.[1] The operation was basically to deliver live babies from dead mothers but more often to deliver dead babies from dead mothers. There has been much discussion about the origin of the name for the operation, and three different explanations are offered.

It has been stated that Julius Caesar had been delivered by this method. This is most unlikely as his mother, Aurelia, was still alive at the time of his invasion of Britain. As the knowledge of anatomy was so poor at that time, it is inconceivable that any woman could have recovered from such crude major surgery.[2] In 715 BC, Numa Pompelius, King of Rome, codified the Roman laws. It was forbidden to bury a dead pregnant woman before the fetus was excised. The child, if alive, was known as a "caeson", but if dead, it was buried separately from its mother. This law was the Lex Regis. With the development of the Roman Empire under the Caesars this law became known as the Lex Caesaris. A more acceptable explanation is that the name is simply derived from the Latin verb "caedere" — to cut. Guillemeau may have complicated matters as "section" is also derived from the Latin verb "seco" (to cut). As both words mean to cut, a better name for the operation would be the original — caesarean birth.

HISTORY

The history of the development of the operation can readily be divided into four eras.

Pre-history — 1500 AD

The ancient records are so meagre that there is little value in assessing early midwifery practice. A woman would often give birth to her baby out of doors and unaided. It is not surprising that the first caesarean births were regarded as supernatural. Aesculapius, the God of Physic, was delivered by his father Apollo from the side of his dead mother Corelia. Bacchus, the God of Wine, was delivered in a similar manner by Jupiter from his dead mother.

Many of the old religions had very definite rules about the operation. Two of the oldest Rabbinical commentaries on the Book of Moses, the Mischnagoth and the Talmud, written about 150 BC, include references to the operation.[3] In the Mischnagoth it is written, "it is not necessary for the women to observe the days

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John F O'Sullivan, MB, FRCS, FRCOG, Consultant Obstetrician, Jubilee and Royal Maternity Hospitals, Belfast.

of the purification after the removal of the child through the parieties of the abdomen. Such children were known as 'jotze dotin', translated as 'go out of the body wall'". This statement suggests that not only was the operation performed on living women but that many babies survived. The Talmud states "in the case of twins, neither the first brought into the world by the cut in the abdomen nor the second can receive the right of primogeniture — either as regards the office of priest or successor to property". On the other hand, the followers of Islam were opposed to the operation and believed that a child delivered by this method was the offspring of the devil.[2] The Christian Church, being concerned with saving both lives and souls, favoured the operation.

In Ireland in the year 200 BC there is the record of such an operation. When Connor McNessa, King of Ulster, was deserted by his wife Queen Maeve of Connaught, he asked her father for the hand of another daughter, Eithne, in marriage. Unfortunately, near term during her first pregnancy, Eithne fell into the river Inny. When taken from the water it was obvious that she was dead so an immediate postmortem operation was performed. A son, born alive, was named Furbaidh which is derived from the Gaelic word "Urbaidh" (to cut). Details of the operation are recorded in the Book of Lecan which is preserved in the Royal Academy in Dublin.[4]

Hippocrates, the great Greek physician born about 460 BC, had a sound knowledge of anatomy. He was the first doctor to attempt to improve the art of obstetrics and he wrote about disproportion in labour and antepartum haemorrhage. His teachings influenced many other physicians. However, from the earliest times, the practical side of midwifery was entirely in the hands of the midwives, and management of the woman in labour was regarded as outside the province of the physician, except when summoned in very exceptional circumstances. The midwives were not the skilled women of today. They were uneducated and usually the older members of the woman's family. There was no formal training and knowledge was based on experience, often obtained at the expense of the lives of their unfortunate patients.[5] In early Christian times some physicians, for example Soranus Swanus in Rome, wrote textbooks of instructions for midwives. But from the second to the sixteenth century, medicine suffered a severe setback and the teachings of Hippocrates, Soranus and others were forgotten. Rational medicine gave way to superstition and disease was regarded as possession by the devil. Practical midwifery remained in the hands of the midwives and physicians gave up its practice altogether.

1500–1876 AD

This era may be regarded as the time of re-introduction of doctors to midwifery, or the age of the obstetric physician. It has been suggested that the first successful operation was done by the horns of a rampant bull and not by man. Jacob Nufer, a Swiss sow-gelder, has been given credit for performing the first successful operation in modern times — in the year 1500 — when both mother and child survived. His wife had been in labour for several days and was unable to deliver the baby. Thirteen midwives and a lithotomist tried on different occasions to assist her, but of no avail. The local mayor permitted Nufer to perform the operation, which he did with a razor. It is reported that this woman subsequently had five vaginal deliveries, but details of the operation were not recorded until 1582.[6] Many modern historians no longer accept this claim as they feel that the news of such a feat would have been widely reported before that time.

Disagreements — both verbal and physical — developed between doctors who wished to practise midwifery and midwives who wished to have full control of the patient. Prudery at that time often forced doctors to perform deliveries under cover of a sheet. In Hamburg, in the year 1552, a Dr Wertt attended a patient while disguised as a woman, but he was recognised and then burnt to death.[7]

Likewise, in England, the details of the first caesarean birth did not appear in the medical press but in the proceedings of a court.[8] The report read as follows: "Doctor John Bullawanger of Huntingdon was indicted before the Justices of Assize for the Norfolk Circuit. The charge was that he, who claimed to be a physician and surgeon, took upon himself to operate on Alice Redborne who was labouring under diverse infirmities on or about the 17th June 1573. He made an incision in the belly and the womb and drew out a child. The patient died on the 28th June 1573. The doctor was found guilty, but as he was thought to be the first in the British Isles to perform the operation, he was pardoned." The first authenticated operation reported in a medical journal was performed by Dr Trautmann of Wittenberg on 21st April 1610.[2] Present at the birth were a professor, an archdeacon, two midwives and seven honourable women. The baby survived but the patient died on the twenty-fifth postoperative day.

In the British Isles only a few caesarean births took place in the next 100 years. In Edinburgh, on 29th June 1737, a Mr Smith performed the caesarean operation in the presence of seven medical gentlemen. Other medical colleagues who refused to agree to the operation did not attend. The indication for the operation was "prolonged labour of seven days due to mollitus ossium." The child was stillborn and the mother died 18 hours after surgery.[9]

The first caesarean birth in England in which the patient survived was performed by Dr James Barber of Blackburn in 1793. The patient was a Jane Foster of Chorley. In Ireland we hold the record where both mother and baby survived the operation. This was reported in the medical press by Surgeon Duncan Stewart of Dungannon[10] and confirmed by a letter from Dr Gabriel King of Armagh.[11] Stewart wrote as follows: "Alice O'Neill, aged about 35 years, wife to a poor farmer near Charlemont, Co Armagh, and mother to several children, in January 1738 was taken in labour, but could not be delivered by several women who tried it. She remained in this way for twelve days. Mary Donnelly, an illiterate woman, but eminent among the common people for extracting dead births, tried to deliver her in the common way, but not succeeding, performed the Caesarean operation by cutting with a razor, first the containing parts of the abdomen and then the uterus, at the aperture of which she took out the child and the secundies. She held the lips of the wound together with her hands till one went a mile and returned with silk and common needles that tailors use. With these, she joined the edges in the manner employed for hare lip. In twenty-seven days the patient could walk a mile". Stewart reported that he used to meet her regularly in the town which was six miles from her home.

There was marked opposition to this procedure in the British Isles because of the appalling maternal morbidity and mortality. There was, of course, only one indication for the operation — disproportion in labour. This opposition was led by Fielding Ould who wrote in his Treatise of Midwifery (1742) "I have taken upon myself to absolutely explode the caesarean operation as repugnant — not only to all the Rules of Theory and Practice but even Humanity itself".[12] Ould became the second Master of the Rotunda Hospital in Dublin. He was knighted for his services to the Countess of Mornington, whose family lived in Belvoir Park House. Belfast.

In 1783, Dr Dease, also from Dublin, condemned the operation.[13] He wrote, "The operation seems in general only to have been performed by ignorant and rash men who had no reputation to lose and were anxious to establish one, though their fellow creatures lives should be the price". He did approve of the postmortem operation. One year later he gave up the practice of midwifery, became a founder member of the Royal College of Surgeons in Ireland and its first Treasurer.

In England, Smellie and Burton favoured the operation. Hull of Manchester, who was the first doctor in England to perform the operation twice on the same patient, favoured it,[14] while his colleague Simmonds opposed it. Simmonds[15] tried to get all doctors to sign an agreement never to perform the operation. He suggested that the high mortality in England was due to the poor climate. British physicians considered the operation only in patients with rickets in whom the antero-posterior diameter was less than 2¾ inches.[16] They claimed that a good man could always deliver the baby vaginally. The case reported by Dr Osborne in 1776 illustrates this practice.[17] The patient was only 3 feet 6 inches tall. The antero-posterior diameter of the left half of the pelvis was ¾-inch and of the right side 1¼ inches. After the patient had been in labour for 72 hours Osborne managed to perforate the skull. After 120 hours he succeeded in getting a crochet into the foramen magnum and delivered the baby in another 3 hours. He reported that the patient displayed great fortitude throughout!

During the nineteenth century the operation was performed in many countries throughout the world. Dr Felkin in 1879 witnessed an interesting operation in Uganda.[18] The native operator prepared the patient's abdomen with alcohol made from bananas, gave some of it to her orally as a form of analgesia, and then washed his hands in it as a form of disinfectant. Even at this time, British doctors were still opposed to the operation. The alternatives were craniotomy with or without embryotomy, high forceps, the blades being applied above the pelvic brim, or symphysiotomy, by which the symphysis was divided to enlarge the pelvic cavity. Doctors had no means of knowing whether the baby was alive or dead — unfortunately it was usually dead. The fetal heart was first heard by the Vicomte de Kergardac in 1819. The fetal stethoscope was introduced into British obstetrics by the staff of the Rotunda Hospital, who in turn had been taught by J C Ferguson, first President of the Ulster Medical Society. In 1855, Simpson pointed out that the fetus, if alive, felt pain during craniotomy.[19] Despite these developments doctors still favoured craniotomy because of the lower maternal mortality (Table I).[20]

TABLE I

Maternal mortality in caesarean births[20]

Year	*Method*	*Mortality*
1866	Craniotomy	20%
1866	Caesarean section	89%
1876	Caesarean section	84%

What did the caesarean birth entail?

Throughout the centuries, artists have depicted the birth of Eve from the right side of Adam's abdomen, lateral to the rectus muscle. This technique protected the woman's bladder. In 1606, Shakespeare, in Macbeth, described the birth of

Macduff who "from his mother's womb was untimely ripped"! By the late nineteenth century there had been little change in the operative technique. The patient may have been given laudanum or alcohol as a form of anaesthesia, and she was held in the semi-recumbent position by four strong assistants. The abdominal incision was made lateral to the right rectus but it might have been vertical, oblique or semi-lunar. Some doctors favoured a transverse incision below the rib cage in order to expose the fundus of the uterus. Rarely was the midline incision performed. The uterine incision was made in front, at the side, in the fundus or even in the posterior wall. Again, the incision might be vertical, transverse or oblique. The incision was never sutured. The placenta might be removed manually or allowed to extrude vaginally later. The abdominal wall was closed by three or four sutures. Death was the rule — either due to primary postpartum haemorrhage or peritonitis initiated by infected lochia.

In Ireland during the nineteenth century a few caesarean births took place. In 1816, Charles Hawkes Todd was the first doctor to perform the oepration.[4] This was carried out in Dublin on a Mrs McClorey from Loughbrickland, Co Down. The baby survived but the patient died on the fourth postoperative day. On 29th September 1829, Dr McKibben performed the operation in the Belfast Lying-In Hospital.[21] The patient had been in labour for 48 hours: there was a bony exostosis in the hollow of the sacrum so that the antero-posterior diameter was only 1½ inches. The operation took 20 minutes and there was no anaesthesia, the baby was stillborn and the mother died 17 hours later. On 18th May 1849, Dr John Campbell,[22] medical officer to the Lisburn Union Infirmary performed the operation on a Mrs Rodgers, aged 40 years, who suffered from osteomalacia. The operation was performed in her home — described as a wretched cabin near Dromara, Co Down. Chloroform anaesthesia was used. The assistant was Dr Musgrave (Junior), whose family have been benefactors of both the City of Belfast and the Royal Victoria Hospital. It is noteworthy that Simpson had first used chloroform anaesthesia in 1847.[19]

In far away South Africa a young Irish doctor also made history. The doctor, Surgeon James Barry of the Army Medical Service, was described as "the most skilful of physicians". In reality she was probably the illegitimate daughter of Margaret Bulkely and James Barry, both being natives of Co Kerry. Her life story is fascinating and so far has provided material for several biographies, at least four novels, and two plays.[23] Doctor Barry delivered Mrs Munnik of Cape Town of a male child by the caesarean operation on 25th July 1826.[24] The child was baptised James Barry Munnik. A descendant of that child, James Barry Munnik Hertzog, became one of South Africa's most famous Prime Ministers. Dr Barry eventually became Inspector General of the Army Medical Services. Only after death was her true sex discovered, but her headstone in Kensal Green Cemetery still recorded her as male.

1876–1949

During this time most improvements took place in the operative technique — the era of the obstetric surgeon. Doctors searched desperately for methods to reduce the mortality associated with the operation. In 1880, Radford of Manchester found records of only 131 caesarean births in the previous 140 years, with a maternal mortality of over 83%.[25] In Italy in 1876, Porro reported his operation.[26] He performed the caesarean operation, then placed a "cintrat" — really a snare — round the uterus and performed a subtotal hysterectomy and bilateral salpingo-oophorectomy. The cervical stump was brought out through the lower end of

the abdominal incision. The snare, together with the abdominal sutures, was removed on the fourth day. This operation stopped primary haemorrhage and usually prevented sepsis. Soon the maternal mortality was below 30%. This operation, though previously suggested by others, had never previously been performed.[27] Porro published his case report in a 62 – page article which included photographs of himself, the patient and the specimen! As the operation was mutilating and restricted family size, search for better techniques continued.

In 1769, Lebas sutured the uterine incision. The patient survived but the technique was rejected by the pundits of that time. The materials which became available were waxed silk, silver wire and, later, carbolised catgut which, in theory, was best but because of its variability in strength was worst in practice. The use of sutures in the uterus abolished haemorrhage, reduced sepsis and preserved the uterus. Once this was seen to be an obvious progress, numerous operations were described. Sanger in 1881 described his procedure, which is the forerunner of the present classical operation.[28] There have been many modifications. Sanger's contribution was that the uterine muscle was sutured in one layer and then the peritoneum was sewn in a continuous separate layer over it. However, he was not the first to perform his own operation! Dr Leopold performed the operation in 1882,[29] while Sanger did not do so until 1884. This operation was widely adopted in Britain. Also in 1881, Kehrer incised the lower uterine segment transversely and sutured it after delivery of the child and placenta.[30] Many others had performed the operation in the lower segment with disastrous results, but Kehrer's contribution was the closure of the incision. This is the present day lower segment operation, although this advance was not appreciated for many years.

The present century opened with a maternal mortality following caesarean births of between 5% and 10%. This was due to better asepsis, antiseptics and careful surgical technique using good suture material. However, doctors realised that there was a high mortality following surgery if the patient had been a long time in labour. It is only 100 years ago since the first report of a successful caesarean birth performed by a doctor in Ireland in which both mother and baby survived. Sir Arthur Macan had never seen the operation but read Sanger's article before deciding on his technique.[31] The patient was only 104·0 cm tall, and the fetal head was not engaged, so an elective "classical" operation was performed.

In 1911, Routh published a detailed list of 1,282 caesarean births in Britain between 1890 and 1910.[32] Of these, 53 were performed in Ireland, with a reported maternal mortality of 13·2%. Forty of the births took place in Dublin, four in Cork and nine in Belfast. The Belfast doctors were Sir Robert Johnstone of the Belfast Lying-In Hospital, Sir Alexander Dempsey of the Mater Hospital and Sir John Campbell of the Samaritan Hospital. In the same year, Munro Kerr in Britain adopted the lower segment operation.[33] During the twenties others experimented with it, in the thirties there was considerable support for its use, and in the forties there was almost universal acknowledgement of its superiority over the classical operation. Finally, at the twelfth Congress of Obstetrics and Gynaecology held in London in 1949, the use of this technique was vindicated. Many papers were presented to support this claim. Munro Kerr, long since retired, was invited to speak from the platform. He thanked everyone and ended by raising his hands and acclaimed "Alleluia. The strife is o'er, the battle is done!". The safety of the operation had been recognised, but that safety may have led to the problems of the present time.

1949–1989

This phase may be regarded as a time for widening the scope of the operation — the era of the obstetric specialist. The National Health Service began in 1948. In 1949, home confinement was still the norm and there were no specialist maternity units outside Belfast. Maternal and neonatal mortality were high, and caesarean births were rare. The obstetric policy was conservative and the motto was "masterly inactivity".

In the early 1950's, specialist units were opened in many large country towns, each being staffed by a consultant surgeon, a physician and an obstetrician. Soon to be added were consultant anaesthetists and clinical pathologists, but there were no junior staff other than pre-registration housemen. Pregnant women gradually chose to have their babies in hospital. Operative obstetrics increased and the motto became "active intervention". How did this come about?

ACTIVE INTERVENTION

The easier induction of labour

The long established but hated, oil, bath and enema technique was replaced by the Pitocin-Syntocinon drip. As this was a better method of induction, more labours were induced. Unfortunately, there was also a high failure rate because of poor patient selection, which necessitated delivery by the caesarean operation. In one Belfast hospital in 1980 this operation was performed in 25% of primigravidae whose labours had been induced. (Dornan, personal communication). Newer induction agents, stricter selection of patients and a lower induction rate have reduced the number of caesarean births from this cause.

The change in the definition of prolonged labour and the introduction of the term "failure to progress"

In 1964, the definition of prolonged labour was reduced from over 48 hours to over 12 hours. Since that time it has been taught that, in normal labour, the cervix in a primigravid patient dilates at 1 cm per hour. The partogram, devised by Philpott[34] is a visual record of labour and is more easily studied than hand-written notes. When the cervix does not dilate at the normal rate, Syntocinon augmentation is instituted. If progress still remains slow, operative delivery is recommended because of failure to progress.

The development of electronic fetal monitoring

This technique was introduced in the late 1950's. Two electrodes attached to the maternal abdomen record the fetal heart rate and the strength of the uterine contractions. The fetal scalp electrode is used regularly but the intrauterine pressure recorders have largely been abandoned. The tracings record normal and abnormal rates, both during and between uterine contractions. This technique, like so many others in medicine, was recommended to obstetricians as a great advance in the management of the fetus in labour, without controlled clinical trials. Now, many operative deliveries are performed for fetal distress due to presumed intrapartum anoxia on the basis of this electronic monitoring. The advent of this method of diagnosis of fetal distress in labour has now led to "obstetricians' distress" — because of litigation and claims of negligence based on these fetal heart rate tracings, "defensive obstetrics" has become the obstetric motto.[35]

Widening the indications for caesarean birth

An example of this is the now widespread practice of delivering the breech presentation either by elective surgery or in early labour. Most patients with antepartum haemorrhage now have operative delivery instead of only those with placenta praevia. Another welcome development has been the diagnosis of intrauterine growth retardation by ultrasound scanning, and early safe delivery by surgery. Likewise, patients with severe pregnancy-induced hypertension, diabetes, or rhesus isoimmunisation, who are unsuitable for induction, are offered elective surgery — much safer than the attempts of yesteryear at induction of labour with the Drew-Smythe catheter or stomach tube!

Repeat elective operation

In the USA in 1916, Craigin recommended "once a caesar always a caesar".[36] This directive is widely quoted but it was first stated over 80 years ago when in the USA a large percentage of uterine incisions were made in the fundus of the uterus. In 1972, Tindall in England also recommended "once a caesar repeat caesar",[37] thus effectively abolishing the conservative English motto "once a caesar always in a specialist hospital". Tindall made this proposal because patients had no intention of having more than two or three children. In the USA, vaginal delivery following a caesarean birth is now almost a rarity because of the strict conditions laid down for the supervision of labour. Unfortunately, in both the USA and the UK, the repeat elective caesarean birth has become more acceptable to both patient and doctor.

The development of the neonatology service

The development of this specialty has had a dramatic effect on the management of patients as more and more premature and severely ill babies can now be successfully treated.[38]

WHAT OF THE PRESENT?

The mortality due to the operation is now less than 0·08%.[9] The rate for caesarean birth has risen in England and Wales since 1970. In the USA in 1970 the rate was similar to that in England and Wales but has increased more rapidly. (Table II). Experts predict that in 1990 the US rate will reach 28% of all deliveries and by the year 2000 will be 40%.[39] It has been suggested that the improvements in maternal and perinatal mortality are entirely due to the more liberal use of the caesarean operation.

TABLE II

Incidence of caesarean birth in England and Wales, and in the USA

Year	*England and Wales*	*USA*
1965		4·5%
1970	4·3%	
1980		16·5%
1985	10·6%	
1986	11·3%	24·1%

In an editorial in the British Medical Journal in 1988, Lomas discussed "holding back the tide of caesareans".[40] At the 1989 British Congress of Obstetrics and Gynaecology in London several doctors supported this view. Elstein pointed out that the increased operative rate had not reduced the incidence of cerebral palsy, which he considered was rarely due to intrapartum anoxia. Barrett in a survey of all emergency operations in one hospital, suggested that caesarean birth was unnecessary in almost 40% of patients delivered by that method. Batemann pointed out that of babies delivered by emergency caesarean operation because of fetal distress in labour, only 20% required admission to a special care baby unit.

Unless we can reduce the high operative delivery rate, much of the improvements which have been achieved by the medical and nursing professions will be swept aside by popular lay opinion and the natural childbirth enthusiasts, both groups being concerned by the high rate of intervention. The late George Gibson concluded such a lecture as this[8] by quoting one of his teachers, Davidson, Master of the Rotunda hospital, who in 1940 was disturbed when the caesarean birth rate had risen to 1·3%. In 1988 it was 12% at the same hospital. (Darling, personal communication). May I conclude by repeating that quotation: "Is it", asked Davidson, "that some obstetricians now regard the birth canal as a makeshift exit only to be used when they are otherwise engaged?"

I wish to thank Professor JMG Harley, Mr JK Houston, Mr CAJ Macafee and Dr M Scott for helpful information. Miss May Weller assisted in the preparation of the manuscript.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 11 – 16, April 1990.

The lure and lore of surgery

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108th Annual Oration at the opening of the 1989 – 90 teaching session, Royal Victoria Hospital, delivered on 5 October 1989.

What is an oration and how does one qualify for the job? Is there a correspondence course, night school or tutor available and who were those orators of the past? There have in fact been 107 Opening Addresses of this nature, the earliest in 1826, ten years after Laennec's epoch making invention of the stethoscope. This was given by Dr James McDonnell who was appointed in 1792 as Consulting Physician to the Belfast General Hospital. It was entitled "Systemic Medicine" which is of interest as I stand before you as a systemic surgeon. Dr McDonnell's story is well told by Ian Fraser in his Opening Address on the heritage of the Royal Victoria Hospital given in 1952, a mere 37 years ago; Sir Ian was then Senior Surgeon of this hospital and remains so here with us today.

As I scanned my predecessors — *á la recherche de temps perdu* — I discovered that 50 were physicians, 52 were surgeons; there were no women. The age range interested me, but would have been extremely difficult to calculate, and it was in any case decided long ago that the address should be given on merit rather than on seniority. This rule has in fact been disobeyed throughout, and is certainly disobeyed today. Subject matter was more difficult, as the titles alone gave only a hint of their contents and to read through them all seemed a herculean task more suited to our archivist than to a mere bone surgeon. Suffice it to say that it should be a learned discourse, and represent a lifetime of professional zeal and study.

My first duty is to welcome to their clinical years another generation of medical students. It is 40 years since I myself first crept into the back row of clinical bedside voyeurism, anxious not to be noted for my appalling unsuitability to the medical profession. No such fear need cross your minds nor does it cross mine as I contemplate you. Only this year it was a rare honour to examine for the first time a small sample of the final year. I was immensely impressed at the breadth of their knowledge, and the humanity displayed. If this is to be your standard we need have no fear for the future.

What is it that constitutes the urge to embark on a career in medicine? This is perhaps an overworked theme. There are legions of reasons, or to use the modern jargon it is multi-factorial. No one reason dominates nor do any particular qualities constitute the essential ingredients. Some qualities can be considered handicaps — just as being a woman seems to debar from being Orator! An intense dislike for the human species, an inability to communicate, or an entirely fiscal interest seem less praiseworthy attributes. An agile and retentive brain is always useful; does one need a pair of hands? I seem to remember that to qualify as a doctor appeared as an end in itself. What a sense of achievement as

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we swirled our gowns and doffed our mortar boards calling each other doctor. We went out to celebratory nights surrounded by admiring family and impressed friends, some of whom even asked for medical advice having scorned this on previous occasions when unsolicited. Rejoicing was soon over. We timorously entered into service — some say near slavery — as junior hospital doctors, and began to realise that the door through which we had passed opened to a vast arena of structured careers with intercommunicating pathways mazelike in complexity. The brave, the strong and the determined as always plunged forward without hesitation, whereas those less well endowed — and I count myself among these — seemed to drift.

It is tempting at this stage of my discourse to paraphrase James Joyce and embark on a "Portrait of the Surgeon as a young man": the haunting fears, the prejudice, the moral and ethical dilemmas, the trials and tribulations that beset each young surgeon as he progresses ever onwards towards that goal of independence — a Consultancy, — the final recognition of success which makes it all worthwhile. Now at last the opportunity to make one's mark on society. For some, the few, international acclaim, leadership in one's profession, perhaps a knighthood — these attributes seem less necessary and certainly less achievable, a sort of icing on the cake or by-product of a surgical career. What then are the satisfactions as one reflects? One of my young surgeons (no ownership implied) on hearing of my oratorship and looking me straight in the eye — a quality I admire — said to me "Sir, is this the end of the beginning or the beginning of the end?". It takes courage to speak to your boss like that and it takes courage to be a good surgeon. So I instantly forgave him. What he was in fact saying was entirely true; some reflection was indicated! For an intelligent person qualified in medicine to choose surgery as a career seems indeed a strange choice. Much of one's time is spent in close, indeed intimate, physical contact with the patient. Some of this contact is of a distinctly crude nature. I recollect the young surgeon with his eye close to the sigmoidoscope on receipt of the end product — a mixture of flatus and faeces — ruefully wiping his eye. Was this, he asked, what he had studied six long years in medical school to achieve? Long stressful hours immersed in the intricacies of resecting and rejoining those parts of the viscera that any self-respecting pork butcher would reject and throw into the bin. Re-organising the drainage system from the kidneys all the better to fill our already overburdened sewage systems. Ensuring the survival of the individual by replacing cardiac tributaries, and fixing worn or fractured hips at a time when that individual's worth to society may long be over. Rebuilding shattered limbs, and on occasions resuscitating those destined to be a burden both to their loved ones and the social services.

The technological advances that support modern surgery are truly impressive and in what a short period of time have these been achieved. There are today people still living who were born before Wilhelm Roentgen, Professor of Physics at Wurzburg, discovered X-rays just before Christmas in 1895. Where would we be without modern imaging techniques? Furthermore, we can now look into almost every nook and cranny of the body as endoscopy invades each and every duct and joint, previously only accessible at the post-mortem table. Only a week ago we learnt of being able to suture the gastro-intestinal tract by swallowing a sewing machine! Biochemical analyses accompany each advance in the understanding of human physiology, just as microbiological and biogenetic engineering push back the frontiers to the very understanding of life itself — the anatomy of

individuality in health and disease. These advances are only a beginning and as the rate of progress itself multiplies, so the complexity increasingly decreases any chance of an individual to master it all. The day of the omnicompetent renaissance man seems dead. Only with the help of our new-found ally the computer can we hope to summon up in orderly fashion what is now called the data bank of human experience. Where does all this leave the humble surgeon whose crude weaponry in the fight against disease, decay and death may depend ultimately on his manual skills?

The essential difference between a surgeon and a physician is that one is prepared to enter the body to put things right, whereas the other uses different techniques mainly related to altering the body's physiological *milieu intérieur* (Claude Bernard) to adjust, to replace, to manipulate and to bolster the defence mechanisms. This distinction has always been somewhat blurred: Thomas Sinclair, Professor of Surgery in Belfast from 1866–1923 said "a surgeon is a physician doomed to the knife". Access to the blood stream has always been allowed to physicians — indeed it is now allowed to nurses. Few, if any, modern physicians would now bleed a patient deliberately to promote harmony though this was done on a massive scale in the 18th and early 19th century, and seemingly the more important the patient the more blood was removed. King George III was virtually bled to death for porphyria. Nowadays bleeding is more subtle and used on a more modest scale (though alarming enough to the patient) for diagnostic analyses and monitoring. The open road to the circulation remains the only certain therapeutic pathway. Furthermore, with the boom in cytology and endoscopy modern physicians have become more surgically adventurous.

The surgeon's traditional training equips him at an early age to develop manual therapeutic skills and he derives much satisfaction and frustration from this aspect. It is simply untrue that the average manual skills required of a surgeon are such to enable him knot his tie and do up his shoe laces. I doubt that there is a surgeon still practising who cannot remember vividly his early apprentice days. The excitement, apprehension and immense satisfaction of an operation that went well, and the agonies of frustration and disappointment when defeated, hoodwinked and wrong! Does a surgeon need a brain as well as a pair of hands? For goodness sake don't ask a physician or an anaesthetist! Most physicians would say "No, at least not if he has a good physician to advise him: we will tell him what we want done and let him get on with his craft". May I say this; there is no more bloodthirsty or radical an adviser than a physician urging a surgeon to operate: good physicians don't. What about anaesthetists? Here I admit to some bias. I actually like anaesthetists, and will mourn the day, now approaching fast, that a robot with physiological feedback from the patient will control brain, pain and movement during surgical procedures. There is no activity that can be so boring as watching or listening to a surgeon operating day in and day out. Many surgeons realise this and exchange pleasantries with their anaesthetist on whose co-operation and skills they so much rely. Anaesthetic crises are very frightening occasions and the average surgeon pales significantly when involved on such an occasion. The modern anaesthetist needs and has a cool head: no longer the surgeon's servant depending on the droppings from the rich man's table, he is now a resourceful cardio-respiratory physician, a technologist in his own right, friend, adviser, confidant and occasionally surgical accomplice.

How important are manual skills in surgery? We all know that these skills are not necessarily related to intellectual attainment, and that with good training

techniques and sheer practice high grade manual expertise can be achieved in many agricultural, industrial, commercial and communicative activities. Not to mention the creative aspects of art and design where they achieve their highest peak. How often do we see a "super surgeon" at work and marvel at his skills and dexterity? As that great contemporary teacher Alan Apley has said "the average surgeon is an average surgeon"! Far more important is that the operative procedure carried out is the one that will benefit that particular patient best, remembering always the basic truth that of the surgical team by far the most important contributor is likely to be the patient. Wise and prudent selection in itself implies sound medical knowledge, a good training background and communicative skills. These attributes combined with manual competence seem a dull concept compared with the virtuoso performance of brilliant, even dazzling, dexterity; but how we all admire the latter! There is no more dangerous animal than a surgeon looking for someone on whom to perform his surgically skilful *pièce de résistance,* except perhaps one who has lost all confidence and can no longer involve himself in risk factors. There are two stages best exemplified in the ageing process among many doctors — not all. The young doctor with his urge for therapeutic activity, a zest to treat everyone; and the sad decline of the elderly for whom no treatment seems worthwhile, a sort of therapeutic nihilism. Somewhere between these two lies the ideal, the truly balanced doctor.

From the other end of the spectrum, from the consumer viewpoint, what is it that makes patients choose surgeons? Members of the public may be very naïve, but many are now very much better informed than some surgeons are aware. We are fortunate in this part of the world to retain the referral system whereby patients are likely to be advised by their family doctor whose opinion they should seek. The very complexity and team-work of modern medicine confuses many patients, and in the hurly-burly of a busy clinic and of life on the ward they may not always be sure whom they have in fact consulted. In the not so distant past a large scar extending across the abdomen from xiphisternum to pubis could be readily identified by the patient as the work of Sir Lancelot, but on enquiring what that great man had actually done — "God, sir, I never asked him"! Now the same question is more likely to elicit the reply "I had an anteroplasty and a highly selective vagotomy", but as to who did this splendid procedure — "God, sir, I never asked".

There are still those relics of medieval urban development, the street of the tailor, the street of the doctor (Harley Street) but here in Ulster we are more likely to be associated with our hospitals. With no inference elsewhere I will admit to being proud of being one of the Royal surgeons — it is said that you judge a man by the company he keeps. All-in-all patients choose surgeons for a vast variety of reasons, but few, if any, relate to the true value of the man which is best judged by his own colleagues — more often the junior ones. This constitutes the *vis a tergo* of incentive motivation. Let us hope that we can keep our precious referral system and shun the cult of personality so exemplified by the power of the media. Not that surgeons are conspicuously noted for their self-effacing humility or lack of personality projection. The whole ethos of surgical training, the very performance of the art in a "theatre", the grand conclave on the surgeon's ward round especially in a teaching hospital, lead to the development of character traits that can only be described as those of a prima donna. We have all seen examples of this — how entertaining and colourful such a performance can be. "Good old Sir George — he's at it again — ten out of ten for the ward round today, and what

about the way he dealt with scrub nurse in theatre when she handed him the needleholder beloved by Mr Truelove, his arch rival". A certain amount of this theatricality was programmed in to the system and is not by any means confined to surgery.

Medicine can at times appear a very arrogant profession, but beware of pride in arrogance lest the fall prove too humiliating. A degree of eccentricity colours life. That all men were truly equal — a sort of surgical clone — would indeed be a dull world and provide no fuel for the satirist at the housemen's concert, or the anecdotes of the after-dinner speaker on staff occasions. Some theatricality is permissible as a sort of safety release valve in a stressful profession. It is however, very important that surgical rectitude and discipline be entirely professional. There is no safe alternative to the disciplined clinician and operator. Of course, no surgeon is devoid of habits. These depend on one's training background, tradition and to a certain extent on current fashions — for there are fashions in surgery just as in any other sphere of human activity. Habits should however be open to question and revision. There is no one perfect manner of surgical technique: but there are certainly some methods that are better than others, some procedures that can no longer be justified and some attitudes that require careful re-examination, especially in the light of new knowledge. Otherwise there would be no progress.

The development of team-work in surgery has been a striking change even over the short span of my own career. It is furthermore one of the many signs of change, with the increasing complexity of technology and the division of surgery not only by specialisation but also into special interest spheres, that threatens to transform our professional attitudes. I use the word threat well aware that what some surgeons regard as a threat others see as a joyous opportunity. Not the difference between rich and poor as in a political or sociological sense, but between the old established and the young and thrusting. In any locale we now need to build up a surgical team not just to represent the accepted specialities that have hitherto been designated by systemic surgery, but to represent new opportunities, new concepts, new skills and technological attainments. I have seen myself become the last of the generalists, even in my own speciality. Take what was once a very common, indeed mundane, orthopaedic procedure — menisectomy or removal of a torn displaced knee cartilage. This has now been elevated, much to the patient's advantage, and may be carried out by an expert arthroscopist who in certain circumstances not only removes it at day surgery through the visualising beam of a small telescope, but may actually sew it back again. The concept of teamwork is a heartening development. It has been greatly lubricated by intra-speciality referrals, communication between surgeons, and lessened rivalries and feuds which so bedevilled the surgeons of old. Surgical meetings and conferences are now much less likely to be a parading of skills and achievements, and more often represent a quest and pooling of knowledge — a process of cross-fertilisation where one and one make three or more! Sometimes such a conference can degenerate into a shared responsibility in decision-making which is not always to the patient's advantage. Committee decisions are not based on an equity of knowledge. The wise clinician having heard the ebb and flow of the discussion either takes the decision himself, or should the case be outside his own expertise, refers the patient to the proper quarter. It is this very explosion of sophistication in super-specialisation, and the expense incurred, that has created a new hydra that again threatens to change the pattern of the lure and lore of surgery.

Two new terms borrowed from industry are now on each and every surgeon's lips. One is resource management and the other quality control. Each of these terms sounds laudible enough in itself. Resource management is concerned with provision of services to the patient within budgetry control. Quality control is the assessment of clinical audit and evaluation of cost benefit. The problems with these two concepts are firstly, with whom is one going to compete for the budget that one controls, and secondly, to my mind the more necessary concept, what represents quality and again who controls it. Of course, we need to monitor the successes of surgical procedures. We need to know more accurately the eventual outcome, and at what price in terms of human suffering is the degree of success achieved. Every operative procedure must have an indication and the condition of the patient may constitute a contra-indication, but the complexity of the problem is much greater than this. A certain operative procedure may give good results in one surgeon's hands and very poor results in another's, who might in turn have achieved a comparable result by utilising an alternative technique more suited to his own individual skills. In my own speciality the treatment of a simple fracture by closed conservative management may demand as much skill and diligence by one surgeon as a much more invasive technique of greater surgical complexity in the hands of another. One may involve a much longer hospital bed occupancy, the other a much shorter but more intensive high-tech theatre utilisation. And how does one measure human suffering which is an individual attribute? The other common denominator to both these concepts is the word control: whether to go the whole way towards the industrial concept of management by direction with power to prioritise, dictate treatment policies and possibly to hire and fire? Will the new patient's brochure of the Royal Victoria Hospital contain a list of new treatments available, showing it to be at the forefront of modern science with glossy pictures of the staff in white coats listing their special interests and attainments?

In summary, great changes in surgical practice have taken place and will continue to occur. These changes are inevitable and are to be welcomed as the exciting evolution of life on our planet Earth progresses. Science fiction can scarcely be too far-fetched to be truly impossible, except that life on other planets and galaxies seems increasingly unlikely. Our historical and traditional concepts of the lure of surgery — that of great master surgeons dominating their specialities with the breadth and range of their expertise, wisdom and experience, will, it seems, be replaced by the technocrat team member, highly respected for his individual expertise within his narrow sphere. The lore — that which is learned — will invoke very different training patterns embodying management, assessment of cost-effectiveness and computer analysis. Perhaps the keyboard practice will aid manual dexterity as hands-on workshop training augments and possibly supplants the old apprentice system. The Royal Colleges, steeped in the pageantry of history which God forbid we jettison, are alert to these changes and are now radically re-considering the examination structures to meet these changing needs. Let us hope that surgery will not be stultified and lose some of its vital spontaneity and daring by the overlong training now being imposed, with the need for control and audit, and fear of legal consequences. The future lies with you, the students of today, to play your part.

"Tempora mutantur, et nos mutamur in illis".

(Times change, and we change with them).

The Ulster Medical Journal, Volume 59, No. 1, pp. 17–22, April 1990.

Deaths in winter in Northern Ireland: the role of low temperature

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Accepted 14 November 1989.

SUMMARY

Many European countries experience a seasonal excess in deaths each winter compared to summer. The magnitude of the excess is greater in the United Kingdom than in many other European countries. Examination of the data for Northern Ireland indicates that myocardial infarction, respiratory disease and stroke exhibit the greatest increases during winter. Excess deaths from these conditions are closely associated with low environmental temperature.

INTRODUCTION

Many European countries experience a seasonal increase in deaths each winter. A recent study has demonstrated that the British Isles experience some of the largest increases of any European countries.[1] In particular, the Scandinavian countries have much smaller seasonal changes and Iceland experiences virtually none. Although data for Northern Ireland was not analysed separately, when the measure of seasonal mortality (the difference between observed deaths and those which would be expected if the monthly mortality in June to September pertained throughout the year) which was used is applied to Northern Ireland data, the calculated excess winter mortality of 12·9% is similar to that for the UK as a whole (13·1%). The present study seeks to identify which causes of death contribute to the seasonal variation in mortality in Northern Ireland, to examine the association of mortality with temperature, and to review evidence in this and other investigations to determine if the association might be causal.

METHODS

Monthly data relating to the years 1980–1984 were extracted from the annual reports of the Registrar General for Northern Ireland. The data extracted comprised the number of deaths in each of the categories in the A series of the International Classification of Diseases (Ninth Revision), and the average monthly temperatures for the province as a whole. Deaths from cancer and infectious disease were compiled as two separate groups as the numbers of deaths in individual categories were small. The effect of differing lengths of months was allowed for by standardising the number of deaths to a month of 30 days. Seasonality was determined using Edwards' method,[2] which indicates if the pattern of deaths had a seasonal distribution. This method uses the data to generate a sinusoidal curve which represents the seasonal variation, and indicates the date corresponding to the peak of the curve. The use of this technique

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partially overcomes the effect of random month to month variation and the use of months which are arbitrary periods of time. The date of the peak thus calculated may not coincide exactly with the highest monthly total of deaths. The percentage variation in monthly deaths which could be explained by temperature was examined by linear regression of the standardised monthly deaths from each cause against mean monthly temperatures. The percentage was given by $100 \times r^2$ where r is the correlation coefficient.

RESULTS

Seasonal trends

The mean total numbers of deaths each month during the study period for each cause of death are summarised in Table I. There were approximately 300 more deaths from all causes in January than in August, an increase in monthly mortality of about 33%.

When analysed by cause of death there is no evidence of a seasonal trend in deaths from infectious diseases or neoplasms. There is a significant peak in male deaths from mental disorders in early winter but not in female deaths at the same time.

The peak in deaths from myocardial infarction was greatest in mid February. The winter peak was almost 50% higher than the summer level, representing a difference of approximately 100 deaths per month. The calculated peak in deaths from heart failure occurred two weeks later (under the Registrar General's rule 3 governing the attribution of cause of death, if heart failure and myocardial infarction are both mentioned as conditions directly leading to death, the death will be ascribed to myocardial infarction (C Cope, personal communication)).

Although the numbers are small there is a significant seasonal trend in deaths from asthma, bronchitis and emphysema with about 20 deaths per month more in winter than in summer. Deaths from pneumonia are twice as high in winter than in summer, with about 60 additional deaths per month. The calculated peaks in deaths from both respiratory conditions were in late February.

Stroke deaths also showed a 50% increase in winter, representing about 60 additional deaths per month. The calculated peak was in late February, shortly after the peak in deaths from the respiratory conditions. As with deaths from asthma, bronchitis and emphysema this may reflect a considerable variation in seasonal morbidity. There was a seasonal trend in deaths attributed to fractures among both sexes, but the peak among women was in late February and among men was in late March.

Relationship with seasonal change

There is a significant correlation between deaths from all causes and the month of the year. Nearly two thirds (60%) of the variation in total deaths can be explained by these changes, which may be related to temperature. When individual causes of death are considered the association is strongest for myocardial infarction and stroke (Table II).

Deaths from infectious diseases, cancer and fractures were not shown to be related to seasonal changes. In the case of fractures, the peaks were later than for most other conditions, which would be consistent with a situation in which an elderly patient falls and dies from a complication such as pneumonia some time later. The fracture will be recorded as the underlying cause of death. This is

TABLE I

Monthly deaths by cause: Northern Ireland 1980–84

	Diagnosis	Myocardial infarction	Ischaemic heart disease	Heart failure	Stroke	Pneumonia	Asthma, bronchitis and emphysema	Fractures	Mental disorders	Cancer	Infectious diseases	All causes
	ICD-9 A Code	270	27	289	29	321	323	47	21	93, 94, 101, 141	01, 03, 07	
MONTH	January	291	84	31	164	125	30	24	4	100	3	1230
	February	280	78	34	163	135	33	21	3	107	3	1230
	March	287	90	37	151	120	27	18	1	107	5	1246
	April	258	64	29	149	95	26	20	2	92	3	1078
	May	243	67	33	130	81	21	21	1	95	2	1036
	June	224	74	26	128	67	18	20	1	102	3	1016
	July	216	60	22	124	68	15	14	2	91	4	922
	August	195	56	24	107	59	16	13	2	101	2	870
	September	213	61	24	114	65	13	16	4	97	3	916
	October	238	63	24	124	75	20	14	2	102	2	981
	November	246	73	26	122	71	18	17	3	96	3	1024
	December	250	78	30	138	92	21	17	3	102	2	1068
Significance of seasonal trend*												
	Male	0·001	0·001	0·001	0·001	0·001	0·001	NS	0·05	NS	NS	0·001
	Female	0·001	0·01	0·001	0·001	0·001	0·001	NS	NS	NS	NS	0·001

*see text. (p values, NS = not significant). Figures presented are total male and female deaths.

suggested from a re-analysis of the data; for men there is a significant association between deaths from fractures and the mean monthly temperature both two and three months previously ($r = 0{\cdot}324$, $p < 0{\cdot}001$ and $r = 0{\cdot}366$, $p < 0{\cdot}001$ respectively), but this relationship is not present for women.

TABLE II

Variation in monthly deaths from various causes which may be explained by temperature

Code ICD 9A	*Cause*	*Percentage variation explained by temperature* Male	Female
270	Myocardial infarction	58·5 ***	50·1 ***
27	Ischaemic heart disease	14·8 **	10·9 **
289	Heart failure	13·2 **	21·3 **
29	Cerebro-vascular disease	25·4 ***	45 ***
321	Pneumonia	30·7 ***	34·2 ***
323	Asthma, bronchitis, emphysema	25·7 ***	27·5 ***
47	Fractures	21·7 NS	20·0 NS
	All causes	57·9 ***	53·7 ***

** $p < 0{\cdot}01$
*** $p < 0{\cdot}001$
NS not significant

Derived from Annual Reports of the Registrar General for Northern Ireland 1980–84.

DISCUSSION

This paper demonstrates that there is an excess of deaths due to certain causes in winter in Northern Ireland, and that this excess is associated with environmental temperature. Certain criteria are important in distinguishing whether an association is likely to be causal or simply due to chance.[3] Bradford Hill has proposed that they include the following: the association should be strong, consistent, specific, biologically plausible, the proposed cause should precede the effect, and there should be a biological gradient. It is not necessary that all of the criteria should be met, although if most are met the hypothesis that causality exists is strengthened.

The association between low temperature and mortality due to certain causes fulfils these criteria. The association is strong. Deaths from myocardial infarction are 49% higher in January than in August. There is a 53% excess of deaths from stroke.

It is consistent, as studies in different parts of the United Kingdom at different times have demonstrated a relationship between temperature and death rates from cardiovascular disease[4–6] and from respiratory disease.[7] Although low temperature is associated with an excess of deaths from many causes, it is strongly associated with only a few. The seasonal effect on mortality from some of these causes, such as stroke and myocardial infarction, may be indirect and the additional deaths may be due to co-existing chest infections. Anderson and Le Riche[8] have suggested that this is the case with myocardial infarctions in

Canada although Bull and Morton[9] in the United Kingdom and Rogot[10] in the United States dispute this interpretation. If excess deaths were a secondary effect of chest infections one would expect at least a small non-specific seasonal change in all causes of death, but the study by Bull and Morton and the current study have found no seasonal trend among any of the types of cancer examined. In Northern Ireland the monthly variation in deaths from all cancers (representing about a quarter of all deaths) fluctuated by less than 5%, with no seasonal trend. There is also evidence that the severity of influenza epidemics may be related to preceding periods of cold[11] and it has been suggested[12] that the increase in cardiovascular mortality might be due to influenza, but the relationship is inconsistent.[13]

The association between cold and death is biologically plausible. Cardiovascular changes include an increase in systolic blood pressure among normal individuals in winter[14] and among elderly patients exposed to cold.[15] Red cell and platelet counts, and blood viscosity increase after cooling.[16] Respiratory changes include diminished action of respiratory cilia in the presence of cold air,[17] reduced relative humidity causing prolonged survival of airborne micro-organisms,[18] and sleep apnoea due to exposure to cold air while asleep.[19]

Changes in temperature can be shown to precede changes in mortality. It is recognised that the use of figures averaged over a month will obscure many short term and local fluctuations in both temperature and deaths. This will tend to reduce the apparent association and McFarlane has demonstrated the importance of using daily data to indicate the short term relationship between temperature and mortality.[13] Bull and Morton demonstrated that periods of cold precede peaks in deaths from myocardial infarction by 1–2 days and strokes by 2–3 days.[9] Bull also demonstrated that short term changes in temperature and humidity precede increases in deaths from pneumonia.[20] Finally, a biological gradient, as indicated by the correlation between temperature and deaths from certain causes, is observed.

This study suggests that cold has a major effect on mortality in Northern Ireland. Although the routinely published data for Northern Ireland is not sub-divided by age, corresponding data for England and Wales indicate that the elderly are at greatest risk.[21] The increased mortality in winter is widely recognised by health care professionals and by the public, but there are few concerted efforts to combat the problem. Wicks[22] has suggested that the adoption of the definition of hypothermia as a core temperature of less than 35°C[23] has tended to obscure the extent of low temperature related deaths. Most parliamentary questions on this subject tend to ask only about cases in which hypothermia is mentioned on the death certificate despite evidence that cold is implicated in many more deaths. The association of cold with myocardial infarction is now well established but many medical textbooks make no mention of it.

While programmes which lead to a reduction in the seasonal peak may simply lead to the deaths being postponed until later in the same year, it is possible that some of the individuals affected might be enabled to live for several additional years. Cold may be an important cause of premature mortality in Northern Ireland. It may not be coincidental that Northern Ireland has a high rate of both cold related deaths and deaths from myocardial infarction. In a region where large sums of money are spent on the treatment of ischaemic heart disease, some might be spent more appropriately on helping the elderly to conserve heat and providing improved heating and insulation.

I am grateful to Dr K J Collins for helpful comments on the manuscript.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 23 – 29, April 1990.

Hostel placement of mentally handicapped patients in Northern Ireland

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Accepted 6 April 1989.

SUMMARY

All patients discharged to hostels from an 800 bed hospital for the mentally handicapped were studied over a 12 year period. Those whose placement was successful were compared with those who returned to the hospital. Youth and early institutional upbringing were associated with failure of placement. Twelve specific problems were identified by hostel staff and of these aggression, psychosis, absconding and interpersonal difficulties were associated with failure. A worrying trend was that the more modern hostels had a lower success rate and a higher proportion of problems than those which were older and more established.

INTRODUCTION

The policy of discharging increasing numbers of mentally handicapped residents from hospital to hostels within the community has been the subject of controversy (Social Services Select Committee,[1] Kinnell[2]). Particularly worrying are the numbers of patients whose placement in a hostel proves unsuccessful and who must return to the hospital from whence they came. The object of this study is to examine some of the factors associated with these failures of placement.

During the past twelve years, in this part of Northern Ireland, many patients have been discharged into the community from Muckamore Abbey Hospital, which is a large hospital for the mentally handicapped. Patients are given a pre-discharge course lasting for several months, designed to help them cope with life in the community. Some are discharged directly home, to lodgings, to private houses with staff support or staffed group homes, but the vast majority are discharged to hostels. These are seen as stepping stones to future integration within the community. Fourteen hostels were involved: Elliscourt, 505 Antrim Road, Hillhall, Ward House, Glenwood, Lynnwood, Balligan, Greystone, Myrtlefield, Hanna Street, Colinbrook, Breda Park, Redhall and Colgrennan. These hostels had been in use for one to twenty-five years and were scattered over two Area Boards, with a catchment population of one million. Four of the hostels are staffed by Social Services personnel with the rest being staffed by nurses trained in Muckamore Abbey Hospital. All hostels provide individual rooms for their residents.

Ames and Levy[3] point out that hostels vary in the degree of handicap catered for, tolerance level of staff, rate of turnover of residents, size and site. Hostel environments change over the time as the static residents grow older. These

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authors have also grouped patients into four categories: those ready for hostel placement; those who could be prepared in a short time; those who need extensive preparation and those who do not require hostel placement. Important factors identified in the selection of candidates are social maturity, vocational adjustment, capacity for independent action and institutionalization.

Patient variables which influence the success of placement have also been examined by Wing,[4] Kushlick,[5] McDonald[6] and Challis and Shepherd.[7] The large array of assessment tools used to determine the suitability of patients for hostel placement includes — McDonald's Initiative Scale,[6] the Adaptive Behaviour Scale of the American Association of Mental Deficiency[8] and the Handicaps, Behavioural and Skills Interview.[4] Some of these have proved useful in identifying patients who would be unable to cope with hostel living, but little attention has been paid to the assessment of the other side of the equation, hostel environment and the interaction between the resident and this environment. The importance of this is obvious, since the patient may prove unsuitable for one hostel and yet succeed in another.

Shanks, in the Northern Ireland context, examined a group of eleven individuals who had returned to hospital following unsuccessful hostel placement and compared these to a group who had been successfully placed in hostels and had remained there for two years.[9] The two groups were similar in terms of intelligence. The group whose placement was successful tended to be older, contained more females and had more active mental illness, though these results did not reach statistical significance. When the Adaptive Behaviour Scale scores of the two groups were compared they were found to be remarkably similar on all parameters except for anti-social and untrustworthy behaviour. These were associated with failure, indicating the possible importance of subjective factors influencing the success of placement. The present study seeks to enlarge these findings by studying a larger sample and by examining the problem from the perspective of the hospital staff.

METHODS

The sample population included all patients discharged to hostels from Muckamore Abbey Hospital (an 800 bed hospital for the mentally handicapped in County Antrim) between 1972 and 1984.

One hostel was selected at random and each resident was discussed with the member of staff in charge. Twelve problems were identified as causing concern to the hostel staff. These became the basis for a hostel problem check list. The problems identified and included on the check list were: inadequate community skills; inadequate self-care skills; inadequate communication skills; physical disability (including epilepsy); psychoneurosis; deliberate self-injury; absconding; drug or alcohol abuse; aggressive behaviour (physical or verbal); dishonesty (lying or theft); heterosexual promiscuity; homosexual promiscuity; and interpersonal difficulties. This last category of problems was defined as problems with the interaction between the resident's personality and that of other residents and staff irrespective of objective behaviour problems or illness. The check list also included an extra category in which other problems could be recorded.

Each of the 14 hostels was visited in turn and the member of staff in charge was interviewed by the same researcher. This was necessary to ensure that the problems on the check list were clearly understood, while it also provided a

valuable first-hand insight into the attitude of hostel staff towards the hospital discharge policy.

All the residents who had ever been discharged to that hostel from Muckamore Abbey Hospital were discussed in turn. The criterion for unsuccessful placement was that the patient was forced to return to Muckamore Abbey Hospital within one year of discharge. A problem check list was completed on each resident on the basis of information from hostel staff, who were also asked to identify the major reason for return to hospital in those cases where placement failed. The reliability in a study like this is adversely affected by inconsistencies in staffing and the fallibility of the human memory. We attempted to minimise this by interviewing the longest serving staff member, and in most cases we were able to find someone who had been working in the hostel since it opened. In a retrospective study it must be remembered that most observations are coloured by hindsight. The 0·05 level of probability was taken as the level of statistical significance.

RESULTS

There were 185 patients who had been discharged from Muckamore Abbey Hospital to a hostel during the 12 year period. There were 73 males and 112 females. The mean age at sampling was 40 years (SD 12·5). The mean IQ was 62 (SD 8·3). Comparing males to females there was no significant difference in IQ, the females (mean age 41·4) were older than the males (mean age 38·4 $p > 0·03$).

The total population was then divided into 142 whose placement was successful and 43 who failed using the one year criterion, a 77 per cent success rate overall. The mean age of the successful group (41 years) was significantly older than the failed group (36 years). No difference between the two groups was found in the sex ratio, IQ or number of years spent in hospital, but significantly more of the group whose placement failed had spent time in institutional care before the age of nine (Table I).

TABLE I

Differences between successful and failed residents in terms of subject variables

	No.	*%*	*Mean IQ*	*Mean age years*	*Percent female*	*Mean years in hospital*	*In care before age of 9 years*
Successes	142	61%	56·4	41·5	59%	7·2	21·1%
Failures	43	23%	56·2	36·0	65%	6·3	41·8%
			NS	$p < 0·01$	NS	NS	$p < 0·01$

Data fulfilled the criterion for parametric testing and analysis was by Chi squared and students T tests.

Despite the low failure rate problems were common. The mean number of problems per resident was 1·6. The problem check list proved fairly exhaustive in identifying problems as perceived by hostel staff. Of the 290 individual problems identified only three fell outside the 12 specific categories of the check list. The problems fell into three main groups: objective behavioural problems; objective illness and the subjective category of interpersonal difficulties. Some of the hostel

staff felt that this latter category merely reflected a summation of the other problems experienced with that resident, and that difficult behaviour might lead to a negative attitude towards the resident. The 68 patients with interpersonal difficulties were examined as a group. No significant difference was found in the number of objective problems identified in this group compared to the overall sample, which supports the view that interpersonal difficulties is a separate issue not related to illness or behaviour problems. It is an umbrella term covering many different problems each of multifactorial aetiology and in this paper it is not treated as a unitary problem, but used to give some indication of the importance of subjective attitudes.

The presence of problems was significantly associated with failure. At least one problem was identified in only 73 per cent of the successful group compared to 100 per cent of the failed group ($p > 0{\cdot}001$). There was no significant correlation between the number of problems and the percentage of failure ($r = 0{\cdot}3445$). Thus no evidence was found to support the view that the problems identified interact in a cumulative way to influence failure of placement.

Individual problems were identified to determine which of these were associated with failure. Some problems had very low frequencies (drug/alcohol abuse or neurosis) making the results difficult to interpret. Aggression, absconding, psychosis and interpersonal difficulties were significantly associated with failure of placement (Table II).

TABLE II

Failure rates for the specific problems identified

	Problems	*No.*	*Failure rate %*		*This problem stated cause of failure %*
(1)	*Behaviour*				
	Inadequate skills	50	18	NS	33
	Community skills	18	22	NS	25
	Self-care skills	25	12	NS	33
	Communication	22	14	NS	33
	Self-injury	16	31	NS	22
	Absconding	24	50	($p < 0{\cdot}001$)	25
	Drugs/alcohol	11	45	NS	60
	Aggression	45	40	($p < 0{\cdot}001$)	44
	Dishonesty	40	22	NS	22
	Heterosexual promiscuity	25	36	NS	11
	Homosexual promiscuity	15	7	NS	100
(2)	*Illness*				
	Physical	34	21	NS	100
	Psychosis	16	68	($p < 0{\cdot}001$)	81
	Neurosis	6	50	NS	33
(3)	*Subjective*				
	Interpersonal	68	32	($p < 0{\cdot}05$)	51

The problems most frequently identified as causing the patient's return to hospital were homosexual promiscuity, drug/alcohol abuse, physical disability and psychosis. The three problems not identified by the check list were single cases of arson, clothes-ripping and anorexia, and only in the case of arson was this the identified cause of failure of placement.

In the original design of the study the date of discharge from hospital was not recorded, but it became apparent through visiting hostels that patients who were discharged from hospital in recent years were much less likely to succeed in the hostel environment. It was thought that this might be due to the increasing difficulty in finding suitable hostel candidates as efforts are made to reduce numbers in the hospital. If this were the case then recruiting candidates from a decreasingly able hospital population would lead to an exponential increase in failure rates with time. The percentage of failures in each hostel was plotted against the logarithm of the number of years that the hostel had been opened which produced a significant negative correlation ($r = 0{\cdot}54$, $p < 0{\cdot}05$) (Fig). There was a greater negative correlation between the mean number of problems encountered and the logarithm of the age of the hostel ($r = 0{\cdot}67$, $p < 0{\cdot}01$).

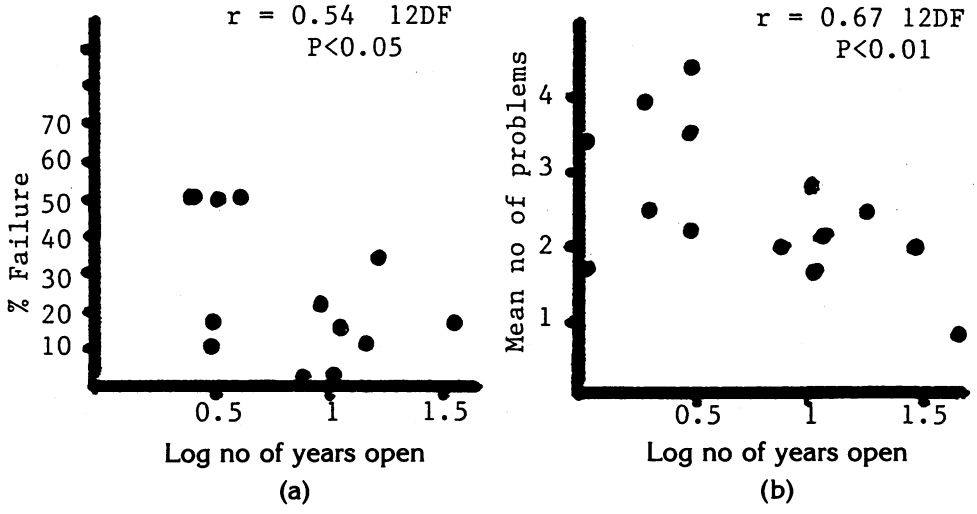

Fig. Scattergrams of the logarithm of the number of years the hostel has been open against (a) the percentage failure of placement and (b) the mean number of problems.

DISCUSSION

The demographic results agreed largely with those of the previous survey,[9] the overall failure rate being 23%. Subject variables found to be significantly associated with failure of placement were youth and early institutional upbringing. Surprisingly there was no significant correlation with the number of years spent in hospital. Many years spent in an institutional environment might have been expected to prejudice chances of successful hostel placement, but the results did not support this theory.

Where a patient was forced to return to hospital, in every case the hostel staff were able to identify a problem which led to failure of placement. Twelve common problems were identified as causing concern to the hostel staff. The subjective nature of some of these problems made them difficult to quantify, but the

presence or absence was recorded for each patient. These twelve problems are comparable to those identified by Challis and Shepherd,[7] which were physical condition, social isolation, behaviour disorder and sexual behaviour.

Of the problems identified by the check list, those significantly associated with failure were found to be aggression, absconding, psychosis and interpersonal difficulties. Only in the case of psychosis was the problem frequently identified by staff as the cause of failure. Other commonly identified causes were drug/alcohol abuse, physical disability and homosexual promiscuity. These problems were not significantly associated with failure yet were often identified by hostel staff as the reason for the patient's return to hospital. It may be that these objective and easily observed behaviours are conveniently used to explain failure in patients with multiple problems. Alternatively these problems may all be potential causes of failure which can only be tolerated under certain circumstances, depending on the attitudes of staff and other residents, and the neighbourhood.

More direct evidence of the importance of subjective attitudes can be found in interpersonal difficulties. Understandably this is the commonest problem. Such difficulties are endemic in any form of communal residence. Although this problem was found to be significantly associated with failure, it was very rarely the identified cause. Perhaps the presence of interpersonal difficulties determined the level of tolerance for the other more objective problems identified. It must be emphasised that these are all problems which have arisen in patients who have already been selected as suitable for hostel accommodation. Possibly the process of transfer to the hostel has precipitated the problems, but an alternative explanation is that the problems were already present in hospital, in which case the present selection process has failed to identify them.[10]

The placement of a mentally handicapped person in a hostel is more analogous to an arranged marriage than to an assessment of capabilities and potential. The interaction between the resident, staff, other residents and neighbourhood is multifactorial and it is difficult to assess objectively. The trial and error approach has the advantage of allowing a mentally handicapped person eventually to settle into a niche which is suitable for him. There are problems however, and the turmoil of changing the environment may precipitate behavioural problems. Repeated failure may demoralise the patient, prejudice staff and lead to resentment of hospital discharge policies by hostel staff. The best method of selection available at present appears to be clinical impression based on a knowledge of both the handicapped person and the range of hostel environments available. This must be based on a careful assessment including individual programme plans, discussion with the patient, the family and the hostel staff.

It has proved more difficult to discharge the established long-stay population than was originally envisaged.[4, 11] One possible reason is that decreasing levels of problem tolerance in the newer hostels has led to more failed placements. The results of this study would not support this view, but suggests that patients discharged in recent years are posing more problems than those placed in hostels ten years ago. Another possible reason is that the older hostels have become miniature hospitals within the community with a stable population of ageing residents. This would be consistent with the lower failure rates seen in these hostels and with the fact that the successful population had a higher mean age at the time of sampling. These chronic hostel residents, with their higher age and lower failure rate, might be the cause of the higher success rate seen in older hostels.

A third possible reason for the exponentially increasing rate of problems seen in the newer hostels is that it may be proving increasingly difficult to find suitable hostel candidates from a decreasingly able hospital population. Future study is necessary to elucidate this by studying the problem rates for each hostel one year after opening and the failure rates for each resident in relation to their date of discharge from hospital. Further research is also required into the other factors of the multifactorial equation influencing the success of placement, including size and location of hostel, staffing levels, staff training and day care facilities.

The higher failure rate found in newer hostels is a cause for concern. The methods used at present in the selection of hostel candidates are not always capable of identifying those whose placement will fail. Perhaps the problems which hostel staff identify as causing failure of placement only become obvious in the hostel environment.

We thank the staff of the hostels involved for their co-operation and Dr Oliver Shanks, Muckamore Abbey Hospital, for his advice and for the use of facilities.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 30–35, April 1990.

Crohn's disease in Northern Ireland — a retrospective study of 440 cases

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Accepted 5 December 1989.

SUMMARY

The incidence of Crohn's disease in the community is thought to be changing, with conflicting evidence for increases, decreases or steady state situations being described. A retrospective study, using strict criteria for diagnosis, for a 16 year period in Northern Ireland demonstrated an increasing incidence of Crohn's disease, with a distribution in the population similar to that described in previous studies.

INTRODUCTION

Crohn's disease has been the subject of many recent investigations with regard to its incidence and distribution, in the hope that epidemiological data will give a better indication of its aetiology and nature. The condition is attracting more clinical attention, both because of the increased awareness of its presence and because it can result in severe symptoms which may lead to grave complications, often in the younger members of the community.

There are conflicting views in the literature about the incidence of this disease with reported increases,[3, 19, 20, 25] decreases[14] and "plateau" situations[9] being described. We previously reported an epidemiological study of Crohn's disease in Northern Ireland for the years 1966–1973,[10] and in a short report highlighted the change in incidence of the disease in the years 1966–81.[11] The purpose of the present comunication is to record the distribution of the disease for a further eight years, and to define the pattern of disease for the total 16 year period 1966–1981. Data were collected by the same method on each occasion, and information from the two periods is directly comparable.

With a numerically stable population in a circumscribed geographical region, Northern Ireland is an ideal area in which to conduct epidemiological studies. Since the mid-sixties more accurate hospital records have become available

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at most of the hospitals, allowing for improved data collection. Throughout the 16 year period under review the histopathology service was centralised in Belfast and Londonderry. Patients have ready access to medical care and hospital investigations within the Province and it has been shown that the vast majority of patients with Crohn's disease eventually present at hospital for investigation and treatment.[1, 3, 5]

METHODS

This investigation was conducted retrospectively by analysis of hospital records. Patients were accepted for inclusion if two or more of the following criteria for the diagnosis of Crohn's disease were present: (a) clinical history of crampy abdominal pain, diarrhoea and weight loss; (b) typical macroscopic findings in the gastrointestinal tract at laparotomy or endoscopy; (c) a definite histological diagnosis on a resected specimen or biopsy material; or (d) characteristic radiological findings present on contrast studies of the small or large bowel.

For the years 1966–1981 the patients were traced by reference to the histopathology and hospital central medical records. The case notes of patients who had a provisional diagnosis of Crohn's disease were examined by one of the authors, after consent had been obtained from the clinician in charge, and data was recorded for computer evaluation. The date of first presentation was taken as the most accurate reference point, since the precise diagnosis was often delayed and in many cases patients were vague about the duration of their symptoms. Patients not resident in Northern Ireland, or diagnosed or treated outside the Province were excluded. A small number of cases was not included, if there was a conflict in diagnosis with ulcerative colitis, or when previously diagnosed Crohn's disease recurred in the study period.

RESULTS

A total of 817 cases with a provisional diagnosis of Crohn's disease was traced. The hospital records of 47 could not be found. There were 440 cases which fulfilled the criteria for diagnosis and inclusion in the study, and these case notes were examined in detail. There were 183 (42%) males and 257 (58%) females (male : female ratio 1:1·4 compared with the male : female ratio in the general population of 1:1·04).[23]

The crude incidence for the 16 year period was 1·83 new cases/100,000/year. (Males 1·57/100,000/year; females 2·12/year). In the first eight year period there were 1·13 affected males/100,000/year and 1·46 affected females/year, a mean incidence of 1·30/100,000/year. In the second eight year period the crude incidence had increased to 1·81/100,000/year for males and 2·85/100,000/year for females, a mean incidence of 2·34/100,000/year. Thus there was an increase by a factor of 1·7 for males and of 1·9 for females, or an overall increase over the original eight year period by a factor of 1·8. Throughout the study period the trend was for an increase in the number of new cases diagnosed annually (Fig 1).

Analysis of the age at first presentation revealed a higher incidence of Crohn's disease in the third decade in both sexes, with female preponderance in almost every decade (Fig 2).

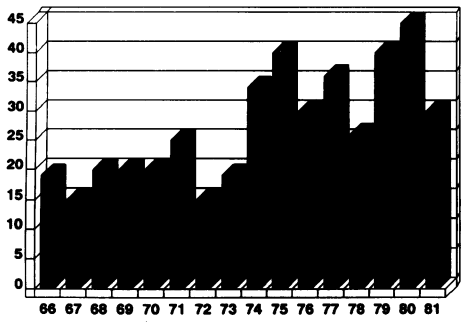

Fig 1. Crohn's disease in Northern Ireland. New cases presenting per year, 1966 to 1981.

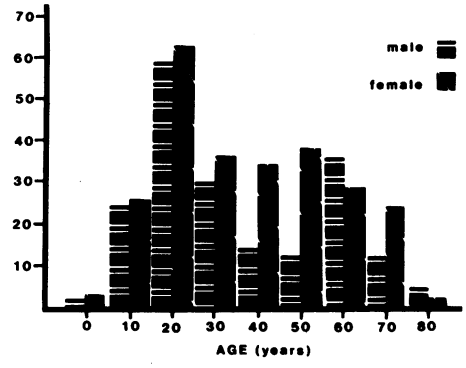

Fig 2. Crohn's disease in Northern Ireland. Age at first presentation in males and females.

Geographical distribution by county is shown in the Table. The observed number of cases of Crohn's disease exceeded the expected number in the Belfast City area and in County Armagh; the expected number of cases being estimated from the incidence rate for the whole Northern Ireland population. When the anatomical distribution of the inflammatory lesion was considered, the small bowel was involved in 143 cases (33%), the large bowel and anus in 178 cases (40%) and there was a combined small and large bowel lesion in 119 cases (27%). Two cases were considered to have duodenal involvement by Crohn's disease and in 9 cases anal disease was the sole site of involvement (2%).

TABLE

Crohn's disease: distribution of 440 cases diagnosed in Northern Ireland 1966–81. (The total population was 1,536,065 in 1971, and 1,507,065 at the 1981 census)

	Population	*Expected cases*	*Observed cases*	*Incidence per 100,000*
City of Belfast	$3{\cdot}6 \times 10^5$	100	178	2·98
City of Londonderry	$0{\cdot}75 \times 10^5$	19	19	1·24
County Antrim	$3{\cdot}56 \times 10^5$	96	88	1·48
County Armagh	$1{\cdot}34 \times 10^5$	23	26	1·09
County Down	$3{\cdot}12 \times 10^5$	91	84	1·84
County Fermanagh	$0{\cdot}50 \times 10^5$	14	12	1·60
County Londonderry	$1{\cdot}13 \times 10^5$	30	10	0·71
County Tyrone	$1{\cdot}39 \times 10^5$	39	23	1·06

DISCUSSION

Retrospective clinical studies are frequently criticised because of inaccuracy in documentation, inadequacy of clinical detail and incomplete tracing of clinical records. In recent years with the use of more standardised medical record systems

and hospital activity analysis, in conjunction with the International Classification of Disease, it is possible to acquire a more complete retrieval of patient information. The personal details about each patient were readily available from admission and identification documentation in the hospital and ward records. It has been assumed that almost all patients with this chronic disease will eventually require hospital care, and only hospital records have been used as the source of information; no community information was sought.

Crohn's disease may well be a new disease of the twentieth century,[12] and it has become apparent following the earlier epidemiological research of Evans and Acheson[6] that the incidence of the disease has been changing. In some areas increases in incidence have been of almost epidemic proportions[20] whereas other reports have suggested a decrease[14] or a plateau type of situation.[9] Problems of definition, and differences in methods of acquiring and recording data have made direct comparisons of the change in incidence difficult, yet there is a need to continue to monitor these changes as this condition tends to affect the younger members of the community and places a heavy and chronic burden on available medical resources. By employing similar strict criteria it should be possible, in the future to audit the incidence in the same location and to compare with similar populations elsewhere.

The clinicians and pathologists in post over the two study periods have been largely unchanged, and we feel that it is unlikely that the condition has simply become more widely diagnosed in later years because of a greater awareness of the colonic manifestations of Crohn's disease. This aspect of the syndrome had already become widely recognised through the writings of Lockhart-Mummery and Morson in the 1960s.[16] Completeness of data collection remains a problem with retrospective studies and in particular with hospital-based data which relates largely to in-patients. However, other investigations of this type show that the vast majority of patients with Crohn's disease eventually require hospital investigation and treatment, including diagnostic radiology and biopsy.[1, 5] It is apparent that the disease tends to be overdiagnosed clinically as seen in the rejection of 377 patients from 817 provisionally diagnosed cases when strict criteria were applied to clinical and diagnostic information. Incomplete patient identification, combined with strict diagnostic criteria may lead to an actual underestimate of the true incidence of the disease in the population. This study indicates that the incidence of new cases of Crohn's disease has almost doubled when the period 1974–1981 is compared with 1966–1973; a similar increase was observed for both males and females, confirming the trend in recent publications.[2, 13, 17] The total number of new cases presenting annually has steadily increased throughout the years 1966–1981, in contrast to the findings of Kyle and Stark[14] and without any evidence of a plateau being reached.[9]

The peak incidence of the disease has again been confirmed in the third decade for both males and females, as recorded originally by Crohn and his colleagues[4] but a further peak in the seventh and eighth decades has also been demonstrated. This bimodal distribution has been discussed previously[7, 8, 12, 19] and the preponderance of females has been a constant feature of many British reports.[13, 15, 17, 21] When the geographical distribution of the cases was considered it was found that there was a predominance in urban dwellers, in agreement with earlier observations in Scotland[13] and in Wales,[18] though latterly such a definite trend was not apparent in northeast Scotland.[14]

The inflammatory lesion was in the small intestine in 33% of cases, in the large intestine in 40% and a combined small and large bowel lesion was observed in 27% of the patients. This is similar to the pattern found in the Blackpool area[15] but with a lesser small bowel involvement than that reported in Clydesdale[24] and northeast Scotland.[13]

From this study it would appear that there is a definite increase in the incidence of Crohn's disease in Northern Ireland, which is consistent with the trend reported in other regions of the British Isles, and the distribution suggests an urban predilection. Our initial findings on the incidence of Crohn's disease in Northern Ireland[10] have been confirmed and it is clear that this disease is not rare in the Irish and continues to have a similar distribution to other regions in these Islands.

The authors wish to acknowledge the assistance rendered by clinical colleagues in Northern Ireland who allowed access to data about their patients and to the pathologists who made their records available. Thanks are due to Mr James Dempsey for photographic assistance and the Mrs Rae Gallea for preparing the manuscript.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 36 – 40, April 1990.

Wound sepsis in 10,000 surgical patients

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Accepted 10 August 1989.

SUMMARY

A twelve year prospective wound audit was undertaken in an academic surgical unit. Data from 10,000 operations were analysed. Overall, wound infection rates decreased during this time. Infection rates in contaminated wounds in particular fell from 19·2% to 4·7%. This decrease in wound infection may be related in part to a change in the antibiotic prophylactic regimen and in part to the institution of the wound sepsis audit which provided regular information on the unit infection rates. This audit permitted early detection of adverse trends, and may have had a direct influence on surgical techniques.

INTRODUCTION

Since the late nineteenth century hospital-acquired surgical wound infection has presented a serious and continuing problem. Infection occurring as a post-operative complication in surgical patients increases discomfort, morbidity, debility and is occasionally life threatening. The side effects of using antimicrobial agents, and the increased cost associated with infection in terms of prolonging hospital stay must also be considered.[1]

The true incidence of wound infection in surgical practice has been difficult to determine for many reasons. There is variation in the criteria for definition of wound infections and types of wounds studied; some reports have included all types of wounds or operations as one category whilst others have used separate and indefinite categories. Comparison between different hospitals is therefore difficult.

This study began as a prospective wound audit, and criteria were set for wound type and wound infection. During the 12 year period of the study two different therapeutic and prophylactic antibiotic regimens were in use, and some comparison between these regimens has been possible.

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METHODS

A prospective audit of wound sepsis in the professorial surgical unit at the Royal Victoria Hospital, Belfast, was commenced in January 1974. The unit covers a wide range of general surgery.

A wound was considered infected if it discharged pus. Wounds with serous or non-purulent discharge were considered infected only if a culture was positive. Even if no organisms were cultured or seen on gram staining of the discharge, the wound was considered to be infected when associated signs of increased local temperature, marked erythema or induration were present. Wounds with sepsis around a suture and wounds in which dehiscence occurred were considered to be infected. The number of individual patients rather than the number of individual wounds were counted. Thus, a patient with multiple wounds was considered as one event.

Surgical operations were classified according to the criteria of the American National Research Council,[2] except that contamination from perforated viscera due to disease or trauma was included in group 3.

Class 1. Clean wound. Non-traumatic wound, genitourinary or gastrointestinal tracts not entered.

Class 2. Potentially contaminated wound. Non-traumatic wound, entry into the respiratory, genitourinary and gastrointestinal tract has occurred but with no or minimal spillage of contents.

Class 3. Contaminated wound due to trauma or disease. Pus or spillage of viscous contents encountered.

Primary septic conditions, such as a pre-existing abscess requiring incision and drainage, were excluded from the survey as the open wounds through which pus continued to drain were inevitably infected.

Routine follow-up of patients was undertaken approximately six weeks after leaving hospital. Patients who gave a history of having had a wound discharge, or significant problems with the wound which could be attributed to infection, subsequent to leaving hospital were recorded as positive for wound infection within the study. Infections not related to the wound area were excluded.

For colonic surgery a regimen of low residue diet, laxatives, colonic washouts and peri-operative antibiotics was maintained throughout the study period. No stipulations were made regarding the method of wound closure. Wound surveillance in hospital was done on a daily basis by the senior house officer or surgical registrar under the supervision of the consultant surgeon. The four surgeons in charge remained the same throughout the duration of the study and no attempt was made to classify the results according to the grade of operator. At a monthly sepsis meeting infected cases were discussed which provided an opportunity to review individual cases, as well as the overall results which were subsequently collated on a yearly basis within the unit.

No prophylactic antibiotics were used for patients in the clean category. For some groups of patients in the potentially contaminated group, prophylactic anti-microbial regimens were used for three doses over a 24 hour period. For patients in the contaminated category a therapeutic regimen was generally maintained for five to seven days.

In the period 1974–1979 the two antimicrobial agents which were mainly used were co-trimoxazole and metronidazole separately or in combination. In the 1980–1985 period metronidazole continued to be used while cephalosporins (mostly cefuroxime) was substituted for co-trimoxazole. Metronidazole was given intravenously except in patients with appendicitis in whom it was given rectally by suppository. The co-trimoxazole and cephalosporins were given intravenously.

RESULTS

During the period of the study 10,000 operations were performed. There were 5,932 clean wounds of which 159 (2·7%) became infected. The infection rate was 8·7% in the 3,211 potentially contaminated cases, and 9·8% in the 857 contaminated patients.

The periods 1974–9 and 1980–5 were analysed separately. There was an increase in the total number of operations performed in the second period due primarily to an increase in the number of clean operations, from 51·0% to 66·5%. This represents an increasing interest in breast surgery in the unit during the period of the study. The percentage of potentially contaminated cases declined from 42% in the 1974–9 period to 23% in 1980–5.

TABLE

Analysis of wound infection in 10,000 patients from 1974 to 1985

	1974–1979		*1980–1985*		*Total*	
	Number	*Infected (%)*	*Number*	*Infected (%)*	*Number*	*Infected (%)*
Clean	2369	71 (3·0)	3563	88 (2·5)	5932	159 (2·7)
Potentially contaminated	1970	165 (8·4)	1241	115 (9·3)	3211	280 (8·7)
Contaminated	302	58 (19·2)	555	26 (4·7)	857	84 (9·8)

The incidence of infection within each class of operation is shown in the Table. The overall incidence of wound infection for the two periods was 6·3% (1974–9) and 4·3% (1980–5) but this difference was not statistically significant. In the clean group (Class 1) the infection rates of 3·0% (1974–9) and 2·5% (1980–5) were similar. In the potentially contaminated group (Class 2) the infection rate was 8·4% for the 1974–9 period and 9·3% during 1980–5. In the contaminated group (Class 3) there was a significant fall in the incidence of infection from 19·2% in 1974–9 to 4·7% (1980–5) ($p < 0·2$, chi squared test).

DISCUSSION

The main purpose of this prospective study was to function as a wound audit on a large number of patients undergoing a wide spectrum of operations. It was not a controlled study in the use of antibiotics but we do feel that it gives an overall view of the incidence of sepsis which may be expected in a general surgical unit. A clear definition of infection was established and agreed prior to commencing. Over the period of the study the patients were under the care of only four consultant surgeons, but there were a considerable number of registrars and senior house officers involved in patient management. A detailed analysis of the grade of operator was not undertaken, the choice of suture material was not defined, and subcuticular sutures were seldom used.

The overall wound infection rate of 5·3% compares well with the results of other large series. Overall infection rates in the range of 3·0% to 12·0% have been reported in many series. Olson et al[3] from Minneapolis reported a low overall infection rate of 2·8%. The clean wound infection rate of 2·7% also compares favourably with results from other centres. Cruse and Foorde[4] reported a rate of 1·5%, Burns and Dippe[5] 2·5%, and Leigh[6] 2·9% in clean wounds. When the two six-year periods are compared (1974–9 and 1980–5) the clean wound infection rates of 3·0% and 2·5% are not significantly different. We would not have anticipated any marked change in incidence but there was a gradual fall throughout the period of the study, and we feel that our figures are reasonably accurate in view of the late surveillance of wounds at six weeks after discharge. Rosendorf et al[7] have emphasised the importance of post-discharge wound surveillance on reported infection rates.

In the potentially contaminated group various prophylactic antibiotic regimens were used, particularly in colorectal surgery. From 1974–9 metronidazole with or without co-trimoxazole was the main choice. The wound sepsis rates of 8·4% and 9·3% are at the lower range of that generally expected for a potentially contaminated group where rates of 8·0% to 29·0% have been reported.[8] It has been consistently shown that prophylactic antibiotics are most useful in this group,[9] but our investigations did not show any definite advantage for the use of a cephalosporin in comparison to co-trimoxazole.

In the group of contaminated wounds a therapeutic regimen of two drugs was used, the antibiotics being given at the time of surgery and continued for five to seven days. A considerable reduction in wound infection, from 19·2% in 1974–9 to 4·7% in 1980–5 would seem to indicate the superiority of cephalosporins used during the second six-year period. The infection rate of 19·2% in the first period was slightly higher than that reported elsewhere (8·8% to 28·4%).[9] The rate of 4·7% for the second period is extremely low. There are two possible reasons for this marked reduction in infection rate — that the change from co-trimoxazole to cephalosporin was more effective in the therapeutic than in the prophylactic regimen, or that the very presence of the monthly wound audit has had some cumulative effect on the reduction of infection in all three categories, most significantly in the contaminated group. We have not recorded the frequency with which abdominal lavage was undertaken throughout the period of the study, nor the nature of the contamination.

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Contributions towards the cost of publishing the Ulster Medical Journal have been made by:

Royal Victoria Medical Staff.
Royal Group of Hospitals Trust Funds.
Northern Ireland Council for Postgraduate Medical Education.
Ulster Hospital, Dundonald.
British Medical Association (Eastern Division).

The Ulster Medical Journal, Volume 59, No. 1, pp. 41 – 45, April 1990.

Conductive education for physically handicapped children: parental expectations and experience

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Accepted 12 December 1989.

SUMMARY

Conductive education, an educational approach devised by Andras Petö in Hungary after the second world war, has attracted considerable media attention. Eight Northern Ireland families who recently had treatment for their disabled child at the Petö Institute in Budapest were identified. Six families returned postal questionnaires designed to look at parental experience of conductive education. An improvement in existing local services, as opposed to the wholesale introduction of this facility was the commonest parental hope for future provision for physically handicapped children.

INTRODUCTION

Parents of handicapped children want the best possible treatment available and anything which offers a glimmer of hope will be explored. In recent years treatment offered to the disabled in general has been highlighted, partly because official reports have focused attention on the size of the problem and the poverty of resources, and partly because alternative treatments which are seen to offer more hope and promise have gained significant media attention. Conductive education, a Hungarian educational philosophy, is one such alternative approach. This method, devised by Andras Petö after the second world war, holds that the effects of motor disorders (mostly cerebral palsy, spina bifida, Parkinson's Disease, and stroke) can be overcome by appropriate educational input. The disabled child and adults must want to learn, to set their own goals, and to find their own way of overcoming the dysfunctioning nervous system with a view to gaining sufficient control to function independently in the able-bodied world.[1] This whole process depends on a close, inter-personal relationship between the special teachers (called conductors) and the taught, and on the motivational force generated within the group.

In order for a Northern Ireland child to have access to conductive education, parents incur considerable expense and families are separated for prolonged periods so that the child can be enrolled in the Institute for Conductive Education in Budapest. At present it is estimated that about sixty children have gone from Northern Ireland to Hungary for assessment at the Petö Institute and a similar number have gone from the Republic of Ireland. Against this background I sought to evaluate parental experience of conductive education, and of local services, in a group of children with physical disabilities.

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METHODS

The parents of eight school or pre-school children resident in Northern Ireland known personally to me, who had been to the Petö Institute for treatment, were sent a postal questionnaire. This was designed to examine their experience of local resources, conductive education, and their opinions about the future development of services for handicapped children.

The children (4 male, 4 female) varied in age from three to seven years (mean 5 years 6 months). Seven had cerebral palsy (six tetraplegic, one athetoid) and one a developmental brain abnormality (Joubert syndrome). Two of these eight children had epilepsy, three were mentally handicapped (two of them profoundly) and seven had a communication disorder (five general delay, one articulation disorder and one severe expressive disorder).

Four were in schools for the physically handicapped where they received daily therapy, two in schools for children with severe learning difficulties, one in an ordinary nursery and one had not yet been placed in nursery. Seven of the eight children had major difficulties with walking (they could not walk across a room even with aids). After conductive education, for a period of time varying from two months to two years, carried out daily both in Hungary and on returning to Northern Ireland, six of the eight had continuing major walking difficulties. The child who made most progress had motor delay associated with the Joubert syndrome rather than cerebral palsy. Five of the families planned to return to Hungary for further conductive education and one was undecided. At present the parents of five of the six children with continuing major walking difficulties do not regard conductive education as the sole treatment required. The two children with associated profound mental handicap no longer attend the Petö Institute routinely and three of the remaining four have asked for referral to other centres using different treatment approaches.

RESULTS

Replies to the questionnaire were received from six of the families. The families of the children with profound mental handicap have talked to me about their time at the Petö Institute, but did not return the questionnaire. The families were asked how they first heard about conductive education, how they subsequently gathered more information about it, why they felt this method might be helpful for their child, what they considered to be the most valuable elements in the system, and what problems the child or the family encountered. All had heard about conductive education from television or radio and in five of the six the BBC documentary "Standing up for Joe" (April 1986) was the initial source of information. Additional information was gleaned from one of the pressure groups for conductive education (5), Television/Radio (3), or from newspapers, relatives or friends, or other professionals.

Parental expectations, and attitudes to conductive education at the Petö Institute included positive thoughts on the intensity of the process (5), the value of group work (2), access to further treatment (2), consistency and integration of approach (2). Negative aspects included the separation of the child from its mother during the process (5), and the further separation from the rest of the family (3). (Table I).

At the Petö Institute conductive education is organised in such a way that five of the six parents were not routinely with their child during treatment time. The parents were asked on a scale of 1 (unsatisfactory) to 5 (excellent) to score the

quality, support, accessibility and help gained in understanding their child's diagnosis, for therapy which they have received both locally in Northern Ireland and at the Petö Institute (Table II). In addition to the initial assessment, five had been for treatment at the Institute on two occasions, and one on one occasion (range 4 to 12 weeks, mean 9·3 weeks). Of six different developmental areas examined, parents felt that conductive education was most helpful in developing independence skills and physical progress, and least helpful in the speech and language, and educational spheres. The quantity of local therapy varied from a parental statement of "no therapy of any kind here for almost a year, and the situation hasn't changed very much to date" (two children) to daily therapy (four children in schools for the physically handicapped).

TABLE I

Attitudes and expectations among six Northern Ireland parents whose children had received conductive education at the Petö Institute

Positive	*Negative*
Intensity (5)	Separation for child or mother (5)
Group work (2)	Separation for rest of family (3)
Access to more treatment (2)	
Consistency of approach (2)	
Pleasant atmosphere/hard working conductors (1)	

TABLE II

Mean parental scores (from 1 unsatisfactory to 5 excellent) for four aspects of therapy for physically handicapped children offered locally in Northern Ireland or at the Petö Institute, Hungary

	Local therapy (Northern Ireland)	*Conductive education (Petö Institute)*
Quality	3·4	4·7
Support	2·6	4·2
Understanding condition	2·5	4·2
Accessibility	2·7	2·7

Parents were asked about their hopes for the future in relation to local services, and about the introduction of conductive education. Four of the families had no comment to make, two felt that the whole system should be introduced, and one felt that the introduction of any aspect of conductive education into the present system would be helpful. Other comments included the need for more services for handicapped children in general (5), more group work (3), better integration of therapy and education (2), improved parent-therapist liaison (2) and more integration of handicapped children into the local schools (1).

DISCUSSION

The treatment for children with physical disabilities attending the Petö Institute, Budapest, or one of the Child Development Centres or special schools in Northern Ireland would aim through comprehensive programmes to ensure maximal physical function, self-care, and independence with a view to integration into local schools. The Hungarian system of conductive education is based on an educational model, and considers the neurological condition less as a pathological consequence and more as a dysfunction which can be overcome by structuring the child's total learning environment. The conductor, who is the key person, has had a four year training which allows her to deal with all aspects of the disabled adult or child's life. The Western model, by contrast, has been seen by some as confusing and fragmented [2] due to the involvement of a number of professionals who bring different specialist skills to a multi-disciplinary team which aims to provide an integrated educational and therapeutic input for child and family.

Research studies on different treatment approaches to cerebral palsy have failed to show the superiority of one method over another. In the early 70's the principles of conductive education were introduced into some British schools, initially in Bristol and later at one of the Spastics Society residential schools, Ingfield Manor. A series of studies carried out by the Institute of Education failed to show any advantage of conductive education over the conventional approach.[3] Unfortunately the opportunity for early evaluation of 'pure' conductive education and other treatment methods has again evaded us: the Hungarian conductors working with the Birmingham Institute from 1987 selected a group of children with cerebral palsy who fulfilled their criteria of suitability but there was no agreement for a controlled trial of conductive education and equally credible alternative approaches. The Government at that time had set aside £326,000 for evaluation of conductive education before it responded to demands from pressure groups for its wholesale introduction. At present, information available to parents on conductive education has come largely from the media. The BBC documentary 'Standing up for Joe' was the major force in sending five of the six families represented in this paper to Budapest.[4] The inadequacy of United Kingdom resources for the disabled has been highlighted by reports such as that of the Royal College of Physicians on physical disability in 1986 and beyond. This found that many services for disabled adults were lacking, and referred to them as a "deprived population" able to call on few specific facilities.[5] The present study of disabled children shows that conductive education and all the difficulties attendant in travelling to a foreign country were faced because of "the lack of services and therapy here which has forced myself and other mothers to seek help elsewhere resulting in long separations from family and friends", (parent).

Conductive education has been seen by the media and by parents as being very positive and as offering renewed hope, whereas professionals in the West have been accused of conveying negative expectations of what a child may be capable of doing.[6] The ethos of conductive education aims to be positive and this is conveyed by the conductors and captured by the parents and children. The parents report gains in their child's development in response to the intensive approach, especially in physical development and independence skills. Speech and language skills and educational input were considered to be satisfactory but were less highly rated. Considering English is a second or third language for the conductors this is not surprising. Some speech therapists in the United Kingdom have major concerns about the ability of conductive education to help the more

difficult communication problems associated with cerebral palsy.[7] The parents however feel that with the conductive approach they are receiving satisfactory help for their children in an environment which supports the parents themselves, helps them better understand their child's condition, and is as equally accessible as their home treatment centre, despite being many miles distant from home. The group is a central part of conductive education and it is here that the motivating force for a child's achievement is generated. For parents, informal groups of "foreign" mums and dads battling against the Hungarian language, the strange food, the loneliness and separation emerge, and are a source of strength and information about motor disorders and conductive education, as well as the more practical necessities related to survival in an Eastern European country.

Conductive education is not new. What is new is the recent interest which the media have focused on this method of treatment, and the new face of Hungary under the influence of "glasnost". A determined and articulate lobby has arisen in the United Kingdom to promote the conductive approach. While we wait to see whether it is either desirable or feasible to introduce it we need to know that the government will adequately fund our existing services, to the same extent that it appears willing to support the new International Centre for Conductive Education in Budapest.[8] If that were the case we could expect a multi-million pound financial injection for our services for the disabled. The experience of parents needs to be recognised, and for many their contact with the Petö Institute has been seen in a positive light. As a result of this, local professionals are being asked to modify some of their existing practices. As we consider the place of more group work, the need for continued close parent/therapist liaison and improved integration of education and therapy, we will continue to ensure that our counsel for these families contains hope which is undergirded with reality.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 46 – 50, April 1990.

The role of emergency venography in the diagnosis and management of deep venous thrombosis

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Accepted 14 November 1989.

SUMMARY

A retrospective study of patients who had undergone venography for suspected deep venous thrombosis during a six month period was undertaken to assess the influence of the examination on the subsequent management. Of these patients 38·6% had evidence of thrombus confirmed by the examination. This figure is comparable with other published results and did not bear out the impression that too many negative venograms were being obtained. Objective diagnosis of deep venous thrombosis is essential to ensure safe and cost-effective management. Other techniques have been advocated for the diagnosis of this condition but all have significant disadvantages compared with venography.

INTRODUCTION

The clinical diagnosis of deep venous thrombosis is highly inaccurate: thrombi are present in only half of the patients in whom the diagnosis is suggested by signs and symptoms,[1-3] while up to two-thirds of thrombi are clinically silent.[1,3] Some objective method of investigation is therefore necessary to ensure accurate diagnosis and permit appropriate management in this common but potentially life-threatening condition.[2] Venography is now generally regarded as the "gold standard" in the diagnosis of deep venous thrombosis.

This results in a large number of requests for emergency venograms, a high proportion of which reveal no abnormality, and many radiologists feel that too many such requests are made.[4] We therefore decided to review our experience of venography in the investigation and subsequent management of clinically suspected deep venous thrombosis over a six month period.

MATERIALS AND METHODS

The names and radiological reports of all patients who underwent venography in our department during the six months June to November 1987 were retrieved from the computerised departmental reporting system. All venograms were obtained by injection of water-soluble contrast into one of the dorsal veins of the foot.[5] The case notes (if available) were reviewed for each case and those patients who had undergone venography for indications other than suspected acute deep venous thrombosis were excluded from the study. Age, sex, referral source,

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interval between request and examination, result of venography and subsequent management were obtained.

RESULTS

During the six months 140 venograms were performed on 137 patients (three repeat examinations); the case notes were available for 119 patients. Of these 119 patients, 88 had presented with a suspected deep venous thrombosis. The remaining 31 patients (6 males, 25 females) had undergone venography for other indications such as varicose veins or the post-thrombotic syndrome. There were 41 males and 47 females, age range 12 to 92 years, (average 56·2 years). Evidence of acute thrombosis was reported in 34 patients (23 males, 11 females), 38·6% of the study group. The venogram was considered to be normal in the remaining 54 patients (18 males, 36 females). The hospital department from which each case was referred and the results of venography are recorded in the Table.

TABLE

Venograms performed for suspected deep venous thrombosis from different hospital departments

	Accident and Emergency	*Surgical in-patients*	*Surgical out-patients*	*Medical in-patients*	*Medical out-patients*	*Total*
Positive	2	14	1	17	0	34
Negative	20	15	0	18	1	54
Total	22	29	1	35	1	88

Of the 54 patients with no radiological evidence of thrombus, 21 were attending either the casualty or out-patient departments. Of these 21 patients, 20 were not admitted following venography, only one being admitted for bed rest and elevation of the swollen leg. A further two in-patients were discharged once a thrombosis had been excluded. In seven patients, anticoagulation had been commenced prior to venography and was ceased as consequence of the result. Four patients with negative venograms were considered to be at high risk and were commenced on prophylactic anticoagulation, and two were given a therapeutic course of anticoagulation despite a negative venogram — one of these patients had fractures of the tibia, fibula and femur, and while no thrombus was evident on venography there was compression of the popliteal vein and extravasation of contrast — the other patient had had two previous episodes of thromboembolism.

Positive venograms were obtained in two out-patients who were subsequently admitted for anticoagulation. Of 32 in-patients with positive venograms, eight had been commenced on anticoagulation prior to venography and this was continued after the examination. In a further 22 patients anticoagulation was commenced as a consequence of the venographic findings and in addition two patients had inferior vena cava filters inserted following episodes of pulmonary embolism. Fifty patients (56·8%) underwent venography on the day it was requested and a further 19 (21·6%) the day after the request. A delay of two to seven days occurred between request and venography in 14 patients. In five cases the date of the request had not been satisfactorily recorded in the notes. None of the patients had any complications attributable to the examination recorded in their case notes.

DISCUSSION

Only 38·6% of patients presenting with a suspected deep venous thrombosis had evidence of thrombosis confirmed by venography, which is comparable with other published results: Charig and Fletcher[4] found an incidence of 45·8% (55 of 120) in a prospective study of patients referred for emergency venography while Hull et al[6] reported positive radiographic findings in 42% of patients (201 of 478) presenting with a first episode of clinically suspected deep venous thrombosis. Ramsay[2] reported an incidence of 31% in patients presenting to general physicians. Our results would tend not to bear out the impression that too many venograms were being performed.

Negative venograms were obtained in a relatively high proportion of patients referred directly from the accident and emergency department. This presumably reflects the tendency of casualty officers to admit those patients with more definite clinical evidence of deep venous thrombosis without first obtaining a venogram. The majority, if not all, of these patients would have subsequently undergone venography as medical in-patients.

This retrospective study confirms the central role of venography in the management of suspected deep venous thrombosis. In all but one case the subsequent management of the patient was significantly influenced by the result of the venogram. If the venogram was negative, the very considerable risks of a course of therapeutic anticoagulation[7-10] could be avoided. In addition the duration of some in-patients' stay in hospital could be dramatically shortened, and admission of out-patients avoided. One patient who had a previous history of thromboembolism received a course of therapeutic anticoagulation despite a negative venogram, but the reason for this decision was not recorded in the notes. Venography identifies at least 95% of clinically significant thrombi[2] and it is generally agreed that it is safe to withhold treatment if the venogram is negative.[1] In all cases where the venogram indicated the presence of thrombus, the appropriate treatment was promptly instituted. These results clearly demonstrate the benefits of venography both in terms of cost-effectiveness[6] and in avoiding the risks and inconvenience of an incorrect diagnosis.

Venography is not without its problems. The procedure can be unpleasant for the patient, is not without risk and can consume a considerable amount of the radiologist's time. Common complications include local discomfort and allergic reactions during the examination, and thrombosis[11] may subsequently develop. These risks may be reduced by the use of low osmolality contrast[12-13] but this adds significantly to the cost of the examination and is not used routinely in this department in the interests of economy.

Is there a satisfactory alternative to venography? Several other techniques have been advocated for the diagnosis of deep venous thrombosis. Liquid crystal thermography is a quick and non-invasive screening test which has a sensitivity of 97% and negative predictive value of 96·5%.[14] The specificity is however rather low at 62% and all patients with a positive thermogram must undergo venography to identify the false positives. Real time B mode ultrasound scanning is a sensitive technique for detecting thrombus in the femoro-popliteal segment but not in the calf or iliac veins.[15] Ultrasound does however have the advantage that it may demonstrate other conditions which mimic a deep venous thrombosis such as a ruptured Baker's cyst or haematoma.[16] The ^{99m}technetium venoscan is unable to detect thrombi above the mid-thigh where they are obscured by blood

in the large veins and radioactive urine in the bladder.[1] The technique is slow to produce a result, and it may be equivocal in a significant number of cases.[17] Impedance plethysmography lacks specificity[18] and is blind to calf thrombi.[19] Blood tests for products of coagulation or accompanying fibrinolysis also lack specificity.[1]

All of the alternative methods of investigation in suspected deep venous thrombosis may have significant disadvantages. Venography remains the "gold standard" and is clearly superior to all other techniques in demonstrating the exact anatomical extent of the thrombus. This being the case, is there any way to reduce the number of cases being referred for venography? Given the non-specific nature of the signs and symptoms, yet potentially life-threatening nature of the disease this seems improbable. It is reasonable to avoid venography in those patients whose subsequent management will not be influenced by the result. We would therefore suggest that venography should not be performed on those patients in whom the clinician would be unhappy to discontinue anti-coagulant therapy despite a negative venogram, or if the risk of treatment exceeds the risk of thromboembolism (for example in patients over 90 years of age who run a considerable risk of a cerebrovascular accident or haemorrhage from an occult neoplasm if anticoagulated).[4]

We would like to thank Miss Ruth Dilly for her assistance in the preparation of this manuscript.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 51 – 54, April 1990.

A clinicopathological review of spinal ependymomas in Northern Ireland

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Accepted 22 November 1989.

SUMMARY

Of eighty-three tumours of ependymal origin diagnosed in the twenty years 1969 – 1988 in Northern Ireland, fifteen were located within the spine. Two were in children, 13 in young adults with a mean age of 33 years. 70% presented with back pain and 60% had weakness of the lower limbs. Survival was found to correlate well with histological grading (WHO classification). The mean time of survival for tumours graded 1/2 was six years; there were three long-term survivors of 13, 17 and 18 years; 90% of the patients survived 2·5 years.

INTRODUCTION

Ependymomas arise from the cells lining the cerebral ventricles and the central canal of the spinal cord. There is a very wide variation in the proportion of cases reported as arising from the spinal cord. In most series, the vast majority of ependymomas arise within the cranial cavity, especially in children, and only a small proportion are of spinal origin. Clinicopathological series with large numbers of patients usually emanate from tertiary referral centres and therefore may not reflect the true geographical distribution of these tumours in a defined population. The Departments of Neurological Surgery and Neuropathology at the Royal Victoria Hospital, Belfast provide the regional services for the 1·5 million population of Northern Ireland, so that all cases diagnosed as ependymoma will pass through one or both of these departments.

MATERIALS AND METHODS

The frequency of occurrence of spinal cord ependymomas from 1 January 1969 to 31 December 1988 was found from the records of both departments. There were 83 tumours of ependymal origin of which 15 (18%) were in the spinal cord. The clinical and neuropathological material presented is taken from those patients whose diagnosis was confirmed as spinal cord ependymoma on histopathological review. Operative death was defined as occurring within 30 days of a surgical procedure. Follow-up was determined up to 31 December 1988, in some instances by contact with the patients' general practitioner.

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RESULTS

There were 15 ependymomas of the spinal cord or cauda equina. Age at diagnosis ranged from 5 to 58 years, mean 33 years. Only two children were identified, aged 5 and 13 years. There were nine male and six female patients, male/female ratio 1·5 : 1.

The commonest complaints were low back pain in 11 (73%), and weakness of the lower limbs in five (33%). On examination nine (60%) had lower limb weakness. A long delay from symptom onset to establishment of the true diagnosis was not uncommon, varying from one month to 12 years (mean 2·5 years).

Myelography was the principal diagnostic investigation, in recent years replaced by computerised tomography with myelographic enhancement (CT myelogram). In all cases decompressive laminectomy was performed, total removal of the tumour being achieved in six patients (40%). In one instance, only a tumour biopsy was possible and this patient died three weeks after surgery, the only operative death in the series. Seven patients received postoperative radiotherapy because tumour removal was incomplete. In four there was subsequent tumour recurrence necessitating a second operation; two of these had received radiotherapy. The mean time from primary diagnosis to recurrence was 13 months, range three to 33 months.

Neuropathology

Nine tumours (60%) were variously distributed within the spinal cord; six (40%) were confined to the conus, cauda equina and filum terminale. One tumour stretched from the cervical region to the conus (Table I).

TABLE I

Anatomical location of 15 spinal ependymomas diagnosed 1969–1988

Cervical	1
Thoraco-lumbar	3
Lumbar	4
Cervical to conus	1
Conus	2
Cauda equina	3
Filum terminale	1

Routine haematoxylin and eosin staining was sufficient to confirm the diagnosis in most cases, which were well differentiated with regular features. Immunohistochemical staining for glial fibrillary acidic protein (GFAP), and electron microscopy were used to confirm the ependymal nature of the poorly differentiated examples. Histologically, most were well differentiated with a regular cellular pattern and cytological features indicative of low malignant potential. The tumours were graded according to the World Health Organisation system.[1] This grading correlated well with survival times. Of the two tumours classified as Grade III, one survived 2·5 years. One very poorly differentiated tumour was assigned to Grade IV, and came closest to the concept of a primitive neuroectodermal tumour (PNET) (Table II).

TABLE II

WHO classification: correlation with survival

Grade	*No of patients*	*Outcome*	*Survival (years)*
I	4	All alive	2·5 — 17·0
II	8	1 dead*	2·5 — 17·5
III	2	1 dead**	1·5 — 2·5
IV/PNET	1	1 dead	postoperative death at 3 weeks

*Death unrelated to tumour.
**Death related to tumour.

All of those patients whose tumour was classified histologically as Grade I were alive and well on 31 December 1988. One with a Grade II tumour had died three years after surgery from an unrelated cause (confirmed by autopsy). In addition to the postoperative death one other patient with a Grade III tumour had died one and a half years after treatment.

DISCUSSION

The incidence of spinal ependymomas as a percentage of all ependymomas during the 20 years of this study was 18%, which represents the incidence of this condition in the population in Northern Ireland. Four patients were diagnosed in the first decade and eleven in the second which suggests a rising frequency although the numbers are small. In a national survey from Norway, Mork and Loken[2] reported that spinal tumours represented 53% of all ependymomas, Ilgren et al[3] reported a proportion of 41% from Oxford, and Barone and Elvidge[4] from Montreal found 37%. In common with other studies,[2, 3, 4, 5] we found that children rarely developed spinal ependymomas and that the mean age at the time of diagnosis was 33 years. The male : female ratio of 1·5 : 1 is comparable with that found in other series.[6]

Predictably, most patients presented with back pain, usually in the lumbar region, together with lower limb weakness and a vague sensory loss below the level of the tumour. Because of the slow growth of the tumour, delays in making a diagnosis were common, as long as 12 years. Cooper and Epstein[7] record a mean duration of symptoms of ependymoma of 8·3 years, and compare this with the duration of symptoms of intramedullary astrocytoma which range from 15 years for Grade I tumours, 10 years for Grade II, to only 0·8 years for Grade III/IV tumours.

Spinal ependymomas are most commonly found in the region of the conus medullaris or the cauda equina. They are often quite large when first discovered and can extend over several neural segments. Cooper and Epstein[7] found the mean length as 4·7 segments. In our group, 40% were located in the region of the cauda equina. Mork and Loken[2] found 53% of the tumours in the spinal cord and 45% adjacent to the cauda equina. In none of our patients was there a sign of another primary tumour in the posterior cranial fossa, so that none was the result of seeding to the spine from a tumour at a higher level in the neural axis. Ependymomas are almost always well circumscribed and demarcated. In the spinal cord they are usually well defined, elongated intramedullary masses that can often be shelled out at surgery. However, the ependymal cells are embryological derivatives of primitive neuroectodermal cells and occasionally the tumours assume this very malignant form.

Survival and histological grading correlated very well. Of the three deaths two can be related to tumour, one of these being Grade IV (primitive neuroectodermal tumour) who died three weeks postoperatively. The second patient died from a Grade III tumour 1·5 years after operation. Those whose tumours were graded I or II had a mean survival time of six years, with three long term survivors, 13·0 to 17·5 years. Ninety percent of all our patients were alive at least two and a half years after the diagnosis was made.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 55 – 62, April 1990.

Ascertainment and natural history of treated acromegaly in Northern Ireland

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Accepted 5 January 1990.

SUMMARY

The prevalence of known cases of acromegaly in Northern Ireland in 1984 was 6·3 per 100,000 population. The incidence of newly-diagnosed cases over the preceding 25 years was 5·5 patients per year, or 0·4 patients per 100,000 population per year. This rate would be equivalent to about 200 new cases per year in the United Kingdom.

Four options have been available to most of these patients — surgical hypophysectomy (transfrontal or transsphenoidal), pituitary radiotherapy (usually external cobalt beam), drug treatment with bromocriptine, or no treatment. Choice of treatment has been mainly influenced by tumour size, with the larger pituitary adenomas having surgery initially. No single form of treatment has been successful in achieving a clinical remission or cure in more than a minority of cases. The most successful outcome has been where total pituitary ablation has been achieved.

Life-table analysis for the whole group shows life expectancy which is not markedly different for that of an age-matched population from Northern Ireland. Morbidity related to long term osteoarthritis and treatment complications remain a major problem. The incidence of malignant tumours is higher than would be expected.

INTRODUCTION

The natural history of a chronic endocrine condition can be measured both by morbidity and mortality. While there have been several reviews of the experience of the management of acromegaly in patients referred to large endocrine units serving widely scattered and mobile populations, only the series from Newcastle-upon-Tyne[1] approaches a complete ascertainment of acromegaly in a community.

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Treatment for acromegaly in different centres in the past 25 years has included direct surgical approach to the pituitary by the transfrontal or transsphenoidal route, radiotherapy using a standard cobalt unit or linear accelerator, and more recently drug therapy with bromocriptine or somatostatin. Some patients have had no pituitary-directed treatment. The choice of treatment has depended as much on available local expertise and facilities as on any defined protocol, and many recorded series are based on one particular treatment.[2] In Belfast we have been able to study all patients diagnosed to have acromegaly in Northern Ireland (population 1·5 million) during a 25 year period and to achieve 100% review. All treatment options have been equally available (except for a linear accelerator) and there has been close co-operation between the endocrine, the neurosurgical and the radiotherapy clinics. The long term review of all patients has been at the endocrine clinic.

METHODS

Records for 131 acromegalic patients were available for study. Since 1959 virtually all patients diagnosed to have clinical acromegaly in Northern Ireland have been seen by DRH. In the early years some of these patients had already been treated by radiotherapy or transfrontal hypohysectomy.

In 1984, 86 patients (65·6%) were still attending the endocrine review clinic. Nine (6·9%) had lapsed for a number of years but were ascertained to be alive, and up-to-date morbidity data was obtained from the family doctor. Only two had left Northern Ireland. Thirty-six (27·0%) had died — 17 died outside hospital and information was by death certification only; 19 (14·5%) died in hospital and in 12 of these an autopsy was carried out. Analysis of coded data sheets for each patient was carried out by computer using the SPSS system.

The diagnosis of acromegaly was reached in all cases on clinical grounds. All patients had a standard lateral skull X-ray. Radioimmunoassay for serum human growth hormone became available after 1967 and has been carried out in the endocrine laboratory at the Royal Victoria Hospital since that time.

RESULTS

Prevalence and incidence

Prevalence is the number of people in the community who have the condition. In 1984 there were 95 people alive and known to have acromegaly out of the 1,490,000 population of Northern Ireland (prevalence 6·3 per 100,000 population).

Incidence is the number of new cases per unit of population per year. One hundred and thirty-one patients in 25 years represents 5·5 patients per year for Northern Ireland, or 0·38 patients per 100,000 population per year. It may be that not all patients identified in Northern Ireland were referred to the Royal Victoria Hospital in the early part of this time, but we can be sure from 1970 onwards of complete notification: over this 13 year period there were 81 patients, representing 6·4 new cases of acromegaly per year, or 0·41 patients diagnosed per 100,000 population per year.

Clinical features at diagnosis

The presenting features did not differ from those found in other larger series.[2] There were 66 females and 65 males. We have excluded from this review some

patients who were referred because of clinical resemblance to acromegaly (large hands or prognathic jaw) in whom serum growth hormone levels were normal and no radiological evidence compatible with acromegaly was found. The median age at diagnosis was 40–49 years, the youngest was 11 and the oldest 71. The clinical estimate of the mean duration of symptoms prior to diagnosis was about 10 years. Six patients were noted to have acromegalic clinical features during treatment for a non-pituitary malignancy.

Cardiovascular disease at diagnosis

Forty-two patients (33%) were hypertensive at diagnosis (blood pressure >160/95 mmHg), or already on antihypertensive treatment. An abnormal electrocardiograph (any reported abnormality) was found in 23 (25%) of 93 patients. Cardiomegaly on routine chest X-ray was found in 18 (19%) of 95 patients.

Carbohydrate metabolism at diagnosis

Sixteen of 116 patients (14%) were diagnosed to be diabetic by oral glucose tolerance test using the criteria in use at the time of the test. None of the other 15 patients had glycosuria at the time of diagnosis. Two others (1·7%) fell into the impaired glucose tolerance category used since 1980.[3] Of these 16 diabetic patients, eight required insulin treatment to control hyperglycaemia, six were on oral hypoglycaemic agents and two on diet only.

Other endocrine disorders at diagnosis

Only one patient had a close relative (sister) also known to be acromegalic. She had been diagnosed and treated by surgical hypophysectomy in Glasgow, where she had been living for some time and she has not been included in this analysis.

Using standard thyroid function tests available at the time, two of the 114 patients (2%) were shown to be hyperthyroid and two others were euthyroid having previously been treated for hyperthyroidism; seven (6%) had secondary hypothyroidism (absence of serum TSH rise or other evidence of panhypopituitarism) and five (4%) had primary hypothyroidism (elevated serum TSH at the time of diagnosis). Four patients were hypercalcaemic, of whom three were shown to have primary hyperparathyroidism which was subsequently cured by parathyroidectomy.

Detailed studies on hypothalamic/pituitary function have only been carried out in recent years and in younger patients. Thirteen of 72 patients (18%) had secondary hypogonadism at diagnosis, and six of 84 patients (7%) had secondary hypoadrenalism. Serum prolactin measurements were only available at diagnosis in 34 patients. Nine of these (27%) had a serum prolactin greater than 360 mU/l.

Radiography

Ninety-three of 127 patients (73%) had an abnormality of the pituitary fossa on lateral skull X-ray. Detailed measurements of pituitary size were not made, but the radiological opinion was reached at weekly ward meetings with the same radiologist (Dr J O Y Cole) for the major period of this review. Computerised tomographic scanning of the pituitary fossa was available from 1980 and with more precision from 1983: of 21 cases examined at diagnosis, three were judged entirely normal, 10 were consistent with an intrasellar adenoma and eight had an extrasellar extension of an adenoma (seven suprasellar, one into the sphenoidal sinus).

Ophthalmology

A formal ophthalmic record of visual acuity at diagnosis was available in 97 patients; 89 (92%) were normal. In eight, visual acuity was abnormal, and was less than 6/60 in one eye or worse in five patients. Perimetry was carried out on 115 patients (initially with a simple confrontation perimeter, after 1972 with a Tubingen static perimeter). Visual fields were normal in 94 patients (82%). Unilateral field loss was found in seven (6%) and bilateral loss in 14 patients (12%).

TREATMENT

Twelve patients (9·2%) have had no treatment diercted toward the pituitary. Sixty-two have had only one single form of treatment (10 hypophysectomy, 34 radiotherapy and 18 bromocriptine only), 37 have had two separate episodes of treatment, 17 have had three, and three have had four different treatment episodes. In all, 199 treatments have been given to 119 patients.

Fifty-one patients (39%) have had external cobalt irradiation (usually 4,500 rads); 12 of these also had pituitary surgery and five received bromocriptine later. Eleven patients (8%) had internal irradiation by Yttrium-90 implantation at the time of hypophysectomy.[4] Sixty patients had 78 hypophysectomy operations, 45 by the transfrontal route and 33 transsphenoidal. Repeat surgery was carried out in 15 patients and three had a third exploration.

Ten of the 39 patients who received a single treatment with external radiation became panhypopituitary during follow-up. The onset of hypopituitarism ranged from 1–17 years after irradiation. Five patients who received only pituitary-directed radiotherapy developed visual complications which were shown to be due to the radiation rather than to local pressure from further pituitary enlargement.[5] Temporary diabetes insipidus developed postoperatively after hypophysectomy on 22 occasions — nine following transsphenoidal surgery (27%) and 13 following transfrontal surgery (29%). Severe haemorrhage causing abandonment of operation occurred in two attempted hypophysectomies, one patient developing a subdural haematoma. Other operative complications were infection of wound or bone flap in seven, deterioration in visual fields in two, and single cases of aphasia and mild hemiplegia, loss of taste and smell, and third nerve palsy. No patient received treatment for meningitis but one patient who died suddenly of respiratory arrest associated with severe headache and pyrexia one day postoperatively was suspected to have had overwhelming meningitis despite lack of post-mortem confirmation of this diagnosis. Another patient developed self-limiting CSF rhinorrhoea.

After brief experience with chlorpromazine (four patients),[6] 63 patients since 1972 have been treated with bromocriptine, usually as an adjunct to other definitive therapy. Eighteen have been treated with bromocriptine only. Drug intolerance occurred in seven patients; treatment was continued in three of these. One patient developed acute gastrointestinal symptoms and died of a perforated duodenal ulcer shortly after starting bromocriptine as adjunctive therapy.

MORBIDITY AND MORTALITY

Morbidity at six months

In the first six months after treatment (or after diagnosis in those who were not treated) six patients died. There were two peri-operative deaths (one on the

first day from possible overwhelming meningitis and one on the seventh day from pulmonary embolus and cerebral infarction). Three untreated patients died rapidly of malignancy (carcinoma of lung) and one died of a cerebrovascular accident three months after pituitary radiotherapy. In three cases no data on six-month review was recorded. None of the other nine untreated patients had any appreciable morbidity at six months. Full assessment of residual pituitary function was not in general carried out on the earlier patients, and replacement therapy with cortisone acetate or hydrocortisone was generally started postoperatively. Fifty-three of the 116 patients were taking adrenal steroids and 55 were taking thyroxine at six months. Of the 21 patients operated on transfrontally as an initial treatment, all were on replacement treatment, compared with 13 of the 15 operated on transsphenoidally. Only 19 (16%) were receiving androgen or oestrogen replacement therapy. Blood pressure was elevated in 31 of the 125 patients alive at six months (25%).

Morbidity at last review

The case notes of all 125 patients who survived six months from diagnosis, including those who had no treatment, were studied to ascertain morbidity at last attendance or prior to death. Eighty-six patients were still under review and had been seen within the last year. Nine patients, including two who had left Northern Ireland, had lapsed from the clinic; information concerning their state of health was obtained from their general practitioners. Morbidity prior to terminal illness was ascertained from the case notes in the 30 patients who died. Twenty-one of the 125 patients were judged still to have active acromegaly on the evidence of persistently elevated serum GH.[7] Sixty-three (50%) were either demonstrably panhypopituitary or were established on replacement therapy. Forty-eight (38%) had arthritis, predominantly destructive osteoarthritis of the large joints, especially hips, knees and lumbar spine. There were two cases with rheumatoid arthritis which produced widespread and particularly crippling disability. Forty-three patients (34%) had ischaemic heart disease based on documented myocardial infarction, or a history of angina and electrocardiographic changes. Forty-two patients (33%) were hypertensive. Nineteen (15%) were diabetic. Nine had had a cerebrovascular accident. Other medical problems, mostly not of major significance, occurred in 28% of these patients. Nine patients (7%) admitted to no symptoms or disabilities of any sort.

Mortality

By December 1984, 36 of the 131 patients had died. There were 12 deaths from cardiovascular disease (five from acute myocardial infarction, three with an episode of congestive cardiac failure, and four sudden deaths outside hospital had been certified as due to myocardial infarction) and five deaths from cerebrovascular disease. Eleven patients died from a malignancy (see below). The two early post-craniotomy deaths were due to pulmonary embolus and possible overwhelming meningitis. Two older patients died of bronchopneumonia, tuberculous in one case. One young patient died in an orthopaedic hospital from pulmonary embolus after tibial osteotomy to reduce excessive height. One patient committed suicide 22 years after treatment. One died of acute adrenal insufficiency having survived two years without taking replacement therapy following treatment by radiotherapy and then transfrontal craniotomy in 1961. One patient died of peritonitis after perforation of a duodenal ulcer while taking bromocriptine.

Malignant diseases

Fifteen of the 131 patients have been diagnosed to have a malignant tumour. Four of these are still under surgical review, one having been treated for breast carcinoma, one for renal cell carcinoma and two for transitional cell bladder carcinoma. Four patients have died of carcinoma of the colon, three from carcinoma of the bronchus and one each from carcinoma of breast, pancreas, oesophagus and bile ducts.

Squamous cell skin carcinomas were successfully treated in two patients. Benign epithelial tumours were found in six patients (four nasal polyps, one benign tumour of the gum and one benign vocal cord polyp). Two patients had large benign subcutaneous lipomas.

DISCUSSION

The epidemiology of acromegaly has not been easy to study as patients are often referred long distances for consultation and management and many less severely affected patients do not remain under long term review by the treatment centre. In Newcastle-upon-Tyne a retrospective survey of all known cases in the region suggested an annual incidence of close to three new cases per million population and a prevalence of diagnosed cases of up to 40 cases per million.[1] The Northern Ireland experience is likely to be even more complete due to the geographical isolation and the clinical referral of all patients to the regional endocrine, radiotherapy and neurosurgical centres in Belfast. In addition, a central register of acromegalic patients has been maintained for the past 28 years with the aim of producing long term data. The overall annual incidence of newly-diagnosed cases of about four per million population is somewhat higher than in Newcastle, perhaps because that study was less successful in maintaining contact with the more peripheral parts of their region. This figure would be equivalent to 200 new cases per year in the United Kingdom (population about 50 million) or 1000 per year in the USA (population 250 million).

Cause of death

The London five-hospital review (1937–1967) of 55 deaths in 194 patients showed a mortality almost twice that expected from the general population,[8] with increased deaths from cardiovascular and respiratory disease in males and cerebrovascular and respiratory disease in females. There was also an excess mortality from malignant neoplasms in females aged 65–74 years. The Newcastle study[1] also showed a significantly higher mortality in males from cardiovascular, cerebrovascular, respiratory and malignant diseases but in females only from cerebrovascular causes. Both of these studies have suggestive evidence of lower mortality in treated patients, but neither was able to produce incontrovertible data. Even in a single centre in Northern Ireland there has not been a consistent therapeutic policy, due to the gradual introduction of new options such as bromocriptine and transsphenoidal microsurgery.

A life-table analysis of the 131 patients shows that 80·7% survived to 10 years, 63·2% to 20 years and 37% to 30 years, which is similar to the life expectancy for age- and sex-matched groups from the general population of Northern Ireland.

An aetiological association between excessive growth hormone secretion and malignant colonic tumours has been suggested by some authors,[9] but Wright et al[8] and Mustacchi and Shimken[10] found no increased morbidity from, or risk

of, cancer in acromegalic patients. Alexander et al[1] found an excess of malignancy death in men only. We found a higher than expected mortality from malignant tumours, but the numbers are too small for detailed statistical analysis.

Treatment options

The problem in assessing response to treatment with a very long term disorder such as acromegaly is that the patient often survives for a longer time than the clinical interest of the doctor who made the treatment decision. Both surgical hypophysectomy and pituitary radiotherapy have been available at most centres for the past 40 years, so that a truly "untreated" series for comparison does not exist. Most analyses have been carried out to try to assess the effectiveness of one or other newly-introduced technique or drug, such as 'conventional' radiotherapy,[11] bromocriptine[12] or transsphenoidal microsurgery.[13] The Acromegaly Study Group in Germany have made the best attempt to compare primary treatment with transsphenoidal surgery (with or without cryotherapy), Yttrium-90 implantation or bromocriptine, but their results are short term and based largely on a single endocrinological evaluation six months after the treatment.[14]

The short term complications of surgical treatment are well-documented and probably depend both on the experience at the centre and the severity of the disease process. Analysis of the morbidity at last review may be a more useful indicator of the patient's health than short term post-treatment assessment of growth hormone levels. This would be particularly valid if the long term morbidity of the treated patient depended more on the degree and duration of the excess growth hormone secretion prior to treatment than on the post-treatment growth hormone value. The Northern Ireland experience would support this view; although 21 patients (more than six months after treatment) were judged still to have active acromegaly with excess growth hormone secretion, compared to 63 where pituitary function was effectively ablated, the prevalence of osteoarthritis (50% vs 38%) and hypertension (33% vs 33%) was not noticeably different in the two groups. Only 7% of patients had no symptoms or disabilities of any sort, although the great majority had been able to continue their normal occupation in spite of acromegaly and its treatment.

This approach is not to argue against the most effective treatment possible to reduce inappropriate growth hormone secretion, but rather to concentrate on the disability caused by the pre-treatment phase of the disease. Relevant to this aspect is whether the natural history of distinct forms of inappropriate growth hormone secretion is different. Analogy with the problems of hyperprolactinaemia would suggest that some acromegalic patients with large, predominantly chromophobe adenomas would have a more protracted disease which was more resistant to any form of intervention than other patients with smaller, more discrete pituitary lesions. It has been suggested that these two histological forms of the disorder may represent different aetiological entities[15] rather than the larger adenoma merely being a later stage in the evolution of the smaller lesion. If that is so, the neurosurgical practice of considering the larger pituitary lesion as necessitating as extensive a hypophysectomy as possible, employing additional cryotherapy or local irradiation to achieve a panhypopituitary state may well be correct at the present time. The smaller, more discrete eosinophilic 'adenoma' in the pituitary may in some cases be removed while leaving normal residual pituitary tissue, but this form of the disease may in any case be less aggressive.

Whatever endocrine treatment option is undertaken, the natural history of the treated patient who avoids acute peri-operative problems is probably more

dependent on the pre-treatment severity and underlying pathophysiology of the disease, than on the immediate post-treatment assessment. It is now 100 years since the initial recognition of acromegaly by Pierre Marie,[16] but the neuro-endocrine basis of this particular disorder is still elusive and present-day treatment remains less than ideal.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 63 – 70, April 1990.

Belfast experience with P6 acupuncture antiemesis

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Accepted 5 January 1990.

SUMMARY

In a strictly controlled clinical situation, (postoperative sickness) where variables were reduced to a minimum, it was possible to demonstrate an effective prophylactic antiemetic action of P6 (Neiguan) acupuncture. Manual and electrical invasive (needling) stimulation of this point were equally effective. Non-invasive stimulation (transcutaneous electrical or pressure) was effective in the early postoperative period, but the effect did not last as long as for invasive acupuncture — although it was as good as standard antiemetics. Stimulation of a "dummy" acupuncture point was ineffective as was administration of the acupuncture after the emetic stimulus (opioid). This effect can be blocked by local anaesthesia at the P6 point.

Acupressure (P6) is moderately effective in reducing morning sickness, but here there is more of a psychological element as pressure on a "dummy" point gives some alleviation of symptoms.

Given in conjunction with standard antiemetics, P6 acupuncture is a useful adjuvant in reducing sickness after cancer chemotherapy. This effect can be prolonged for 24 hours by acupressure.

INTRODUCTION

During a visit to the Republic of China, in an antenatal clinic in Beijing, I saw young girls being taught to press their right forearm as a prophylaxis against morning sickness.[1] I decided to see how this would work when used in the clinical situation in which we have investigated the efficacy of various antiemetic drugs.[2] One English language acupuncture textbook mentioned this use,[3] and described the location of the P6 or Neiguan point. P6 indicates that it is the sixth point on the pericardial meridian. It lies two Chinese inches[4,5] (about 5 cm) from the distal wrist crease, between the tendons of flexi carpi radialis and palmaris longus: on needling at that point to a depth of 1 cm one elicits a non-anatomically distributed sensation known as "chi" (qi).

We were unable to locate any scientific studies as to the antiemetic efficacy of stimulation of the P6 point either by manual acupuncture or electroacupuncture, by transcutaneous electrical stimulation or by pressure, which presented a challenge. It was not anticipated when the studies started at Musgrave Park Hospital in 1984[6] that they would be continuing, albeit in a modified form, some six years later; nor was it expected that they would have any clinical application. This paper summarises the findings in over 2,000 P6 acupuncture

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administrations. Most of the individual studies have been reported in detail elsewhere[1, 6–15] and this review only deals with the overall findings.

The initial studies were approved by the Queen's University Research Ethical Committee: the technique is now recognised as standard treatment.

ANAESTHETIC STUDIES

Over four years, studies were carried out in patients scheduled for minor operations, standardised as shown in Table I. The premedication was given intramuscularly by the anaesthetist 60–90 minutes preoperatively, and at the same time acupuncture, or another method of stimulus at the P6 point was carried out (transcutaneous electrical stimulation or acupressure). The studies included stimulation of a point outside the known acupuncture meridians (dummy acupuncture) and the use, in random order, of two standard antiemetics (cyclizine 50 mg and metoclopramide 10 mg). The acupuncture needle was either manually rotated or electrically stimulated (10 Hz DC) and after a number of initial observations[1, 7] the period of stimulation was limited to five minutes. In all studies patients were told that the procedures were being studied to try to "improve the effect of the premedication", but the exact postoperative observations to be made were not given until the six hour postoperative visit.

TABLE I

Acupuncture at the P6 point; basis of studies following anaesthesia

Opioid premedication	Nalbuphine 10 mg
Standard population	Women: 15–60 yr; 50–75 kg
Standard operation	Dilatation and curettage: 7–10 min
Standard anaesthesia	Methohexitone N_2O/O_2
Postoperative observations at 1 and 6 hours	Vomiting, including nausea and retching
	Nausea alone

The results, summarised in Fig 1, are based on a minimum of 62 observations per series, except for dummy acupuncture when, for ethical reasons, the number was limited to 31. All methods of stimulation of the P6 point caused a significant reduction ($p < 0{\cdot}01$) in postoperative sickness, compared with the untreated controls. Dummy acupuncture was ineffective as an antiemetic. The overall benefit of invasive acupuncture at P6 (manual or electrical) was greater than that of non-invasive (transcutaneous electrical or pressure) stimulation of the P6 point. This was due to the shorter action of the latter: the reduction in sickness was similar with all methods during the first postoperative hour, but in the one to six hour period invasive methods were superior. At all times of observation invasive acupuncture was a superior antiemetic than conventional drugs, whose action was similar to that of non-invasive stimulation of P6.

Timing of acupuncture. In two studies application of invasive acupuncture during general anaesthesia (which included an opioid) was without effect.[16, 17] Despite our failure to find any antiemetic action with dummy acupuncture, there could still be a psychological explanation for the apparent effects of the acupuncture, its absence of effect in anaesthetised patients supporting that view. Alternatively the

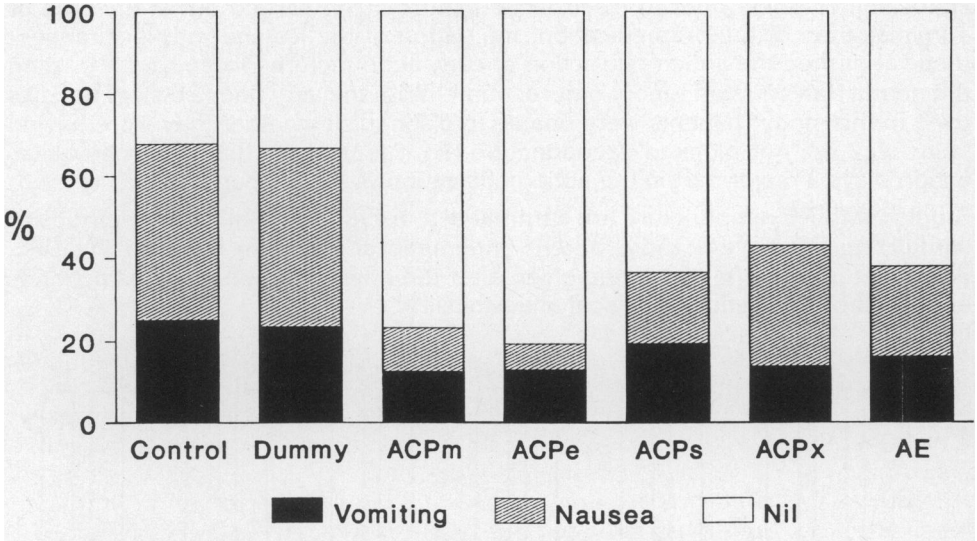

Fig 1. The efficacy of measures to prevent postoperative nausea and vomiting (0–6 hours).

ACPm = Manual acupuncture
ACPe = Electrical acupuncture
ACPs = Transcutaneous stimulation
ACPx = Acupressure
AE = Standard antiemetics

administration of the acupuncture after rather than before the emetic stimulus (opioid premedication) could explain the difference. Table II summarises findings when acupuncture was given with premedication (early) or immediately before or during anaesthesia (late). These studies show that late acupuncture is relatively ineffective compared with its administration at the same time as premedication.

TABLE II

Overall (0–6 hr) incidence of vomiting (including nausea and vomiting, or retching) and nausea, related to the time of administration of the acupuncture. Infiltration of the P6 point with lignocaine (blocked) or saline (not blocked) was carried out during further studies of early acupuncture

Acupuncture	*n*	*Vomiting*	*Nausea*	*Nil*
Nil	56	25%	43%	32%
Early	87	13%	13%	78%
Late	33	33%	27%	49%
P6: blocked	37	34%	17%	49%
: not blocked	37	13%	6%	81%

Mode of Action. Chinese studies have suggested that blocking the acupuncture site with local anaesthesia abolished its analgesic action.[19] To see if this applied to the antiemetic effect, the P6 point was infiltrated in random order with either

lignocaine or saline prior to electroacupuncture being carried out at the time of administration of the premedication. Infiltration of the P6 site with local anaesthetic abolished the antiemetic action of early acupuncture (Table II), supporting the neural transmission theory of its action.[20] With the very fine (26 swg) needles used in this study, patients were unable to distinguish whether they were having "blocked" or "not blocked" acupuncture, so it is unlikely that a psychological action plays a major part in the antiemetic action of P6 acupuncture.

Studies with P6 acupuncture are summarised in Fig 2. The invasive methods of stimulating P6 have a more potent antiemetic action than the non-invasive. Acupuncture is ineffective when given after the emetic stimulus and its action is abolished by infiltration with local anaesthesia.

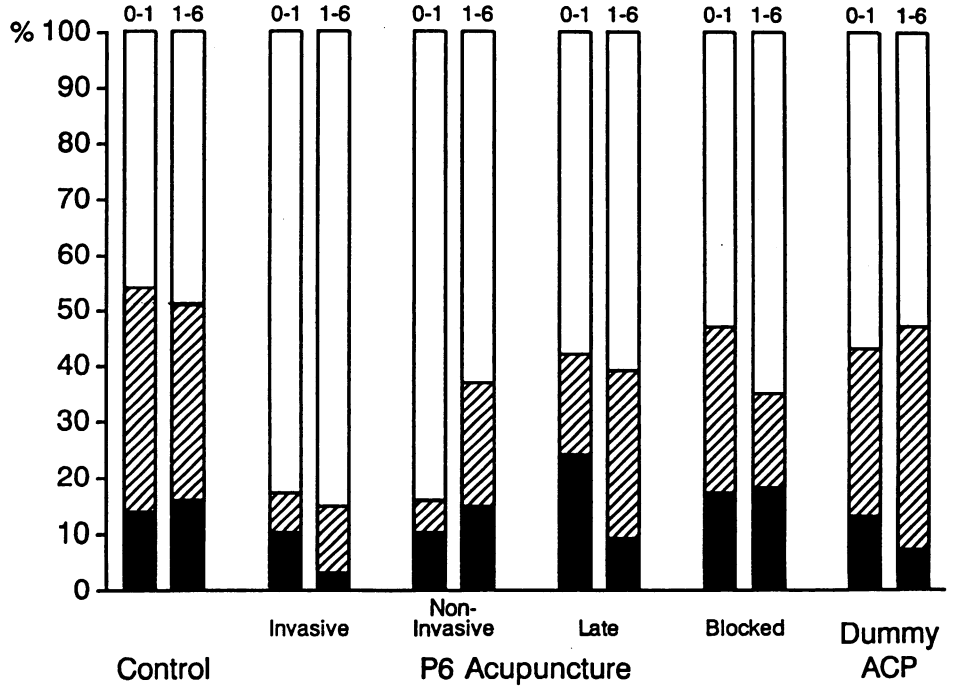

Fig 2. Comparison of the beneficial effect of invasive and non-invasive P6 acupuncture with an untreated control series and a group who received acupuncture at a "dummy" point. Also shown is the relative ineffectiveness of late acupuncture, and the abolition of its therapeutic effect by infiltration of the P6 point by local anaesthetic.

MORNING SICKNESS

The beneficial effects of self-administered acupuncture has been studied in 350 consecutive women attending the antenatal clinic of the Royal Maternity Hospital.[21] A self-reporting system of study was adopted, patients being given either no treatment, told to press P6 for five minutes every two – three hours, or to press a dummy point at the right elbow. Although the incidence of returned records (70%) was less than hoped for, the findings in Table III show benefit from P6 acupressure, with lesser benefit from pressing the "dummy" point. Since patients had to have the reason for pressing their elbow explained to them, the latter would appear to be a psychological effect.

TABLE III

Acupuncture at the P6 point, and other studies: percentage incidence of varying degrees of morning sickness, reported by patients attending the antenatal clinic at the Royal Maternity Hospital, Belfast

Acupressure	*n*	*Severe or troublesome*	*Moderate*	*Slight or nil*
Nil	119	56%	21%	23%
P6	110	19%	21%	60%
Right elbow	112	37%	37%	26%

CYTOTOXIC DRUG THERAPY

Troublesome sickness is a major problem with some forms of cancer chemotherapy[22-24] particularly cisplatin and DTIC. The oncologists at the Northern Ireland Radiotherapy Centre welcomed our studies to see if P6 acupuncture had anything to offer in this field. Seventy-one consecutive patients who had had at least two previous courses of chemotherapy were questioned regarding their sickness.[25] Despite the use of established antiemetics, 54 (76%) of these had troublesome sickness at the first administration, of whom 52 had the same experience with the next course.

Acupuncture studies were all carried out on patients who had a history of troublesome sickness during a previous course of chemotherapy despite the use of conventional antiemetics. These were repeated at the next course when manual or electroacupuncture was carried out immediately before administration of the chemotherapy. Outpatients were seen at their next visit to the clinic, while inpatients were seen frequently in the wards, when the acupuncture was repeated if necessary. This was an "open" study as it was necessary to explain its objectives in detail to the patients, but on ten occasions it was possible, without the patients' knowledge, to stimulate a dummy point in the course of repeated acupuncture. Before embarking on the major project, which involved 105 patients, a small pilot study in 15 patients was undertaken. This was successful in gaining the confidence and co-operation of the nursing staff as 12 of these patients had considerable benefit from the acupuncture.

Based on the reports of the patient, and of the nursing staff in hospitalised patients, the benefit was graded on a simple four point scale, ranging from complete alleviation of symptoms to no benefit. The findings which have been reported in detail elsewhere[12] are summarised in Table IV. In the crossover study only one patient benefited from the dummy acupuncture compared with nine who had P6 acupuncture.

There are two problems with invasive acupuncture as an antiemetic — not all patients welcome needles, and the effect only lasts for about eight hours. Attempts to overcome the former by patient-administered transcutaneous electrical stimulation were only partly successful,[14] but the latter problem can be largely overcome by application of an elasticised band and stud (Sea Band) over P6, the patient being instructed to press this for five minutes every two hours.[15] Here the results (Table V) in inpatients (96% had good or fair alleviation of sickness) are superior to those in outpatients (85% success), presumably due to the frequent reminding by the nursing and medical staff of the necessity of repeated pressure on the stud. To do this only when one feels sick is not effective.

TABLE IV

Sickness during cancer chemotherapy: summary of the beneficial effects of P6 acupuncture in the "open" studies in cancer chemotherapy at the Northern Ireland Radiotherapy Centre

				Alleviation of sickness		
		Neoplasm	*n*	*Good*	*Fair*	*Slight or nil*
Inpatients	:	Testis	29	16	12	1
	:	Lymphoma	5	2	3	0
Outpatients	:	Breast	64	46	15	3
	:	Lymphoma	7	2	3	2
Crossover study	:	various neoplasms	10	9	1	0
		Total	130	87	36	7

TABLE V

Sickness during cancer chemotherapy: summary of benefit obtained over 24 hours by the use of electroacupuncture followed by acupressure

		Alleviation of sickness		
	n	*Good*	*Fair*	*Slight or nil*
Courses of treatment				
Inpatients	43	26	14	3
Outpatients	43	32	5	6
Individual patients				
Inpatients	20	16	4	0
Outpatients	20	15	2	3

Continuing studies are based on doctor-administered transcutaneous electrical stimulation of P6 followed immediately by application of the stud, with instructions to press this for five minutes every two hours. Although not quite as effective as needling followed by pressure, the results are sufficiently promising to warrant continuing investigation. Simplification of the method of stimulation has enabled a number of co-operative intelligent patients to use the apparatus themselves. Following an explanation they apply a current for five minutes every two hours. There is no need for professional acupuncturists. The ultimate aim would be to build a very small transcutaneous electrical stimulator into the button on the elasticised Sea Bands. This could be worn for three – four days, as required by patients, and activated by pressure every two – three hours as necessary. Much work is needed before this aim is accomplished; it is a far cry from the first sceptical attempts at invasive P6 acupuncture in gynaecological patients. Initially all acupuncture and allied procedures were done on the right forearm. A survey showed that only 7·5% of patients claimed to be left handed and a retrospective analysis of findings in 650 patients showed slightly greater benefit when the procedure was carried out on the dominant side[13] and we recommend this practice.

DISCUSSION

This work started as an attempt to test a traditional Chinese remedy by orthodox Western methods of clinical research, with standardisation of method of study and elimination of variables as far as is possible under everyday working conditions. The need for such studies has been emphasised by the British Medical Association report on Alternative Medicine.[26] There has been a suggestion that single aspects of traditional Chinese medicine should not be practised without the full oriental approach [27] but our findings refute this view.[28]

The most difficult aspect of these studies became the acceptance that a technique which was initially regarded with scepticism did in fact work. This conversion was a long and stressful process for all involved. The hostility shown to the first presentation of the findings at a scientific meeting [6] was not expected and reflects the conservative outlook of our profession to anything which is outside the field of orthodox medicine.

This work could not have been carried out without the support of many people. Thanks are due to the senior members of the Department of Anaesthetics, Professor R S J Clarke, Drs J P H Fee and J Moore for facilitating availability of junior staff. At all stages this was very much a "team effort" and among others, particular thanks are due to Drs W N Chestnutt and A G A Lynas who carried out the first anaesthetic studies, Drs K T J Fitzpatrick and R G Ghaly for both anaesthetic and oncology studies, Dr K M Bill for the acupressure studies, Dr M McKinney for the statistical analyses, Mrs Eileen Fee and my present assistant Dr Jing Yang for the transcutaneous stimulation studies and Dr F Sourial for the obstetric studies. Without the co-operation and encouragement of Mr J K Houston, Professor W Thompson and the late Dr G A Lynch who provided access to suitable patients, and to their corresponding nursing and medical staff, these studies would not have been possible.

A grant from the Friar Fund of the Faculty of Medicine financed the initial studies with subsequent support from the Research Council for Complementary Medicine. The studies with cancer chemotherapy were supported generously by the Friends of Montgomery House and thanks are due to their President, Mrs Christine Lynch for her continuing interest.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 71 – 76, April 1990.

Impact of community violence on the workload of a district general hospital

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Accepted 18 December 1989.

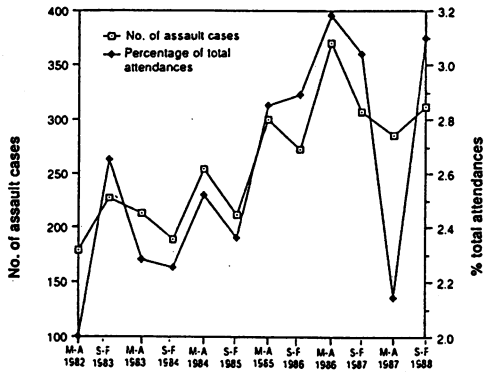
SUMMARY

Clinical observation suggests that deliberate violence against the person is increasing in both incidence and severity in the community. Over a six-year period there was a trend towards an annual increase in the number of attendances at the Waveney Hospital as the result of assaults. A retrospective study for a six-month period (August 1987 to January 1988) defined the pattern of attendance, injuries and treatment for 284 cases. Most of the victims were young males who presented outside normal working hours with superficial injuries. Admission was required in 12% of patients.

INTRODUCTION

Reports in the popular press, police reports and clinical opinion would suggest that there is increasing violence in the community. In 1985 there were 3,475 offences against the person reported to the police, 4,205 cases were reported in 1986 and 4,198 in 1987. The number of serious crimes and cases of wounding with intent in 1986 was 200 and had increased to 282 in 1987. In this hospital from March 1982 the accident and emergency department daily patient register was used to identify those patients presenting with injuries resulting from an alleged assault. These records show an increase in the number of assault victims attending, with a peak in 1986. There has also been an increase in the total new attendances but the percentage of those attending with injuries sustained as the result of alleged assault has generally risen from about 2·0% to about 3·0% during this time. (Fig 1).

Figure 1: Assault victims attending the accident and emergency department and the percentage of total attendances 1982-1988



M-A: March to August
S-F: September to February

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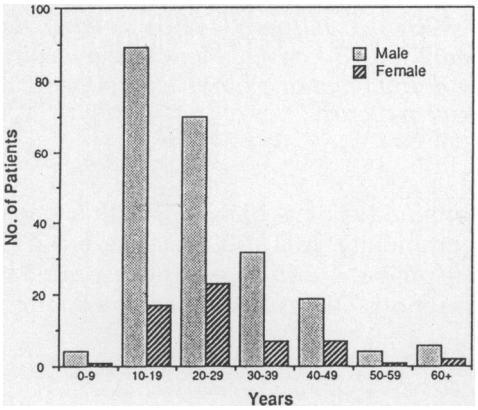
Published information with regard to assault victims and the injuries they have received is sparse and usually confined to the concomitant effects of violence and alcohol intoxication. A retrospective study was undertaken in this hospital to define the extent of the problem in the community served by a district general hospital.

PATIENTS AND METHODS

For the period August 1987 to January 1988 patients presenting as the result of an alleged assault were identified from the daily register and the case notes were retrieved for detailed investigation. From this source information with regard to the patient's name, age, sex, presenting injuries and initial management was recorded. For patients admitted to the hospital the records were obtained to ascertain the nature of any further treatment and its outcome.

Figure 2: Age and sex distribution of assault victims

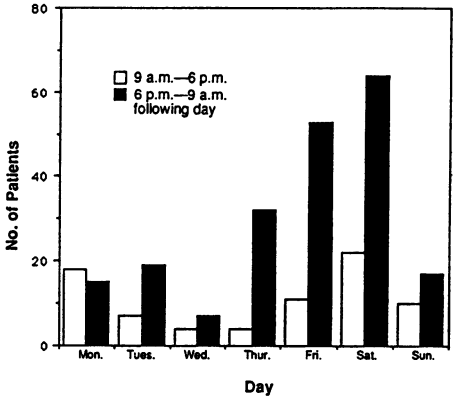


RESULTS

During the six-month period there were 10,343 new attendances. Of these, 294 cases were identified from the daily register as victims of assault. On retrieval of the case notes, ten patients had injuries which were not the result of an assault and were therefore excluded from the survey. The remaining 284 patients represent 2·75% of the new attendances. Of these 222 (78%) were male and 62 (22%) female with a mean age of 27 years (range 2·5 to 76 years). Two-thirds of assault victims were aged between 10 and 30 years. (Fig 2).

Figure 3 illustrates the pattern of attendance of the assault victims by day of the week and by time of day. Eighty-four per cent of the patients attended outside "office hours" (ie 9 am – 6 pm; Monday to Friday) and 41% attended on Friday and Saturday nights. For six of these patients the time of arrival was not recorded in the day register or in the case notes.

Figure 3: Day and times of arrival



The trauma sustained was classified according to the site and nature of the injury and the results are recorded in Table I. There were 221 head and neck injuries and 116 cases of lacerations including stab wounds.

One hundred and forty-three patients required 188 radiological examinations of which 22 (7·7%) showed fractures. A further 28 (9·8%) patients were diagnosed clinically as having nasal bone fractures without X-ray. (Table II).

TABLE I

Site and type of 367 injuries in 284 patients (some patients had more than one injury in more than one site)

Site of injury	*No of patients*	*Bruising*	*Abrasion*	*Laceration*
Face and neck	172	104	38	57
Scalp	49	23	7	22
Upper limb	72	43	11	23
Trunk	42	25	9	7
Lower limb	32	24	6	7
Total	367	219	71	116

TABLE II

Radiological examinations undertaken and fractures identified (143 patients had 188 separate sites X-rayed)

X-ray	*No of patients*	*No with fractures*
Skull	60	0
Facial bones	41	9
Nasal bones	0	28
Cervical spine	3	0
Upper limb	30	3
Chest	32	3
Abdomen	8	0
Lower limb	14	1
Total	188	44

Seventy-three (23%) patients did not receive any treatment including seven patients who left the accident and emergency department either without waiting to be seen or having refused treatment; 138 patients received treatment of whom 64 required suturing of lacerations. Twenty-nine had wrist and ankle strapping, 23 dressing of wounds and nine required a plaster of paris with or without manipulation. Analgesics were given to 33, tetanus toxoid to 28, antibiotics to four, a cervical collar to three and eye ointment to two patients. Forty-two (15%) patients were referred to specialist units, usually as an out-patient; patients with nasal bone fractures were referred to the ENT clinic within the hospital but other patients required referral to maxillo-facial surgeons, ophthalmologists and orthopaedic surgeons. Thirty-four (12%) patients were admitted to the Waveney Hospital of whom 33 were admitted to the surgical unit and one to the medical unit, with an acute exacerbation of asthma, having been severely kicked about the chest. Two-thirds of these patients were admitted for observation after sustaining minor closed head injuries of whom 50% were discharged within 24 hours. One child, admitted for head injury observation, remained in hospital for six days while social workers assessed his domestic circumstances.

There was one death, a 69-year-old man, admitted for observation following a blow to the head, who collapsed 36 hours after admission with ventricular fibrillation, and died despite attempted resuscitation. Autopsy showed no significant head injury but extensive coronary artery diease was found. Illustrative of the major trauma seen were three patients who underwent emergency surgery as the result of stabbing incidents. A 28-year-old man presented with a carving knife protruding from his left loin which, on removal under general anaesthesia, was found to have produced a 3cm laceration in his left kidney necessitating surgical repair. A 50-year-old man, who had been stabbed three times during a domestic disturbance, received superficial injuries to his upper arm and thigh and one stab wound to the abdomen which was found at laparotomy to have produced two perforations of his ileum and a further perforation of the caecum at the base of the appendix. A third case was a 27-year-old man, who had been stabbed in the abdomen at his engagement party and was found at laparotomy to have lacerations to his liver, pancreas and splenic vessels leading to repair of the liver and pancreas and to splenectomy. Details of the remainder of inpatient treatment are summarised in Table III.

TABLE III

Assault victims admitted to surgical unit, their inpatient treatment and time spent in hospital

Treatment	*No of patients*	*Length of stay days*
Observation after head injury	21	1 – 6
Observation after other injuries/awaiting transfer	5	1
Exploration of wounds under general anaesthesia	3	1 – 10
Laparotomy	3	9 – 16
Manipulation under general anaesthesia and transfer to specialist unit	1	1

DISCUSSION

There has been considerable publicity surrounding the increased level of community violence, with recent reports on public disorder in rural areas showing that personal violence is not confined to the inner city areas.

The Waveney Hospital serves two large market towns, Ballymena and Antrim, and the surrounding rural area with a catchment population of 100,000. During the study period 2·75% of the new attendances at the accident and emergency department resulted from alleged assault which is similar to the 2·3% recorded by the Cardiff Royal Infirmary.[1] The majority of victims, including all of those most seriously injured, arrived at hospital at night when the accident and emergency department was minimally staffed by doctors and nurses (one surgical senior house officer and two trained nurses). When dealing with uncooperative and disruptive patients the staff are at risk of becoming victims of assault themselves and this problem has been addressed in the DHSS report on violence to staff,[2] the guidelines suggesting improvements to the design of accident and emergency departments, advice on adequate staffing and appropriate training and procedures for dealing with and reporting violent incidents. No member of staff in this hospital was assaulted during the period of the study.

It was not possible within this retrospective study to assess the prevalence of alcohol ingestion amongst all the victims, but ingestion of alcohol or suspected intoxication was recorded in 45% of the notes of those patients admitted to hospital which accords well with a recent study by Walsh and McLeod[3] who reported that 70% of assault victims had a positive breath test and 50% had blood alcohol levels in excess of 80mg/100ml. Shepherd et al found that there was a direct relationship between the degree of intoxication and the severity of the injuries sustained.[4] The injuries recorded in our series commonly resulted from punching or kicking but a number of patients had been attacked with weapons such as broken glass, iron bars and knives. The task of assessing intoxicated or uncooperative patients with obvious superficial injuries and yet with life-threatening head or intra-abdominal trauma is often the responsibility of relatively inexperienced junior medical staff. Trauma scales based on the extent of anatomical injury are of limited value in the initial assessment of the patient and by applying one such classification to this study, (enumerating haematomas, lacerations and fractures), four seriously injured patients would have been initially categorised in the least injured group.[5] However, three of these men required significant surgical intervention and the other patient died. At present there are no suitable physiological trauma scales which readily apply to this type of trauma.

Fifty percent of patients underwent radiological investigation. Sixty patients with head injury fulfilled the Royal College of Radiologists' criteria requiring skull X-rays to be taken (loss of consciousness, substantial scalp injury, difficulty in assessment;[6] however no bony injury was identified. In keeping with advice from the department of Otorhinolaryngology, Belfast City Hospital, that X-rays were of no value in the management of uncomplicated cases of nasal trauma, there has undoubtedly been a reduction in the number of these requests.

The impact upon the overall workload of the accident and emergency and surgical departments is relatively small but the majority of these patients, who are often difficult to assess and may be reluctant to be treated, present at times when staffing levels are low and produce considerably more work than the normal patient. Because of the risk of a possible significant injury, these uncooperative and difficult patients cannot be taken immediately into police custody.

Other significant consequences of civil violence include long term problems for the victim and his family which may subsequently involve the general practitioner and the social services. Another major problem in most district hospitals is the absence of an emergency admission unit, which leads to abusive and disruptive patients being admitted at night directly into surgical wards with ill and post-operative patients. As a "knock-on" effect these acute surgical beds become blocked thus delaying planned admissions for elective surgery.

In financial terms Evans asserts that the annual expenditure for the National Health Service, in the treatment of assault victims, may be in excess of £18 million or approximately £33,000 per 100,000 of the population.[1] By applying DHSS charges for outpatient consultation, inpatient stay, radiological investigation and theatre use the estimated annual cost to this district may be in the region of £38,000.

The police authorities have already introduced new measures to try to reduce the level of violence and to institute more effective means of dealing with offenders. Doctors have the immediate responsibility for the initial assessment and care of the victims, and the Faculty of Community Medicine of the Royal College of

Physicians has stated that "tackling violence in a constructive way must be a major goal for health promotion". To aid this goal the extent of the problem must first be defined.

This study confirms the trend of increasing violence in the community in the last five years, as indicated by attendance at hospital for treatment. This study has also focused on the size of the problem for a small district hospital in a mixed urban and rural community. Obviously the figures presented do not reflect the full extent of the problem for the community as many victims of assault sustain minor injuries which do not require hospital treatment and many will be treated outside hospital by general practitioners. If this trend continues there will be a need for some reallocation of resources to meet the increasing demand and ongoing complications resulting from community violence.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 77–81, April 1990.

Case report

Cerebral vasculitis associated with shingles

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Accepted 9 August 1989.

Shingles is a common manifestation of infection with herpes zoster virus (more correctly varicella-zoster virus) in middle-aged or elderly people. We describe three patients who developed brain stem encephalitis and cerebral vasculitis due to infection with this agent during a 12-month period.

CASE 1

A 77-year-old lady initially presented to her family doctor in January 1987. She complained of a painful left ear with associated hearing loss and dizziness. There were vesicles on the left pinna, and she had a left lower motor neurone facial palsy. She was treated for five days with oral acyclovir and topical idoxuridine, but her symptoms did not resolve. Two weeks after the onset she became ataxic, with double vision and nausea. She was admitted to an ear, nose and throat ward, and a neurological opinion was sought.

She was fully alert and orientated. There were vesicles on the left pinna. She had gaze-evoked nystagmus on horizontal and vertical gaze, maximum on left lateral gaze. There was a complete left lower motor neurone facial palsy. There was a right carotid artery bruit. There were no other cranial nerve lesions. Power and sensation were fully intact, tendon reflexes were symmetrical but the left plantar response was extensor. She had marked truncal ataxia and left-sided incoordination. Computerised tomography scan of the head showed evidence of cerebral atrophy but no focal lesion.

Treatment with heparin and acyclovir was started intravenously. Her ataxia showed a steady improvement but left tarsorrhaphy was required due to the absent corneal reflex. At review five months later she was walking unaided though her balance was poor. The left lower motor neurone lesion persisted.

CASE 2

A 66-year-old man first presented to his family doctor in March 1987 with left-sided ophthalmic herpes zoster. Two days later he developed drowsiness, confusion, slurring of speech, left-sided facial weakness and a tendency to fall to

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the left side. He was admitted to an ophthalmology ward, where he was found to have iritis in the left eye, left-sided facial weakness and an almost complete restriction of upward gaze. He was treated with oral acyclovir, prednisolone eye drops and mydriatics for five days. After discharge, his unsteadiness and facial weakness gradually improved but he was troubled by post-herpetic neuralgia.

Six weeks after the onset his condition deteriorated, with return of the unsteadiness and facial weakness. He also complained of headache, double vision and speech was again slurred. On admission to the neurology ward he was drowsy and mildly confused with marked dysarthria. His left pupil was dilated therapeutically. Upward and downward gaze was restricted to a flicker, and there was restriction of conjugate gaze to the left with nystagmus. He had a right-sided upper motor neurone facial nerve lesion, right arm weakness and mild heel-shin ataxia. Power in the lower limbs was full. Reflexes were symmetrical and plantar responses flexor. Sensation was fully intact. CT scan showed considerable enlargement of the lateral and third ventricles and of the cerebral sulci consistent with cerebral atrophy, probably long-standing. There was a small focal area of low density in the left basal ganglia bordering on the left internal capsule, consistent with infarction.

He was considered to have brain stem encephalitis secondary to varicella-zoster infection and treatment initiated with intravenous heparin and acyclovir was continued for seven days. He made a gradual improvement and remained an in-patient for four weeks. At discharge his speech was clear, the right-sided weakness was barely detectable, and his range of eye movement had improved. Confusion and drowsiness had disappeared. The post-herpetic neuralgia has remained a persistent problem. At review 16 months after the onset he had regained his previous normal mental state, there was no ataxia, but elevation of both eyes was restricted to 30% of normal.

CASE 3

A 72-year-old lady presented to the neurology department in March 1987. Twelve days previously she had experienced left-sided facial pain, followed by the development of a herpes zoster rash on the ear and loss of sensation on the left side of the face. She became unsteady on her feet and was confined to bed. She was fully alert with slurred speech. There was minimal gaze-evoked nystagmus to the left side and a partial left lower motor neurone facial palsy. She had a vesicular rash on the left side of her face and diminished sensation in the left fifth nerve territory. Examination of the limbs showed cerebellar ataxia, worse on the left side, and bilateral distal weakness. Plantar responses were flexor and sensation was intact. These features were consistent with the Ramsay–Hunt syndrome, with additional brain stem signs. She was treated with intravenous acyclovir 10mg/kg for ten days.

During the first week she began to complain of paraesthesia in the left arm and progressive weakness of the left side. CT scan excluded the possibility of intracerebral haemhorrhage, and it was decided to add intravenous heparin. Her weakness showed a sustained improvement but two weeks later she had an unexpected cardiac arrest and died. (Figs 1, 2).

Autopsy showed severe stenosing atherosclerosis of the left anterior descending coronary artery with recanalised thrombus. In the brain and spinal cord there was generalised meningoencephalitis with lymphocytic infiltration of the leptomeninges and of the walls of small meningeal and cerebral blood vessels. No

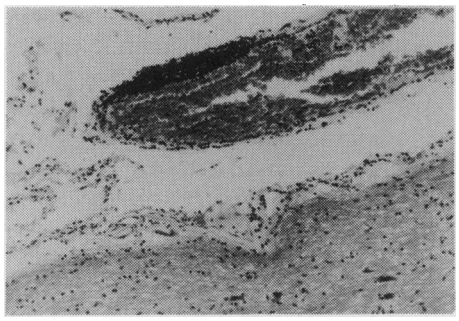

Fig 1. Section of brain stem showing lymphocytic infiltration in the meninges and in the wall of a meningeal blood vessel. Several neurones near the surface of the brain show degenerative changes. HE X100.

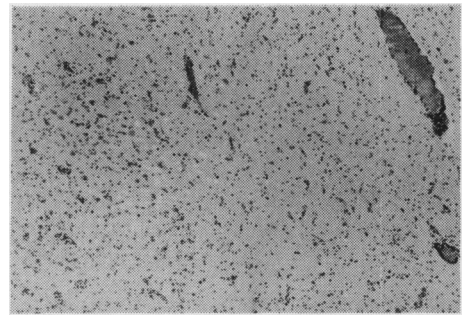

Fig 2. Section of brain stem showing lymphocytic infiltration in the walls of small cerebral blood vessels and capillaries. There are areas of localised oedema and mild glial reaction, and the neurones show focal chromatolysis and neuronophagia. HE X60.

giant cells were present and there was no evidence of a systemic vasculitis. The internal carotid arteries showed no inflammation and there was no generalised thrombosis. The brain stem showed a localised area of oedema, focal chromatolysis and neuronophagia, with lymphocytic cuffing of small blood vessels. The lumbar root showed marked neuronal swelling and there was demyelination of the spinal cord, which could be attributed directly to the virus or could represent neuronal damage due to oligaemic hypoxia secondary to the vasculitis.

DISCUSSION

These patients all demonstrated the development of neurological features after a latent period following varicella-zoster virus infection. The development of brain stem encephalitis is well recognised, but these cases highlight the importance of cerebral vasculitis, which is less often recognised and has important implications for treatment. Each case not only showed the signs of brain stem encephalitis; two developed ipsilateral weakness and in Case 2 a contralateral hemiparesis. There was therefore clinical suspicion of cerebral thrombosis in all, and in Case 3 pathological evidence of vasculitis with selective neuronal necrosis.

In 1982 Doyle et al[1] reported a case of ophthalmic herpes zoster followed by contralateral hemiplegia which at first responded to steroids, but when these were reduced, culminated in massive cerebral infarction and death. At autopsy the left internal carotid artery was thrombosed throughout with extension into the middle and anterior cerebral arteries. They demonstrated an extensive necrotising arteritis of large and small cerebral vessels and were able to demonstrate herpes-like virions in the smooth muscle cells of the middle cerebral artery. Gasperetti and Song[2] reported a 79-year-old woman with right-sided ophthalmic herpes zoster and a left-sided hemiplegia. Autopsy showed lymphocytic infiltration of the meninges, thrombosis of meningeal arteries with arteritis, and lymphocytic infiltration of the semilunar ganglia on the affected side.

Eidelberg et al[3] studied three patients with large vessel cerebral vasculopathy following herpes zoster. At autopsy or brain biopsy all showed large vessel occlusions without notable inflammatory or granulomatous change. Varicella-zoster virus antigens were demonstrated in the media of the affected arteries, but

little or no inflammation was associated with the foci of virus antigens. The distribution of the vascular lesions in the two patients with ophthalmic herpes zoster was consistent with what is known of trigeminovascular connections. Patients with ophthalmic herpes zoster and contralateral hemiparesis have demonstrated a stereotyped pattern of angiographic abnormalities, and they concurred with the anatomical route of infective spread suggested by Gasperetti and Song. Their histopathological findings were consistent with thrombosis *in situ* of large cerebral vessels as opposed to vasculitis, and they concluded that the therapy of choice would be heparin.

Thomas and Howard [4] estimated the incidence of encephalitis to be 0·25% of all cases of herpes zoster infection. The risk increased in immunosuppressed patients with disseminated zoster, elderly patients, and for zoster affecting the cranial nerves and cervical and upper thoracic cord segments. The clinical manifestations of encephalitis usually develop about nine days after the rash,[5] but may precede the rash by as much as 30 days, begin simultaneously or occur as long as six weeks later. Herpes zoster-associated encephalitis is suggested by the presence of the characteristic rash, or by a recent history of zoster. Lumbar puncture frequently shows lymphocytic pleocytosis with elevated protein and normal glucose. The clinical picture is variable, onset is usually acute but may be gradual. Headache is frequent with neck rigidity and fever, impairment of consciousness with hallucination, confusion or delirium. In contrast to encephalitis following varicella infection, convulsion, coma and ataxia are said to be uncommon. Cranial nerve paralysis may develop during the encephalitis illness, as may features of myelitis, hemiparesis and choreoathetoid movements. Forty per cent of uncomplicated varicella-zoster virus infection will show cerebrospinal pleocytosis possibly reflecting ganglionitis of the involved nerve root.[6] It is interesting to speculate why such patients do not show signs of meningism.

The pathogenesis of the encephalomyelitis is not fully understood, but there are two main theories — direct viral invasion from the infected sensory ganglia, and an immunologically mediated post-infectious mechanism. The evidence for direct viral invasion is in two cases where inclusion bodies and varicella-zoster virus particles have been demonstrated in glial cells. The frequently observed delay between rash and symptoms may be evidence of an autoimmune post-infectious aetiology. The evidence is not conclusive for either mechanism and the two mechanisms are not mutually exclusive.

Our three cases all presented with symptoms which supported a diagnosis not only of brain stem encephalitis but also suggested vasculitis, and in the one case examined at autopsy, cerebral vasculitis was demonstrated histologically. Of more practical importance, we demonstrated definite clinical improvement in all three cases with intravenous heparin as well as acyclovir. The third patient died of an unrelated myocardial infarction, but the other two have shown continued improvement. We suggest that in those patients where intravascular thrombosis consequent on varicella-zoster virus infection is likely, this regimen should be the treatment of choice.

We are grateful to Professor Ingrid Allen for the neuropathological reports and to Dr V H Patterson for allowing us to include a case under his care.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 82 – 83, April 1990.

Case report

Bilateral patellar tendon rupture

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Accepted 10 December 1989.

Bilateral infrapatellar tendon rupture is a very rare event. There are only ten previous reports in the literature and, of these, nine patients had an underlying systemic illness.[1, 2, 3]

CASE 1

A 58-year-old man with a past history of acquired emphysema was admitted after his legs 'gave way' as he walked down a short flight of steps. He was unable to extend either knee actively. Bilateral patellar tendon ruptures were diagnosed clinically from the history, and the finding of swelling and a palpable gap below the lower pole of each patella. The diagnosis was confirmed radiologically (Figure). There was no history of systemic illness and the patient had never received steroids. His physique was not suggestive of a hereditary collagen disorder and there was no history of tendon swelling or rupture at any other site. The ESR was moderately elevated, 75mm/hr, but the RA latex, Rose Waaler/DAT titre and the anti-nuclear antibody tests were negative. Plasma protein electrophoresis was normal, serum urate 0·26 mmol/l and serum calcium 2·4 mmol/l. At operation, the infrapatellar tendons were found to be ruptured through the mid-zone of the tendon bodies. Open repair was performed using an absorbable suture. Biopsy showed no evidence of underlying inflammation. He was in hospital for three weeks, and both legs were immobilised for six weeks in plaster of paris cylinders. After six months he had slowly regained full active extension in both knees. No cause for the raised ESR was found and this fell to normal levels spontaneously. He is now fully mobile and requires no external aid.

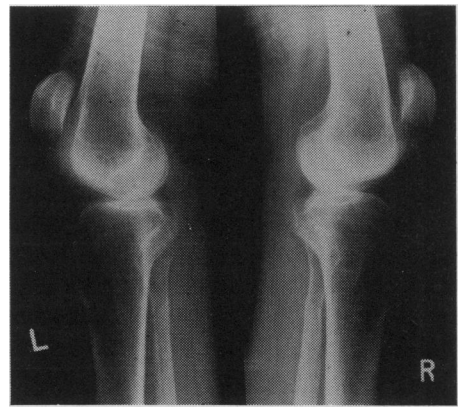

Figure. Lateral X-ray views of bilateral patellar tendon rupture. The high-riding patella, with the distance from the lower pole of the patella to the tibial tuberosity greater than the length of the patella is diagnostic.

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CASE 2

A 66-year-old man, with a past history of duodenal ulcer, was admitted after his legs 'gave way' as he walked up some steps just outside his home. On examination he was unable to extend either knee actively. Bilateral patellar tendon rupture was diagnosed clinically and confirmed radiologically. As in the previous case, there was no history of generalised disease, steroid therapy, tendon swelling or rupture. The ESR was 35 mm/hr, the RA latex, Rose Waaler/DAT titre and the anti-nuclear factor tests were negative; serum urate 0·30 mmol/l and serum calcium 2·35 mmol/l. Open repair was carried out with an absorbable suture material. Rupture through the bodies of the infrapatellar tendons was confirmed, and biopsy showed no pathological change in the tendon structure. It took him seven months to regain full extension at the knees, after readmission for intensive rehabilitation. He is now mobile, but requires a walking-stick.

DISCUSSION

There has been only one previous case report of this condition where there was no associated systemic disease. Of the nine cases with associated factors, one had a severe iron deficiency anaemia of uncertain aetiology, four were suffering from active systemic lupus erythematosus, two from active rheumatoid disease and two had chronic renal failure with hyperparathyroidism. Of the six patients with connective tissue disease, five were on steroid therapy. Spontaneous rupture of tendons is well documented in collagen disorders or in patients who have been treated with local steroids. In these cases, tendon rupture occurs spontaneously because of 'stress' microtears superimposed upon connective tissue with impaired healing ability.[4] It is less certain how the tendon would weaken sufficiently to rupture without excessive stress in people without systemic disease. Infrapatellar tendon ruptures generally occur at the tendosseous junction,[5] but in both of the present cases the tear was through the body of the tendon. This may indicate degeneration in the body of the tendon itself rather than at the distal insertion.

The outcome in all cases of bilateral infrapatellar tendon rupture has been good. Despite intercurrent illness all have been able to walk unaided after an interval of seven to twenty-seven months: 5–10 degree loss of active extension is fairly common, but does not seem to affect overall mobility to any great degree. The types of suture material used have varied and do not appear to be critical. All patients had plaster of paris cylinders applied postoperatively for periods ranging from three to 11 weeks. Thereafter, the emphasis has been on intensive physiotherapy in order to hasten full recovery.

I would like to thank Mr J Templeton FRCS, and Mr I V Adair FRCS, for permission to report these cases.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 84 – 86, April 1990.

Case report

Paroxysmal nocturnal haemoglobinura and diabetes mellitus

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Accepted 5 December, 1989.

Paroxysmal nocturnal haemoglobinura is an acquired disorder of the red cell membrane rendering the cell especially liable to lysis by activated complement. There may be a single or several clones of sensitive red cells and the disorder represents a defect at the pluripotential stem cell stage. This is supported by the findings of leucopenia and thrombocytopenia and the possible progression to pancytopenia and acute leukaemia.

CASE REPORT

A 69-year-old non insulin dependent diabetic was first diagnosed at age 57. Her sister was also diabetic and a brother had died from leukaemia. She had initially been treated with oral hypoglycaemic agents, but because of persistent hyperglycaemia had been changed to insulin at age 63. She remained well until shortly before the present episode, when she developed increasing fatigue, lost 7 lb weight and had a poor appetite with intermittent abdominal pain. She was pale, haemoglobin concentration 7·9 g/dl with normocytic normochromic indices, 1·5% reticulocytes and white cells $3·0 \times 10^3$/mm. Platelet count was normal, and ESR 23 mm/hour. Urinalysis for blood, and six faecal occult blood examinations were negative. Serum iron was 6 umol/l (normal 9–29), ferritin 16 ug/l (normal 18–50), and total iron binding capacity 71 umol/l (normal 43–73). Serum B_{12}, folate and total bilirubin concentrations were normal. Barium enema and intravenous pyelography were normal; gastroscopy revealed chronic gastritis.

The plasma haptoglobin concentration was low (0·05 g/dl, normal 0·20–1·44) and plasma haemoglobin was increased to 0·25 g/dl (normal 0–0·04), suggesting haemolysis. The direct Coombs' test was negative. Bone marrow biopsy showed depressed myelopoiesis, a reduced number of megakaryocytes, and marked erythroid hyperplasia with dyserythropoietic features. Paroxysmal nocturnal haemoglobinuria was confirmed by a positive Ham's test, and a sucrose

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lysis test. Haematological measurements had been normal on several previous occasions, but she had noticed occasional episodes of dark urine on walking and following exertion. Her haemoglobin concentration is now maintained between 8·0 and 9·0 g/dl by transfusion of washed red cells.

Because of the occurrence of her symptomatic haemoglobinuria during a period of poor diabetic control, Ham's tests and sucrose lysis tests were performed on red blood cells from a normal subject, cells from this diabetic patient, and cells from a non-diabetic patient with known paroxysmal nocturnal haemoglobinuria, using different concentrations of glucose, (Tables I and II). There was no additive effect of hyperglycaemia on haemolysis before or after acidification in either patient.

TABLE I

Ham's test. Red cells are exposed at 37°C to normal serum, which is then acidified (pH 6·5–7·0) for lysis. The inactivated samples were placed at 56°C for 10–30 minutes to inactivate complement.

Red cells from a normal subject, from this patient and from a non-diabetic patient with paroxysmal nocturnal haemoglobinuria are compared. Each was also exposed to three concentrations of glucose.

Red blood cells tested	*Haemolysis*								
	Acidified inactivated	*Not acidified*	*Acidified*	*Not acidified + glucose*			*Acidified + glucose*		
				10	*20*	*40*	*10*	*20*	*40*
				mmol/l			*mmol/l*		
Normal subject	0·5%	0·5%	0·5%	0%	0%	0%	0%	0%	0%
This patient	1·8%	4·8%	24·5%	5·9%	5·9%	5·9%	26·3%	24·5%	25·1%
Non-diabetic patient with paroxysmal nocturnal haemo-globinuria	0·0%	3·0%	15·4%	3·6%	3·6%	3·6%	13·8%	14·3%	13·8%

TABLE II

Sucrose lysis test. Percentage haemolysis in a solution comprising 0·1 ml of a 50% suspension of washed red blood cells, 0·5 ml, ABO compatible serum and 0·9% sucrose, 0·9% saline, and 0·9% glucose respectively. Incubated at 37°C for 30 minutes and centrifuged.

Red blood cells tested	*Haemolysis*		
	Saline	*Sucrose*	*Glucose*
Normal subject	0·07%	0·46%	0·75%
This patient	0·09%	40·04%	41·94%
Non-diabetic patient with paroxysmal nocturnal haemoglobinuria	0·09%	16·09%	17·78%

COMMENT

The basic defect in paroxysmal nocturnal haemoglobinuria remains unknown. The clinical features derive from red cell membrane abnormalities resulting in lysis of the membrane by complement. Complement may be activated either by classical or by the alternative pathways, as shown by the sucrose lysis test and Ham's test respectively. *In vivo* lysis tends to be precipitated by the acidification of the blood which occurs during sleep and on exercise. The results of the Ham's test performed in the presence of increasing quantities of glucose, and the sucrose lysis test in which sucrose was substituted for glucose do not suggest that increasing glucose concentration was a factor in precipitation of haemolysis. In both tests, except on exposure to saline, the diabetic red blood cells showed a greater percentage of haemolysis than cells from the non-diabetic patient with paroxysmal nocturnal haemoglobinuria. This is a reflection of the number of complement sensitive cells produced by the abnormal clone in each individual and where the patient has received treatment, is adversely related to the number of transfused cells present. It is normal procedure to wash cells prior to transfusion to reduce the amount of transfused complement thus avoiding a precipitation of a further haemolysis.

This patient did not develop symptoms of paroxysmal nocturnal haemoglobinuria until three years after the introduction of insulin therapy for her diabetic control. Previous surgery did not precipitate symptoms, but the retrospective evidence of low leucocyte counts suggests that the defect may have been present at that earlier time, although the haemoglobin was not significantly reduced. Her platelet count remains at the lower limit of normal which reflects the variability of the disease and the degree of stem cell disorder. Co-existence of paroxysmal nocturnal haemoglobinuria and diabetes mellitus has not previously been reported, but the *in vitro* experiments suggest that elevated glucose levels do not aggravate the tendency to haemolysis.

We thank Miss D McConnell and Miss D Surgenor for typing this manuscript.

The Ulster Medical Journal, Volume 59, No. 1, pp. 87–89, April 1990.

Case report

Reactive arthritis following *Yersinia pseudotuberculosis* infection

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Accepted 10 December, 1989.

Reactive arthritis after *Yersinia pseudotuberculosis* infection is rare. Two recent cases illustrate the typical features, and highlight the need to look for the diagnosis.

CASE 1

A 19-year-old student presented with pain in her left hip for four days. She described pain in her right temporo-mandibular joint, neck stiffness for three weeks, tiredness, and loss of energy. Five weeks previously she had suffered severe lower abdominal cramps, with diarrhoea and pyrexia lasting for one week. Her temperature was 37·5°C. Psoriasis was noted on the scalp. Left hip movements were severely limited by pain. There was tenderness over the right temporo-mandibular joint, both sacroiliac joints and the left plantar fascia insertion. Spinal movements were full, although painful in the neck. Haemoglobin was 12·0 g/dl; white cell count 10·1 × 10^9/l; ESR 70 mm/hr; serum C-reactive protein 32 mg/l; serum rheumatoid factor and autoantibody screening tests were negative, as were a throat swab and faecal culture. Small bowel and skeletal X-rays and sigmoidoscopy were normal. Antibodies were detected to *Yersinia pseudotuberculosis* Type II and *Salmonella typhimurium,* to titres of 1:5120 and 1:320 respectively. After absorption with *Salmonella typhimurium* to remove cross-reacting agglutinins, the titre to *Yersinia pseudotuberculosis* was 1:160. Her tissue type was HLA-B27 positive. The joint symptoms settled with bed rest and naproxen. During the next six weeks there were episodes of acute synovitis involving each knee and the left ankle in turn. Both knees were aspirated and injected with corticosteroid. Joint aspirates were sterile, with white cell count 10·3 × 10^9/l, mostly neutrophils. Spinal stiffness developed but responded to physiotherapy, and at one year review she remained well, except for intermittent back pain.

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CASE 2

A 13-year-old boy presented with a three week history of pain in his lower back and left hip, worst in the mornings. Six weeks previously he had hurt his neck and back during a fall; this was successfully treated by a physiotherapist. Two weeks before, he had had a bout of watery diarrhoea with abdominal cramps and nausea. He looked generally well. There was marked tenderness over the left sacroiliac joint, and slight reduction of lower spinal movements. Haemoglobin and white cell count were normal. ESR and serum C-reactive protein were raised at 50 mm/hr and 8 mg/l respectively. X-ray suggested left sacroiliitis, which was confirmed on isotope bone scan. Stool cultures were negative for *Shigella, Salmonella* and *Campylobacter.* Serological tests revealed antibodies to *Yersinia pseudotuberculosis* Type IA, titre 1:640. His tissue type was HLA-B27 positive. The symptoms settled over a few days with bed rest and naproxen. Early morning back stiffness persisted for six months, but at review after one year he had only minor arthralgia of the hands and wrists.

COMMENT

Reactive arthritis following Yersiniosis is well recognised, particularly in Scandinavia,[1] but is rarely reported in the UK.[2] Nearly all cases occur following *Yersinia enterocolitica* infection, and arthritis due to *Yersinia pseudotuberculosis* remains rare.[3] These two cases were diagnosed by the detection of specific serum antibodies to the organism, backed up by the recent history of typical bowel symptoms. In both cases, the high antibody levels were sufficient to indicate recent infection without having to show a rising titre.

The pathogenesis of this disease is poorly understood. Patients who develop arthritis after infection show several abnormalities of the immune response, with prolonged persistence of the organism in the body.[4] Recently, Yersinia antigens have been demonstrated in synovial fluid cells from affected joints.[5] Over 80% of patients are HLA-B27 positive, suggesting a genetic predisposition.[6] The preceding injury in Case 2 is interesting, as there are several reports of ankylosing spondylitis and Reiter's syndrome believed to have been provoked by trauma.[7] In Case 1, the finding of psoriasis may also be relevant, since this condition is associated with the seronegative spondyloarthritides.

Case 1 typifies the classical syndrome, an asymmetrical oligoarthritis affecting several joints in turn, usually in the lower limbs, with a rise in acute inflammatory markers and a leucocytosis in sterile synovial fluid. Back pain is common, and sacroiliitis occurs in 15–20% of cases,[8] sometimes predominating as in Case 2. The acute illness lasts two to six months, and while the mild residual symptoms experienced by our patients are common, recent reports suggest that in contrast with other spondylarthritic syndromes progression to chronic polyarthritis or ankylosing spondylitis is rare.[9] These cases confirm the need to test for Yersinia antibodies in patients with arthritis following an enteric illness, particularly as the prognosis is now relatively good.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 90 – 92, April 1990.

Case report

Fournier's gangrene: two unusual cases

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Accepted 10 December 1989.

It is now established that the majority of cases of idiopathic scrotal gangrene are secondary to underlying pathology in the lower urinary or gastrointestinal tracts.[1, 2, 3, 4] Two unusual cases of scrotal gangrene are described; the first following surgery for a perforated duodenal ulcer and the second complicating a rectal carcinoma which had infiltrated into the ischiorectal fossa.

CASE REPORTS

Case 1. A 60-year-old man was admitted with symptoms and signs of a perforated duodenal ulcer. At operation a perforated duodenal ulcer with widespread peritoneal contamination was found. The ulcer was oversewn and covered with an omental patch. A tube drain was placed in the subhepatic space and exteriorized in the right hypochondrium. On the fifth postoperative day he developed cellulitis around the abdominal drain site and gross swelling of his penis and scrotum with gangrene of the right-sided scrotal skin. A fistula from the first part of the duodenum to the drain site and a further tract from the drain site, via the subcutaneous tissue, to the scrotum, was demonstrated by upper gastrointestinal contrast studies. Culture of the necrotic scrotal skin revealed infection with *Pseudomonas aeruginosa, Streptococcus faecalis* and *Escherichia coli.*

A second laparotomy with closure of the duodenal defect plus a truncal vagotomy and gastro-jejunostomy was performed. The gangrenous scrotal skin was excised exposing the right testis, and corrugated drains were placed in the tract between the scrotum and right hypochondrium. Despite intensive postoperative therapy there was no improvement. The duodenal fistula recurred and the scrotal gangrene progressed requiring further excision of scrotal skin. The patient died from persistent septicaemia unresponsive to antibiotics, eighteen days after his initial laparotomy.

Case 2. A 73-year-old man presented with a painful swelling of his penis and scrotum which had apparently developed during the previous few days. He also admitted to a longer history of altered bowel habit with constipation and diarrhoea. Examination revealed a grossly swollen, foul-smelling scrotum. The

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penis was buried, with a small patch of gangrene on the foreskin. There was brawny induration of the skin of the scrotum, perineum and inguinal regions. On rectal examination there was a large, craggy circumferential tumour extending to the anal verge.

Broad spectrum antibiotics were commenced and urgent exploration undertaken. This revealed a communicating tract between the tumour and the infected perineal tissue. Radical débridement was performed involving excision of black, necrotic subcutaneous tissue over the penis, scrotum, perineum, lower abdominal wall and inguinal regions together with the overlying skin. Biopsy of the ano-rectal neoplasm revealed an adenocarcinoma, and culture of the necrotic tissue grew *Streptococcus viridans, Escherichia coli, Bacteroides spp.* and diphtheroids. Four days later, laparotomy confirmed the presence of a rectal neoplasm which was fixed to the pelvic wall. Complete surgical excision was not possible and Hartmann's procedure was performed. Preoperative consent for orchidectomy was refused so the testes were placed in subcutaneous pouches in either thigh. The extensive débrided area was covered with split-skin graft. The patient made an uneventful recovery and was referred for radiotherapy to the residual rectal tumour.

COMMENT

In 1883 Fournier initially described an idiopathic scrotal gangrene characterised by sudden onset and rapid progression in previously healthy young men.[5] It is now apparent that the majority of cases of scrotal gangrene occur in middle-aged or elderly men and are secondary to an underlying aetiological factor such as direct local trauma or, more commonly, spread of infection from the lower urinary tract or perianal region.[1, 2, 3, 4] Multiple aerobic and anaerobic organisms can usually be cultured from the necrotic tissue. The condition is also more likely to occur in patients with diabetes.[1, 2, 3] Our two cases demonstrate particularly unusual causes.

Scrotal gangrene secondary to spread of infection from an abdominal drain site or duodenal fistula has not previously been reported. Extravasation of fluid in the anatomical fascial planes between the perineum, penis, scrotum and the abdominal wall is a well recognised phenomenon and occurs most frequently following urethral rupture.[6] The first case demonstrates that fluid entering the tissue planes in the abdomen can spread in the opposite direction and collect in the most dependent part, producing a secondary Fournier's gangrene. It is most likely that necrosis of scrotal subcutaneous tissue and skin was initiated by the duodenal fistula fluid, allowing secondary infection with colonic bacteria which were responsible for the gangrenous process. There are only three reports of this condition arising as a direct complication of a rectal carcinoma,[3, 7, 8] where spread of infection follows perforation of the tumour into the ischiorectal fossa.

Fournier's gangrene still carries a significant mortality. Broad spectrum antibiotics against aerobic and anaerobic organisms are recommended and may help prevent further spread of infection and septicaemia. The mainstays of successful management remain early diagnosis and urgent aggressive débridement of all necrotic tissue. The subsequent wound may be left to heal by secondary intention, although cover with a split-skin graft can speed recovery. Attention must also be paid to any underlying cause to prevent persisting or recurrent infection. Most cases are not idiopathic and underlying disease in the lower gastrointestinal and urinary tracts should be excluded.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 93 – 95, April 1990.

Case report

Carotid sinus massage in carotid sinus syndrome

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Accepted 29 November 1989.

The cardioinhibitory carotid sinus syndrome is diagnosed when syncopal patients have prolonged asystole during carotid sinus massage. The heart rate slowing and drop in blood pressure in response to carotid sinus massage is commonly reproducible within one minute of pressure over the carotid sinus. The present case disputes the reproducibility of the response in all cases, emphasising the necessity for repeated massage in suspected cases of carotid sinus syndrome and unexplained syncope.

CASE REPORT

A 71-year-old man was admitted to the cardiac unit having had a syncopal episode whilst eating lunch. During the meal he felt nauseated, dizzy and faint and then lost consciousness. After rapid spontaneous recovery he complained of further nausea and vomited until hospital admission. There were no epileptiform movements during the syncope. For the previous year he had had almost daily presyncopal episodes associated with prolonged standing, head turning or looking upwards, but in many episodes no precipitating features were identified. Ischaemic heart disease with infrequent exertional angina had been diagnosed 15 years previously but he was not on prophylactic anti-anginal medication. A diagnosis of alcoholic cirrhosis had been made nine years previously, and he had remained off alcohol since then, with normal liver function tests at subsequent outpatient review.

On examination in the cardiac unit 60 minutes after the syncope he was fit, alert and well orientated. The heart rate was 84 per minute in sinus rhythm. Blood pressure was 150/80 mmHg, with no orthostatic drop. General physical and cardiovascular examination was unremarkable. Serial surface electrocardiographs and cardiac enzyme sampling showed no evidence of myocardial infarction. Echocardiogram and 48-hour cardiac telemetry were also normal. Right and left sided carotid sinus massage on the second and third days after admission produced periods of asystole of 5·2 seconds (right) and 3·2 seconds (left) on day two and 4·4 seconds (right) and 3·0 seconds (left) on day three (Figure). Carotid sinus massage was performed using the technique of Morley et al[1]: Longitudinal massage over the carotid sinus was continued for six seconds, whilst simultaneously palpating the ipsilateral temporal artery; this was sufficient to

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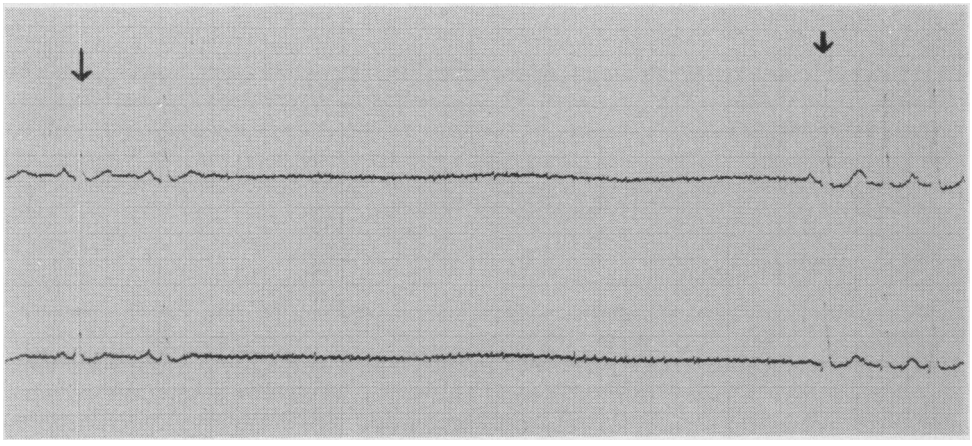

Figure. Carotid sinus massage for six seconds (arrows) producing 5·4 seconds asystole on day seven of hospital admission.

produce slowing of heart rate. A minimum delay of one minute was kept between right and left sided massage. On day four carotid sinus massage was repeated by two observers and on day five by four observers, in the morning and again in the afternoon. On each of these occasions the heart rate slowed from a maximum of 65 per minute to a minimum of 45 per minute, but on no occasion was significant heart rate slowing present. During massage blood pressure was simultaneously monitored to outrule a predominant vasodepressor effect, but systolic pressure remained above 130 mmHg and did not fall more than 20 mmHg on days four and five. Head-up tilt to 70 degrees for 45 minutes failed to reproduce syncope. On the seventh day in hospital carotid massage by the same two observers reproduced asystolic periods of 6·0 and 5·4 seconds (right) and 3·0 and 3·2 seconds (left). The carotid sinus syndrome was diagnosed, and because of the history of syncope and frequent presyncopal episodes a dual chamber pacemaker (Intermedics Avis, DVI Mode) was implanted. The patient remains asymptomatic at one year follow-up with no recurrence of dizziness or syncope.

COMMENT

The cause of syncope may remain undiagnosed in up to fifty per cent of patients despite clinical and electrophysiological investigation (Kenny RA, MD Thesis). More recently, head-up tilt has been used to reproduce vasovagal symptoms in front of a medical witness; this technique identified vasovagal syndrome as a cause of recurrent unexplained syncope in seventy per cent of patients.[2,3] Despite advances in the investigation of syncope a persistent number of patients remain undiagnosed. The present patient had had frequent presyncopal symptoms and a single syncopal episode. After admission carotid sinus massage produced asystole, indicating that the cause of his syncope was the cardioinhibitory carotid sinus syndrome. This response to carotid sinus massage was not consistently reproduced during subsequent follow-up, which may account for the failure to establish this diagnosis in a proportion of unexplained syncope patients.

The carotid sinus syndrome has three clinical presentations: cardioinhibition (asystolic episodes), vasodepression (hypotensive episodes), and a mixed pattern with a predominant cardioinhibitory component, which is commonest. The

diagnosis is established in syncopal patients in whom six seconds of longitudinal unilateral massage over the carotid sinus results in a minimum of three seconds asystole (cardioinhibition) or 50 mmHg drop in systolic blood pressure (vasodepression).[1] Dual chamber cardiac pacing results in symptomatic relief in ninety per cent of patients.[4]

The response to pacing in the present instance was complete with no symptom recurrence at one year follow-up; previously symptoms had occurred daily. The syncopal episode which precipitated admission and some of the presyncopal episodes were vagal in character, and head turning and neck extension, procedures which mimic carotid sinus massage, also precipitated symptoms. Considerable overlap exists between the vasovagal syndrome and the carotid sinus syndrome: seventy per cent of subjects with the carotid sinus syndrome become vasovagal after head-up tilt. Carotid sinus massage does not produce cardioinhibitory or vasodepressor responses in patients with severe vasovagal syncope.[5] This degree of variation in heart rate has not been previously documented.

A negative response to carotid sinus massage does not exclude the presence of the carotid sinus syndrome. The response may not be reproducible and repeated examination is necessary to confirm or exclude the diagnosis in unexplained cardiac syncope.

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The Ulster Medical Journal, Volume 59, No. 1, pp. 96 – 101, April 1990.

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JS LOGAN

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Professor Harper makes the point that this is a disease for real clinicians (of whatever specialty) and that, in the absence of a specific test, followers of the 'serum rhubarb' approach will seldom get far. The diagnostic challenge is heightened by immense phenotypic heterogeneity; the example perpetuated in most textbooks of medicine of the myotonic dystrophy patient as a bald man with a wasted face and small testicles accounts for well under 10% of gene carriers. Professor Harper has studied this disease in a depth equalled by few. From early descriptions of the disease, through to the fine detail of chromosome 19, aspects of myotonic dystrophy are dealt with in a comprehensive yet straightforward manner. Where there is doubt or controversy, he presents both sides of the argument and states his own view. It is difficult to cavil with anything in this book. It is *the* book on myotonic dystrophy and it should be available on the library shelves of any department whose members are likely to encounter these unfortunate patients.

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In general it is well written, although it could be more concise. A helpful reference list is provided. After reading this text, I can only agree with the author's quotation of Saint Augustine — "man looks about the universe in awe at its wonders and forgets that he himself is the greatest wonder of all".

H WHITEHEAD

Diet, lifestyle and health in Northern Ireland. A report to the Health Promotion Research Trust. By M E Barker, S I McClean, P G McKenna, N G Reid, J J Strain, K A Thompson, A P Williamson, M E Wright. (pp 212, figs. £14.75). Coleraine: University of Ulster, 1989.

This substantial and attractively produced report from the Centre for Applied Health Studies at the University of Ulster to the Health Promotion Research Trust gives the preliminary findings of a survey of diet and health in the Province. The study, funded indirectly by the tobacco industry, is very well written with no spelling mistakes, and is virtually free of factual errors.

The methodology is fully described and was obviously carried out most meticulously. I was surprised to hear that a two stage sampling system was adopted because there were no computerised sampling frames available in the Province at the beginning of the study — when in fact there were at least two. There was an excess of female participants in the study and the chances of so large a difference occurring by chance are less than 100 to 1 — could it be that Ulstermen are not as happy at handling cooking utensils as their women-folk? Although the system of sampling is fully described there were no attempts made to estimate the sampling variation. But these are minor criticisms in view of the wealth of valuable material contained in the report. The thoroughness of the team's research (they even got the Provost of their University to chair the Advisory Team!) can be gauged by the fact that the seven field workers travelled well over 205,000 miles around the Province in search of participants, using 5 hired cars (more than 347 miles for each of the 592 subjects who completed the food record). The overall response rate was a highly creditable 74% considering the dietary instrument of choice, the 7-day weighed record. They surveyed males and females aged 16 – 64 years and the results are in line with those reported from other parts of the British Isles where comparable methods have been employed.

The total daily energy intake in males was 2526 Kcals and in females 1670 Kcals. The mean percentage energy derived from fat (alcohol included), was 38·7 gm and 39·6 gm in males and females respectively. Unfortunately no breakdown of the different types of fat is given and consequently the PS ratio remains a mystery. Interesting comparisons of non-manual versus manual and unemployed groups are made: alcohol consumption in unemployed males is particularly high and cigarette smoking levels show a strong gradient with social class and unemployment. In some of the sub-group analyses the numbers are rather small, for example the yield of angina sufferers detected by the Rose angina questionnaire was tiny for a country plagued with ischaemic heart disease, but the authors themselves admit that it is possible that the results may be a 'function of sample size'. The main burden of the report covers nutrition, but nutrition and food do not appear until Chapter 5. Behavioural factors and self-reported health profile precede it and arthropometric characteristics, blood pressure and haematological and biochemical analyses follow. The report concludes with a review of the psychosocial findings.

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The advice given is excellent, and the logic behind treatment choices clearly explained. This new edition is also commendably up-to-date, with appropriate mention of new treatments, and new diseases, such as AIDS. I am sure it will continue to appeal to a wide readership, including pharmacists, laboratory and nursing staff as well as medical students and junior doctors. If I have any reservations, they are minor ones. Despite the explanation given in the introduction, I still feel that a guide to dosing should be given — although practice may vary, one of the purposes of such a book should be to provide sensible guidelines. Finally, the price may deter students from buying their own copy, but it is now available in paperback rather cheaper.

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This is a labour of love and academic affection. Mr Selwyn Taylor is a distinguished academic thyroid surgeon and lately Dean of the Royal Postgraduate Medical School. He has spent his holidays searching for traces of his eponymous hero, and has uncovered many hitherto unrecorded facts. That the trail runs dry in places is not due to lack of diligence, but to the deliberate destruction of family records.

The book is aimed at the general medical reader: Mr Selwyn Taylor attempts to set the scene of Dublin medicine at its apogee and Robert Graves was one of its brightest stars. He has uncovered other Graves' relations still living in ancestral houses in England whose connection antedates Cromwell. He has talked to Graves' great-grandson, living in a remote castle in south east Ireland and has been introduced to all the fascination of Irish genealogical exploration — the cross references and the missing chapters included.

He has provided a useful and accurate assessment of Graves' place in Dublin medicine, and particularly of his magnum opus, "A System of Clinical Medicine" published in 1843. In this work he laid down the basis of his experience in the diagnosis and treatment of fevers and on the spread of epidemics. In the 1846 famine his disagreement with Corrigan as to cause and effect of fever and famine became a medical *cause célèbre.* Selwyn Taylor points to evidence of looming depression and illness in his hero at that time.

Graves' disease represents a very small section of his clinical observations and the eponymous honour was bestowed by his friend Trousseau, Professor of Medicine in Paris. Thyroidologists will read the book for this section, but we will be much more rewarded by a fascinating glimpse into early victorian Dublin medicine. There is no record that Graves ever came to Belfast.

DR HADDEN

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He has provided a useful and accurate assessment of Graves' place in Dublin medicine, and particularly of his magnum opus, "A System of Clinical Medicine" published in 1843. In this work he laid down the basis of his experience in the diagnosis and treatment of fevers and on the spread of epidemics. In the 1846 famine his disagreement with Corrigan as to cause and effect of fever and famine became a medical *cause célèbre.* Selwyn Taylor points to evidence of looming depression and illness in his hero at that time.

Graves' disease represents a very small section of his clinical observations and the eponymous honour was bestowed by his friend Trousseau, Professor of Medicine in Paris. Thyroidologists will read the book for this section, but we will be much more rewarded by a fascinating glimpse into early victorian Dublin medicine. There is no record that Graves ever came to Belfast.

DR HADDEN

Imaging endocrine disorders. Clinical endocrinology and metabolism — International practice and research, May 1989. Vol 3, Number 1. (pp 228, figs. £18.50). London: Baillière Tindall, 1989.

This small book contains an almost totally comprehensive review of modern imaging techniques in endocrinology. The editors point out in their foreword that the chapter on parathyroid disorders is sadly missing due to death of the planned contributor. The inclusion of a chapter on techniques for the measurement of bone mineral is particularly relevant at this time.

Editorial control has resulted in a work without the problems found in some multi-authors' books. The authors give precise guidance regarding the use and accuracy of existing imaging techniques. The relative merits of ultrasound, scintigraphy, CT and MRI are clearly expounded and the indications for invasive and international radiological techniques such as angiography, venous sampling and embolisation cogently explained. A mild caveat might be entered on the quality of some of the illustrations: the majority are of excellent quality.

This volume can be highly recommended to all doctors dealing with patients presenting with endocrine problems and should be compulsory reading for all radiologists.

EM McILRATH

Antimicrobial chemotherapy. (Second edition). Edited by David Greenwood. (pp 372, illus. £20.00, hardback). Oxford: Oxford Medical Publications, 1989.

This is a very interesting book. It is not a formal textbook of microbiology, but focuses instead on the practical treatment of microbial infections. Enough detail of biochemistry is included to enable the reader to understand the mode of action of anti-microbial agents. In a volume of modest proportions, it is perhaps understandable that there is not room for great detail. Instead, the book attempts to cover the whole scope of human infections, which it does quite successfully. Although there are several authors, a uniform and highly readable style is maintained.

The advice given is excellent, and the logic behind treatment choices clearly explained. This new edition is also commendably up-to-date, with appropriate mention of new treatments, and new diseases, such as AIDS. I am sure it will continue to appeal to a wide readership, including pharmacists, laboratory and nursing staff as well as medical students and junior doctors. If I have any reservations, they are minor ones. Despite the explanation given in the introduction, I still feel that a guide to dosing should be given — although practice may vary, one of the purposes of such a book should be to provide sensible guidelines. Finally, the price may deter students from buying their own copy, but it is now available in paperback rather cheaper.

P NICHOLL

Robert Graves: The Golden Years of Irish Medicine. By Selwyn Taylor. Eponymists in Medicine series. (pp 160. £7.50). London: Royal Society of Medicine Services, 1989.

This is a labour of love and academic affection. Mr Selwyn Taylor is a distinguished academic thyroid surgeon and lately Dean of the Royal Postgraduate Medical School. He has spent his holidays searching for traces of his eponymous hero, and has uncovered many hitherto unrecorded facts. That the trail runs dry in places is not due to lack of diligence, but to the deliberate destruction of family records.

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DR HADDEN

Hutchison's clinical methods. (19th edition). By M Swash. (pp 618, illus, figs. £7.95, paperback). London: Baillière Tindall, 1989.

For many years Hutchison's Clinical Methods has been one of the standard recommended textbooks for students of the Queen's University of Belfast Medical School. Sir Robert Hutchison wrote the major part of the original text at the age of twenty-five when he was resident in Great Ormond Street Hospital, London, the remainder being supplied by Dr Harry Rainy, Tutor in Clinical Medicine, Edinburgh. More recently Hutchison's Clinical Methods edited by Hunter and Bomford and later Mason continued to provide a good basic text for students learning the skills of history taking and physical examination.

This 19th edition by Swash therefore carries on a fine tradition. Its evolutionary background still clearly apparent, it has been expanded to include some of the more recent developments in medicine. Like most books of its type it approaches the subject in a system-based fashion. It has an expanded section on sexually transmitted disease and although this includes some reference to HIV infections, this aspect is very brief and inadequate to cover a topic which is and will remain a major health care issue. A major criticism would be the inclusion of some extremely detailed information which seems rather superfluous for students taking their first steps in clinical medicine. For example, details of how to differentiate the vegetative forms of Entamoeba histolytica from Entamoeba Coli, the standard height and nude weights for boys and girls aged 0–5 years, and details of results of bithermal caloric tests seem rather excessive. Although the text includes a paragraph devoted to "Communicating with the Patient", this is extremely brief and does not stress sufficiently the importance of communication skills and techniques which can be used to improve the efficiency and effectiveness of the clinical history.

It is encouraging to see the inclusion of up-to-date technology with echocardiography and CT images. In an introduction to clinical skills more photographs of common clinical signs would be appropriate. Despite these criticisms, this remains an excellent and comprehensive text for the student of medicine both at the early stages of a career or as a refreshing revision for postgraduate clinical examinations.

DR McCLUSKEY

Yes Matron. A history of nurses and nursing at the Royal Victoria Hospital, Belfast. By Peggy Donaldson. (pp 199, illus. £12.50; paperback £7.95). Belfast: White Row Press, 1989.

A book of interest to all nurses, past and present, who have known life within the Royal Victoria Hospital. The early chapters cover the period from 1797 to 1903, at a time which saw the inception of a rudimentary nursing service and the granting of a Royal Charter. It is interesting to note "apart from the perennial difficulty of money the main problem facing the Board of Management in 1870 was what to do about improving the standard of nursing in the hospital" (Page 28) — strangely consistent with the problems of today.

Because of the necessary amount of historical information the book is somewhat difficult to read but interest is maintained by photographs appropriately placed calling to memory old and forgotten friends and events. It is unfortunate that the final chapters appear to have been written with a critical bias against the present Senior Nurse Structure and contain what could be construed as inaccuracies e.g. page 158 — "Miss Barratt was the sixth and final head of nursing . . . " There is still a head of nursing of the RVH. Names — Matron, Principal Nursing Officer, Director — may change but inevitably a large part of the role remains unchanged. Emphasis is placed on events e.g. the reduction in the number of student nurses, the removal of white aprons. These are portrayed as lightly-taken decisions without reference to the reasons why they were taken or of the alternative options.

The unchanging challenge to nurses has been and remains the care of the sick to the highest standard possible throughout periods of change and financial difficulties. To this they have always responded, be it 1797 or 1989.

E DUFFIN

Handbook of neonatal intensive care. (Third edition). By Henry L Halliday, Garth McClure, Mark Reid. (pp 404, figs. £9.95, paperback). London: Baillière Tindall, 1989.

The first two editions of this book have been widely used by medical and nursing staff. This third edition continues with the same brief didactic style, for which no apology is necessary in a book designed to provide safe and practical advice rapidly.

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In the general layout the use of frequent lists and tables imparts a lot of information economically and needs no other justification. The line drawings are excellent. More would be welcome. Ultrasonic scanning is a very important bedside technique in neonatology. The text and diagrams for cerebral scanning are excellent. A few simple diagrams of the ultrasound findings in some of the commoner forms of severe congenital heart disease would be a welcome addition.

In conclusion this book has held a difficult position, contains a vast amount of well presented information and yet is still small enough to be a pocket book.

DA BROWN

Fullness of life. The story of J J Pritchard, Professor of Anatomy at QUB 1952–1979. By Muriel Pritchard. (pp 164. £6.95). Dunmurry: Renewal Publications, 1989.

Wherever and whenever Jack Pritchard is mentioned among gatherings of medical and dental students from Queen's, there will be stories, laughter and fond recollections. Indeed, the great temptation after reading this book, rather than reviewing it, is to be sidetracked into adding mentally to its pages by recalling the good days — and there were many of them — of Jack Pritchard's reign in the Anatomy Department.

But even those of us who worked with Jack in the Department can only have known half the man. Fortunately, Muriel Pritchard kept the family diary/scrapbook, including a portrait of Jack drawn by their daughter, Phillipa, which appears on the jacket and which is lovingly correct down to the last detail of the badly knotted tie. Using these, plus a number of Jack's speeches and contributions from friends and former staff of the Department as the 'bones', Muriel has painted a fuller portrait, not unlike the carefully constructed blackboard diagrams for which Jack himself was so well known. The result is a fascinating and eminently readable volume, tracing Jack's brilliant Australian schooldays to Oxford, where he met two great loves of his life — Muriel and Anatomy — though the latter was almost by accident! After Oxford there was London during the blitz and the post-war period, with Jack making his mark among some of the legendary figures in medicine while Muriel coped with the exigencies of the time plus raising a family. And finally there was the move to Belfast from London, a route that was later to become almost a commuter's hop during years of external examining and world-wide travels.

These early days plus details of Jack and Muriel's several trips abroad make up much of the first half of the book, but it is no mere history lesson, nor a travelogue of someone we in the department used to call *our* visiting professor! Each section is written with fondness and humour around people more than places and nowhere more than in Belfast: it is easy to see from the generous references why the Pritchards were popular arrivals and why in turn, Ulster became their adopted home. Through these personal glimpses emerges a more complete picture of Jack Pritchard the scholar and gentleman. And beyond that, a realisation that he could have been many things — a mathematician, a philosopher, a writer/broadcaster, a cleric, an after-dinner speech writer, or even a physiologist. He could have had his choice of where to work: we were fortunate that chance, or providence, provided the opportunity to come to Belfast. And even there, he could have restricted himself to his laboratory, being largely unavailable to his staff and students, doing the kind and volume of research of which the current UFC would no doubt approve, to bring on himself even greater distinction.

Any book about this extraordinary man is bound to be incomplete — and indeed Muriel confesses to a sense of inadequacy to do justice to its subject. Everyone who knew him will have their own memories. For me it was Jack's love of helping people and the selfless way he gave his time freely to all comers, from the talented to the struggling. As a referee and editor, he often rewrote papers from abroad just to make them acceptable for publication. He wrote countless references for people, always managing to find the best to say about all of them. And — what I most remember — he spent hours with his research students, honing and fine tuning theses and papers. Indeed, if Jack Pritchard could have read

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this book, first he would undoubtedly have been surprised and yet boyishly flattered that anyone should have thought a biography worthwhile; thereafter, I have little doubt that he would have taken out his pencils and spent hours trying to edit it!

It was his love of people, his willingness to help, his humanity and boyish humour that endeared him to all who were lucky enough to know him. We should be grateful to Muriel for providing for us a fuller and lasting memento of someone who was full of life and truly enjoyed it to the full; and for allowing us to share that life in what is essentially a personal book. Jack Pritchard's spirit is well preserved in these pages and his 'Fullness of life' made him a man greatly loved. There can surely be no better epitaph.

PDA OWENS