VOLUME 52 1983 No. 2

THE ULSTER MEDICAL JOURNAL

PUBLISHED BY
THE ULSTER MEDICAL SOCIETY

The Ulster Medical Journal

VOLUME 52

PUBLISHED BY
THE ULSTER MEDICAL SOCIETY
1983

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THE ULSTER MEDICAL SOCIETY

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ROYAL VICTORIA HOSPITAL,
GROSVENOR ROAD, BELFAST.

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THE
ULSTER MEDICAL JOURNAL

PUBLISHED ON BEHALF OF THE ULSTER MEDICAL SOCIETY

Volume 52 1983 No. 2

CLINICAL PROBLEMS WITH A FREE THYROXINE ASSAY

by

P.M. BELL MB, MRCP
Senior Registrar

S.J. TODD FIMLS
Senior Chief Medical Laboratory Scientific Officer

T.J. LYONS MB, MRCP
Research Fellow

D.R. HADDEN MD, FRCP
Consultant Physician

Sir George E. Clark Metabolic Unit, Royal Victoria Hospital, Belfast

THE measurement of serum free thyroxine (FT_4), which forms a small fraction (0.01-0.05 per cent) of the circulating total thyroxine (TT_4), might be expected to provide the most accurate single biochemical index of thyroid status, on the basis that only free hormone is bioavailable. The conventional estimation of FT_4 by equilibrium dialysis[1] is time consuming and the arrival of radioimmunoassay kits suitable for routine clinical use has been eagerly awaited. We have assessed one such kit (Amerlex free T_4) incorporating an I^{125} labelled thyroxine analogue and an anti-thyroxine antibody which binds both the analogue and free, but not protein bound, thyroxine. The competition for antibody binding sites between the known amount of analogue and the unknown amount of free thyroxine allows measurement of the free thyroxine. We have compared the clinical usefulness of FT_4 measured by this technique with that of the more traditional thyroid function tests (TT_4 and a derived free thyroxine index, FT_4I).

PATIENTS AND METHODS

One hundred and one consecutive patients attending the thyroid clinic at the Royal Victoria Hospital were studied. Ten were clinically hyperthyroid, six clinically hypothyroid and the remaining 85 were clinically euthyroid, comprising previously hypothyroid patients stabilized on thyroxine replacement, post-radioiodine follow

A grant has been made from the Royal Victoria Hospital Metabolic Unit Research Fund for the cost of illustrations.

up patients, hyperthyroid patients during a course of antithyroid drug treatment and patients with simple goitre. Patients on thyroxine had been instructed to take their medication as a single dose in the morning. Fifty-two healthy euthyroid controls (hospital staff and medical students), 23 euthyroid pregnant females (second and third trimester) attending the Royal Maternity Hospital, and 10 hospital in-patients with severe non-thyroidal illness (upper abdominal neoplasia, 2; hepatic failure due to cirrhosis, 3; Crohn's disease, 1; renal failure, 1; chronic leukaemia, 1; cardiac failure, 1) were also studied.

FT_4, TT_4 and FT_4I were measured on mid afternoon serum samples and previous treatment of thyroid disease and current therapy were noted. Clinical thyroid status at the time of the blood tests was assessed by one of the authors using standard clinical techniques. Clinical hypothyroidism was confirmed by an elevated TSH level, and all the patients with non-thyroidal illness had normal serum TSH.

Serum FT_4 was measured using the Amerlex free T_4 kit (Radiochemical Centre, Amersham, UK). Serum TT_4 was measured by radioimmunoassay using solid phase thyroxine antiserum (Advanced Laboratory Techniques) and the free thyroxine index was calculated from the ratio of TT_4 to available thyroid hormone binding sites measured by the uptake of I^{131} triiodothyronine (MAA kit, Amersham, UK). The normal ranges (mean $\pm$ 2 SD) for FT_4 (14.8-26.4 pmol/l), TT_4 (72-134 nmol/l), and FT_4I (67-127), were derived from the control group in the present study.

RESULTS

A comparison of the mean values for each test is shown in Table 1. The individual data for the three assay systems are illustrated in Figures 1-3. All three tests gave appropriately high or low values in clinically hyper- or hypothyroid patients. FT_4 values in hyperthyroid patients were more clearly separated from normal controls than were TT_4 and FT_4I values.

TABLE 1

Results of 3 thyroid hormone tests (mean ± S.E.M.)

	CONTROLS (n = 52)	HYPERTHYROID (n = 10)	HYPOTHYROID (n = 6)	EUTHYROID ON THYROXINE (n = 32)	EUTHYROID NOT ON THYROXINE (n = 53)	PREGNANT (n = 23)	NON-THYROIDAL ILLNESS (n = 10)
TOTAL THYROXINE (nmol/l)	104 ± 2	217 ± 21	33 ± 4	108[a] ± 5	85 ± 3	140[b] ± 6	54[d] ± 7
FREE THYROXINE INDEX	97 ± 2	258 ± 29	27 ± 3	99[a] ± 5	75 ± 3	105 ± 5	56[d] ± 6
FREE THYROXINE (pmol/l)	20.5 ± 0.4	83.6 ± 11.7	5.2 ± 0.6	24.2[a] ± 1.7	18.1 ± 0.8	13.0[c] ± 0.6	12.4[d] ± 1.5

a ON THYROXINE > NOT ON THYROXINE $p < 0.001$

b PREGNANT > CONTROLS $p < 0.001$

c PREGNANT < CONTROLS $p < 0.001$

d NON-THYROIDAL ILLNESS < CONTROLS $p < 0.001$

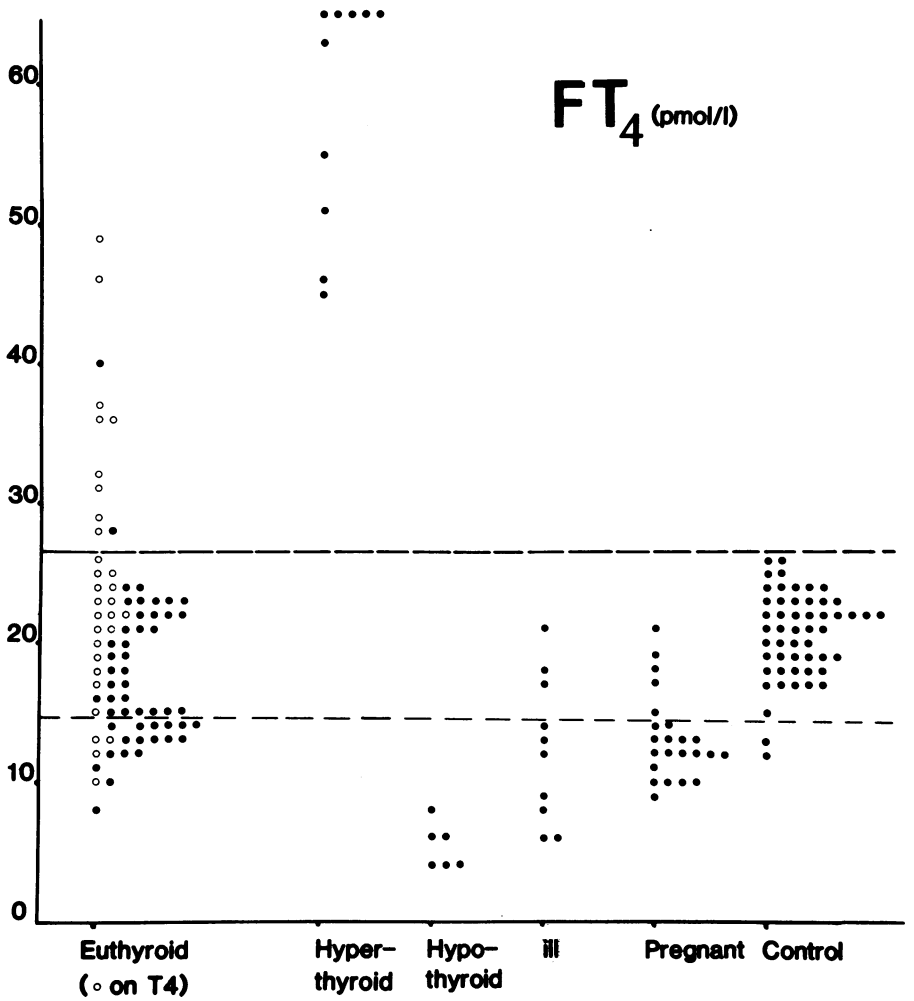

FIGURE 1

Free thyroxine values. Patients on thyroxine denoted by (0). Horizontal broken lines indicate limits of normal range.

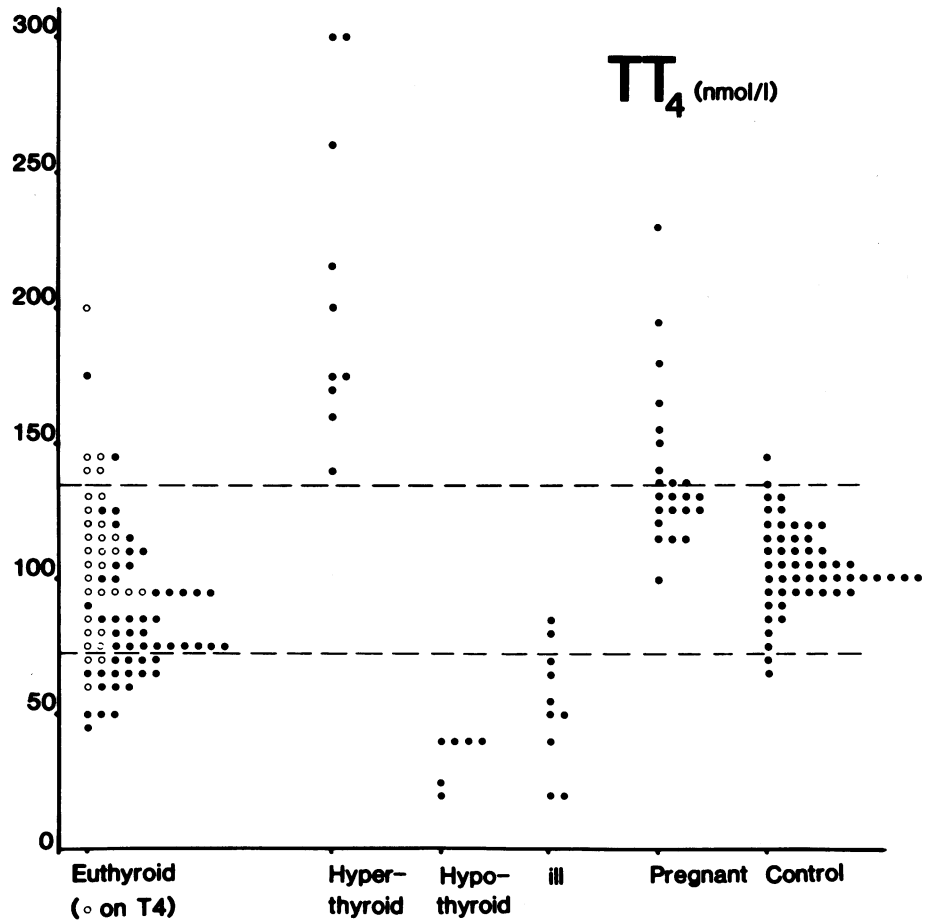

FIGURE 2

Total thyroxine. Patients on thyroxine denoted by (0). Horizontal broken lines indicate limits of normal range.

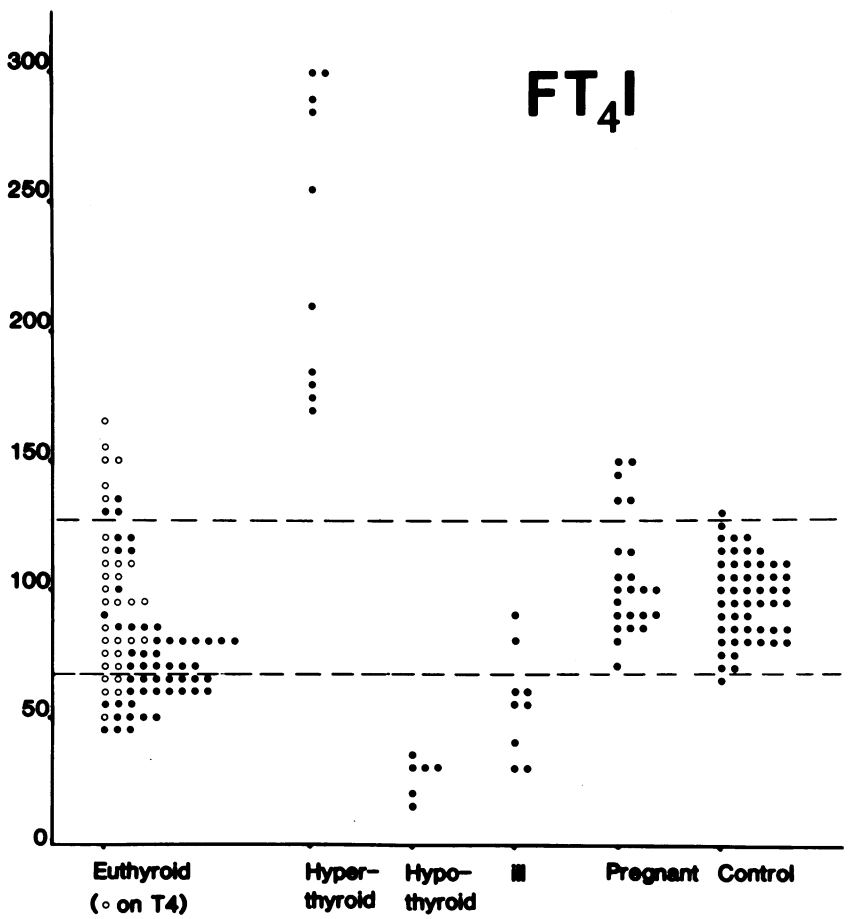

FIGURE 3

Free thyroxine index. Patients on thyroxine denoted by (0). Horizontal broken lines indicate limits of normal range.

FT_4 in 32 euthyroid patients on thyroxine therapy (mean daily dosage 0.13 mg) was significantly higher than in 53 euthyroid patients not on thyroxine, and also higher than in controls: 9 of these 32 patients had FT_4 values in the hyperthyroid range (mean daily dosage 0.16 mg) and in five, FT_4 was grossly elevated. In the 32 euthyroid patients on thyroxine, mean TT_4 and FT_4I were also higher than in the 53 patients not on thyroxine, but were not significantly different from the 52 controls. Only five patients on thyroxine had TT_4 values in the hyperthyroid range, while six had FT_4I values in the hyperthyroid range.

In euthyroid pregnancy FT_4 was lower and TT_4 was higher than in controls. FT_4I values were similar in the pregnant and non-pregnant states.

In severe non-thyroidal illness mean values of all tests (FT_4, TT_4, and FT_4I) were lower than in the healthy controls.

To study the response of each assay to a dose of oral thyroxine, blood samples were taken from two of the controls at frequent intervals over a 48 hour period, a single dose of oral thyroxine (0.3 mg) being taken after 24 hours (Figure 4). In this preliminary study there was a stable baseline without evidence of circadian variation for each of the three assays. Also there was no evidence that following oral thyroxine, the free hormone rose out of proportion to the bound fraction, nor that it fell away more rapidly.

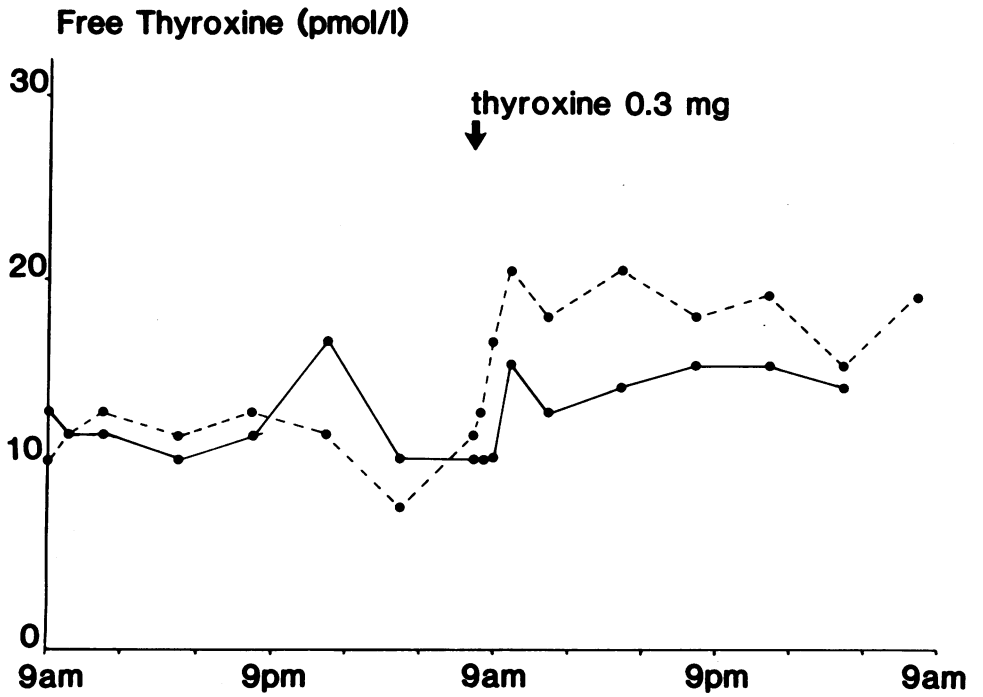

FIGURE 4

24 hour profiles of FT_4, TT_4 and FT_4I before and after 0.3 mg thyroxine in two control subjects.

DISCUSSION

This new FT_4 assay accurately diagnosed clinical hyperthyroid and hypothyroid states. Indeed hyperthyroid patients were very clearly differentiated from normal controls. However, high FT_4 readings were also obtained in clinically euthyroid patients on thyroxine. Slightly elevated TT_4 and FT_4I have been found in treated hypothyroid patients given enough thyroxine to normalise both baseline TSH[2] and the TSH response to thyrotropin releasing hormone.[3] This may reflect a need for relatively higher concentrations of exogenous thyroxine to compensate for the failure of direct triiodothyronine production by the thyroid gland. Though in our study, TT_4 and FT_4I were also elevated in euthyroid patients on thyroxine, the distribution of these values above the upper limit of normal was less markedly skewed than that of the FT_4 values. In some patients on thyroxine (Table 2) FT_4 was

TABLE 2

Clinically euthyroid patients on thyroxine with high FT_4 values

DIAGNOSIS AND THYROXINE DOSAGE	FT_4 (14.8 - 26.4 pmol/l)	TT_4 (72 - 134 nmol/l)	FTI (67 - 127)
HYPOPITUITARISM 0.2 mg	46.4	138	150
GOITRE 0.15 mg	36.1	147	136
HYPOPITUITARISM 0.2 mg	48.9	123	117
HYPOPITUITARISM 0.15 mg	36.1	107	93
HYPOTHYROIDISM FOLLOWING THYROIDECTOMY 0.2 mg	28.3	142	138
HYPERTHYROIDISM (ON PROPYLTHIOURACIL) 0.1 mg	33.5	115	118
HYPOPITUITARISM 0.1 mg	32.2	131	112
HYPOTHYROIDISM FOLLOWING RADIOACTIVE IODINE 0.2 mg	46.4	168	171
HYPERTHYROIDISM (ON NEOMERCAZOLE) 0.1 mg	36.1	147	167

grossly elevated despite relatively normal TT_4 and FT_4I. Four of these patients were on thyroxine replacement for hypopituitarism, therefore TSH would not be present to aid assessment of dosage. Perhaps those patients with very high FT_4 were truly overtreated and the FT_4 assay may detect such patients more easily. The 48 hour profiles in two normal controls provided no evidence to suggest that the high FT_4 in patients on thyroxine was related to timing of dosage.

The actual value of FT_4 in pregnancy is a matter of controversy.[4, 5] Using this assay we obtained low values. It has been argued that a low FT_4 in late pregnancy is adequate to provide normal tissue levels in the presence of very high thyroid binding protein concentrations.[6] However, other FT_4 assay kits give values similar to non-pregnant controls.[7]

In non-thyroidal illness both thyroxine clearance and FT_4 are generally considered to be normal,[8] though low TT_4 is well recognised.[9] We found low FT_4 concentrations perhaps because of unforeseen binding of the analogue to low affinity serum proteins, which may be reduced in non-thyroidal illness. Normal values of FT_4 have been reported with a number of other FT_4 radioimmunoassay kits in this situation.[10, 11]

Falsely high readings with this assay have been obtained in the rare condition of familial euthyroid thyroxine excess[12] and also in the presence of antithyroxine antibodies;[13] this is due to analogue binding to albumin and antibody respectively.

The concept that in euthyroid states FT_4 levels lie within the normal range irrespective of alterations in thyroid binding proteins is perhaps an over-simplification. Circulating protein bound hormone does not just represent an inert store, but is involved in the dynamics of tissue hormone supply. Thus the goal of a single thyroid hormone test which reads within the same normal range in all euthyroid states may be unattainable. Nevertheless tests which most nearly do this will be easiest to interpret in clinical practice. In our study this appeared to be FT_4I. While results from the Amerlex free T_4 assay may be of considerable value, those using it as a screening test should be aware of the altered normal range in pregnancy and non-thyroidal illness, and of the difficulties of interpreting results in patients on thyroxine therapy.

SUMMARY

The clinical usefulness of a free thyroxine (FT_4) radioimmunoassay (Amerlex) was compared with a total thyroxine (TT_4) radioimmunoassay and with a derived free thyroxine index (FT_4I). In hyperthyroid patients FT_4 gave a clearer separation from normal than TT_4 or FT_4I. In 32 clinically euthyroid patients taking thyroxine, mean values of all three tests were greater ($p < 0.001$) than in 53 clinically euthyroid patients not taking thyroxine, although in five of the 32 on thyroxine, FT_4 (but not TT_4 or FT_4I) was grossly elevated. FT_4 may detect overtreatment in apparently euthyroid patients. In severely ill patients all three tests gave lower values ($p < 0.001$) than in controls. In euthyroid pregnancy FT_4 was lower ($p < 0.001$) and TT_4 higher ($p < 0.001$) than in controls; FT_4I in pregnancy was similar to controls. Clinicians using the Amerlex free thyroxine assay should be aware of the altered range of normality in pregnancy, non-thyroidal illness and in thyroxine treated patients.

We are grateful to Dr. A.B. Atkinson, Dr. L. Kennedy and Dr. K. Ritchie who allowed us to study patients under their care. During this work Dr. P.M. Bell was in receipt of a Department of Health and Social Services (N. Ireland) research grant, and Dr. T.J. Lyons was in receipt of a Royal Victoria Hospital research grant.

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THE RHESUS STORY IN NORTHERN IRELAND

by

JOHN F. O'SULLIVAN, MB, BCh, FRCS, FRCOG

Consultant Obstetrician, Royal Maternity Hospital, Belfast

IN the last four decades the Rhesus problem has been defined; its cause then identified, leading on to a rational treatment which for a time was available to the baby after birth but later extended to the baby before birth; culminating in the grand finale—disease prevention. Unfortunately that grand finale, despite the optimism of the seventies, had not yet been reached.

DISCOVERY OF THE RHESUS BLOOD GROUP

For many years, doctors had realised that there was a heterogeneous group of newborn babies who developed jaundice, anaemia or both, which were variants of a single underlying disorder, characterised by haemolysis and erythroblastosis. In 1940, Landsteiner and Wiener[1] published a paper of less than 20 lines in which they described the discovery of the Rhesus blood group system. In the following year Levine[2] reported that haemolytic disease of the newborn or in some cases a stillbirth, was due to incompatibility between mother and fetus.

The next developments took place in England where Fisher,[3] working in Cambridge, predicted and later proposed an alternative notation to the Rh/hr suggested by Wiener. His CDE/cde notation is now accepted throughout the world. Coombs,[4] working in the same laboratory, developed a technique for detecting Rhesus antibodies. This test is also used throughout the world.

Seventeen per cent of women in the British Isles are Rhesus negative, and lack of this antigens is designated by the letters d/d. It has been calculated[5] that three of the seventeen will marry Rhesus negative husbands, six will marry homozygous Rhesus positive (D/D) husbands with a 1:12 chance of the second child being affected, while eight will marry heterozygous Rhesus positive (D/d) husbands with a chance of the second baby being affected in 1:15.

CLINICAL BACKGROUND

Before the introduction of Rhesus prophylaxis the incidence of the disease was 1:200 of all pregnancies. Rhesus negative women became sensitised during the first pregnancy, usually during the third stage of labour as the placenta separated. Minor degrees of placental separation may occur during pregnancy, e.g., threatened abortion, antepartum haemorrhage during external cephalic version and amniocentesis, and play a part in the sensitisation of a small number of patients. Following sensitisation, in any subsequent pregnancy, if the fetus is Rhesus positive, antibodies will be produced. Formerly, blood transfusion had been a major factor in the production of antibodies. Donald[5] reported that pre-1950 over one-third of all patients with antibodies gave a history of blood transfusion.

For many years the only treatment available was a direct transfusion of blood to the baby after birth—often the father's Rhesus positive blood being used! Rhesus negative blood was given after its discovery. Wallestein[6] in New York described the

first "exsanguination-replacement" transfusions. In this procedure he inserted one needle into the superior saggital sinus and a second needle into the umbilical vein. The "exchange" transfusion as performed today only became a reality after the development of the plastic tubing and its introduction into medical practice. In 1947, Diamond[7] brought samples of tubing to Britain and introduced the exchange transfusion. The first such transfusion was performed in Belfast in 1948.[8]

The perinatal mortality remained high so premature induction of labour was considered as another means of improving the results. The Medical Research Council initiated a multicentre controlled trial into the management of patients with antibodies. Two problems were considered— 1) the routine induction of premature labour at three or five weeks before term versus the onset of spontaneous labour, and 2) exchange transfusion versus direct transfusion to the baby. Northern Ireland was represented on the supervising committee by Dr W.A.B. Campbell and all patients in the Belfast teaching hospitals were used in the trial. The results are shown in Table I. The authors[9] concluded that babies born spontaneously at term had a lower mortality than those born prematurely and that exchange transfusion was a better form of treatment than simple direct transfusion.

TABLE I

Results of M.R.C. trial 1952. Fetal loss due to Rhesus disease

Exchange transfusion	13.0%
Direct transfusion	37.0%
Routine induction of labour	36.4%
Spontaneous onset of labour	24.1%

THE LOCAL SCENE

In July 1948, the National Health Service was established. No consultant obstetricians had been based outside Belfast nor were maternity beds available apart from those in the Belfast hospitals. Thus, in 1948, there were only 12 patients with antibodies delivered in the Royal Maternity Hospital, Belfast. The importance of centralisation and the need for paediatric help was obvious. As consultant obstetricians were appointed to peripheral hospitals, patients with antibodies were transferred to Belfast for treatment. In 1956, 63 patients with antibodies had been delivered in the Royal Maternity Hospital, and 15 babies born elsewhere admitted for treatment, while in Jubilee Maternity Hospital 32 patients were delivered and 6 infants transferred for treatment.[8]

Professor C.H.G. Macafee did not accept the results of the MRC trial and instead advocated a policy of selective induction of premature labour. His views were supported by Kelsall and Vos[10] who reported a loss of only 10.7 per cent in infants delivered by premature induction of labour, compared with a loss of 23.4 per cent in those delivered spontaneously at term. Fisher[11] published a series from Royal Maternity Hospital which showed that selective planned induction of labour—as distinct from the MRC routine induction of labour—resulted in a lower fetal loss of

16 per cent as compared with 29 per cent in a similar group delivered at term (Table II). Fisher also pointed out that those infants delivered following induction of labour were from mothers with a bad Rhesus history and required twice as many exchange transfusions as those delivered at term. Campbell[12] reported that a high potassium level in stored citrated blood had toxic effects on many babies during exchange transfusion and recommended that freshly collected heparinised blood should be used for the exchange transfusion.

TABLE II

Fetal loss due to Rhesus disease, Royal Maternity Hospital, Belfast, 1957

Selective induction of labour	16.0%
Spontaneous onset of labour	29.0%

In selecting patients for induction of labour, Professor Macafee admitted such women not later than the thirty-sixth week of the pregnancy. The indications for induction were, to a certain extent, arbitrary, e.g., the history of a previously affected or stillborn infant due to haemolytic disease, a rising antibody titre and a homozygous Rhesus positive father were important factors. During the latter weeks of pregnancy any diminution of fetal movements reported by the patient or an alteration in the fetal heart noted by the midwife were indications for immediate delivery.

CONTINUING RESEARCH

Obviously there was a need for a specific test to help in selecting patients for induction of labour. In 1950, Bevis[13] in Manchester commenced studies on the liquor obtained by hindwater rupture at the time of induction of labour. In 1956[14] he reported that measurement of the bilirubin content of the liquor obtained by amniocentesis during the pregnancy was the best indicator of fetal wellbeing. This test has become the yardstick by which the severity of the disease is measured. The test was improved by Liley[15] who in turn produced the results on a graphic form in which the degree of severity of the affected fetus was recorded in three zones—mild, moderate and severe. Amniocentesis in the management of patients with antibodies was introduced in the Waveney Hospital by Vernon Parry,[16] a former colleague of Bevis.

Amniocentesis is not without risk. In a series of 410 amniocentesis performed prior to placental localisation, Peddle[17] reported that transplacental haemorrhage from fetus to mother occurred in 11.2 per cent. Placental localisation by ultrasound reduces the risk. In the Royal Maternity Hospital, in 1977, despite the use of ultrasound, transplacental haemorrhage was reported in 20 out of 128 amniocenteses performed on women with antibodies. Obviously, in these 20 patients this diagnostic test made the condition worse.

The diagnosis of transplacental haemorrhage could only be made after the introduction of a technique to demonstrate fetal cells in the maternal blood.[18] This test was perfected but was not specifically described in the management of Rhesus patients. Zipursky[19] in Winnipeg was the first to apply this test to maternal blood after delivery.

OTHER TREATMENT

About the late 1950's phototherapy was introduced into the management of the babies. This treatment followed the observation of a ward sister who noted that jaundice faded quickly in those babies who had been exposed for a short time to sunlight. Though there seems no doubt that this is true, the consensus of opinion seems to be that the therapy is of more benefit in jaundice associated with prematurity than in that due to Rhesus disease.[20]

Liley[21] published details of the use of intra-uterine fetal transfusion in an effort to prevent stillbirth or the delivery of very severely affected babies. This procedure was enthusiastically adopted in many centres. In 1964 the first such procedure was performed in Jubilee Maternity Hospital, Belfast.[22] In the following year the first intra-uterine transfusion was performed in Royal Maternity Hospital.[23]

In an attempt to protect the baby from high levels of antibodies while in utero the technique of plasmapharesis was introduced. The results are difficult to evaluate, as other methods of treatment are also given simultaneously, e.g., intra-uterine fetal transfusion. It is possible, however, that repeated plasmapharesis lowers the affinity of the Rhesus antibody and this may explain the apparent success of the procedure.[24] The method was not found rewarding in Belfast.

In 1968, Whitfield[25] introduced his "Action Line" which was superimposed on Liley's zones. While Liley had predicted the severity of the disease, different managements of the patient were advocated by various workers. Whitfield based his recommendation on the results of two bilirubin estimations. This was later modified[26] when liquor studies of the lecithin sphingomyelin area ratio (LSAR) became available. This test is used to estimate the maturity of the fetal lungs. Obviously, if the result was good the baby could be delivered knowing that there would be no respiratory problems in addition to the haemolytic problem. Likewise, if the test was poor then intra-uterine fetal transfusion was needed. The number of intra-uterine transfusions in Royal Maternity Hospital is shown in Table III. The dramatic fall is due mainly to the changes in management and the virtual disappearance of the "grand multipara".

TABLE III

Number of intra-uterine fetal transfusions, Royal Maternity Hospital, Belfast

Year	Transfusions	Patients
1966	6	6
1970	88	55
1975	17	13
1981	1	1

PROPHYLAXIS

The extraordinary story of how an amateur interest in butterflies which had led Clarke[27] to start work on genetics which eventually turned from butterflies to the human blood groups is well known. This led to the discovery that fetal Rhesus-positive cells in the maternal blood could be destroyed by administering anti-D in the

form of gammaglobulin to the mother in the puerperium. At about the same time in the United States of America, Freda et al[28] were achieving similar clinical results, although they had arrived at their conclusions by a different route. Their story is no less bizarre—using volunteers from Sing-Sing Prison as their original subjects.

Routine prophylaxis by the injection of 100 mg of anti-D gammaglobulin within 72 hours of delivery to a Rhesus negative woman who had been delivered of a Rhesus positive baby was introduced in 1970.[29] In 1968 this was given to selected patients following delivery. This was due to the small volume of supplies available. Only in 1971 was routine prophylaxis made available here to all women who required this treatment. The dramatic fall in the number of women with antibodies delivered in Royal Maternity Hospital is shown in Table IV. This is mainly due to prophylaxis but also to the ready availability of contraceptive advice.

TABLE IV

Patients delivered in Royal Maternity Hospital, Belfast

Date	Total	Affected	Fetal loss
1948	12	7	57%
1955	67	54	31%
1968	237	161	19%
1975	116	65	26%
1981	43	36	11%

The Standing Medical Advisory Committee Report on the Prevention of Rhesus Disease[30] recommended that anti-D be given after spontaneous abortions. This had not been the practice in Northern Ireland. An addendum recommending further indications for the use of anti-D is currently being considered. This would include indications such as routine prophylaxis after external cephalic version, etc.

Some women are still developing antibodies. McClelland and McLoughlin[31] reported some disturbing figures from the province (Table V). Obviously, there is room for improvement as some of the patients did not receive anti-D. This applies particularly to those women who abort at home before their blood group is known and to those few women who are delivered at home. With the present methods it is accepted that prophylaxis will fail in 2 per cent of those women who have received

TABLE V

Failures in Northern Ireland 1978-1979: Women with Rhesus antibodies

Failure of administration	11
Failure of treatment	17
Primigravidae	2
Uncertain	1
	31

the gammaglobulin. In several countries this has been reduced by the administration of anti-D during the pregnancy. Figures from Canada, United States, Sweden and Australia show that the failure rate can be reduced to 0.2 per cent.[32] However, the authors use varying quantities of anti-D and administer it at different times during the pregnancy. Their recommendations would require a fourfold increase in the amount of anti-D gammaglobulin required. In the United Kingdom, a further clinical trial, using anti-D during pregnancy is in progress in several centres.

OTHER RHESUS ANTIBODIES

There are a small number of patients with antibodies other than D. There is no prophylaxis against these. It is of interest that there has been no drop in the numbers. The patients from Royal Maternity Hospital have been discussed in detail.[33] Anti-E has not been a problem but C and $\bar{c}$ antibodies may severely affect the fetus and the patients must be carefully supervised. It should be noted that thse antibodies may be found in Rhesus positive patients. Obviously, as prophylaxis against the D antibody continues these others will eventually form the major part of the problem.

CONCLUSION

The story of the Rhesus disease is fascinating, especially as so much, from diagnosis to prevention, has taken place in a very short time. Doctors from many countries have contributed to this. The importance of "teamwork" has been shown—obstetrician, neonatologist, haematologist and physician combining to produce a good end result. Northern Ireland doctors have played an important role in influencing opinion in the United Kingdom.

Complacency must not develop while that "grand finale"—elimination of all anti-D antibodies—has not yet been achieved. We must continually be on our guard to ensure that anti-D gammaglobulin is always given when required and we await the recommendations of the present British research workers which will reduce the disease even further.

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ENDOSCOPIC SPHINCTEROTOMY AND GALL STONE REMOVAL

by

FRANK O'CONNOR, MD, MRCP

Consultant Physician, Altnagelvin Hospital, Londonderry

CALCULI in the common bile duct are extremely common. Although such stones are overlooked at operation in only about 5 per cent of cases, the frequency of gall stone surgery means that there are many patients with retained stones.[1] Stones may rarely form within the biliary system after cholecystectomy. Removal of retained or reformed stones is important because of their morbid potential—cholangitis, hepatic abscess, biliary cirrhosis or pancreatitis. Until recently surgical management has been the only successful method of treatment. Exploration of the common duct increases the morbidity and mortality associated with biliary surgery.[2] Moreover the risks increase with age and the presence of jaundice and indeed those patients requiring surgery for choledocholithiasis are frequently both old and jaundiced. Endoscopic retrograde cholangiopancreatography is helpful in the evaluation of such patients. Removal of gall stones from the common bile duct by endoscopy is being done with increasing frequency and studies to date have shown this to be a relatively safe and effective means of extracting retained stones from the common bile duct.[3] This paper reports our experience with endoscopic sphincterotomy for the extraction of such calculi and for the treatment of other causes of obstructive jaundice over the past two years.

PATIENTS AND METHODS

Patients

Endoscopic sphincterotomy was attempted in 96 patients, with an age range from 26 to 87 years, average 68. Seventy-two per cent were aged over 60 and 44 per cent over 70 years. Indications for endoscopic sphincterotomy were:- choledocholithiasis in 84, periampullary carcinoma in 9 and papillary stenosis in 3. Of the 84 with choledocholithiasis, 44 (52 per cent) had had a cholecystectomy, the interval ranging from two weeks to 30 years. Ten patients still had a T-tube in place. Forty patients (48 per cent) had not had cholecystectomy but 10 had cholecystectomy subsequently. The patients with intact gall bladders either were acutely ill with jaundice, cholangitis or septicaemia or had serious coincidental medical problems including cardiorespiratory insufficiency, advanced liver disease, gross obesity or advanced years. No patients were rejected as unfit for endoscopic treatment. Most patients were referred by consultant surgeons.

Methods

The sphincterotomy was performed in the Radiological Department under sedation with pethidine and diazepam. Standard instruments were used — side viewing duodenoscopes (Olympus JFB3 or JF1T, Japan), diathermy source (Martin, Germany) and sphincterotomy knives (Storz, Germany; Keymed Ltd., England). When retrograde cholangiography confirmed the need for sphincterotomy, the knife

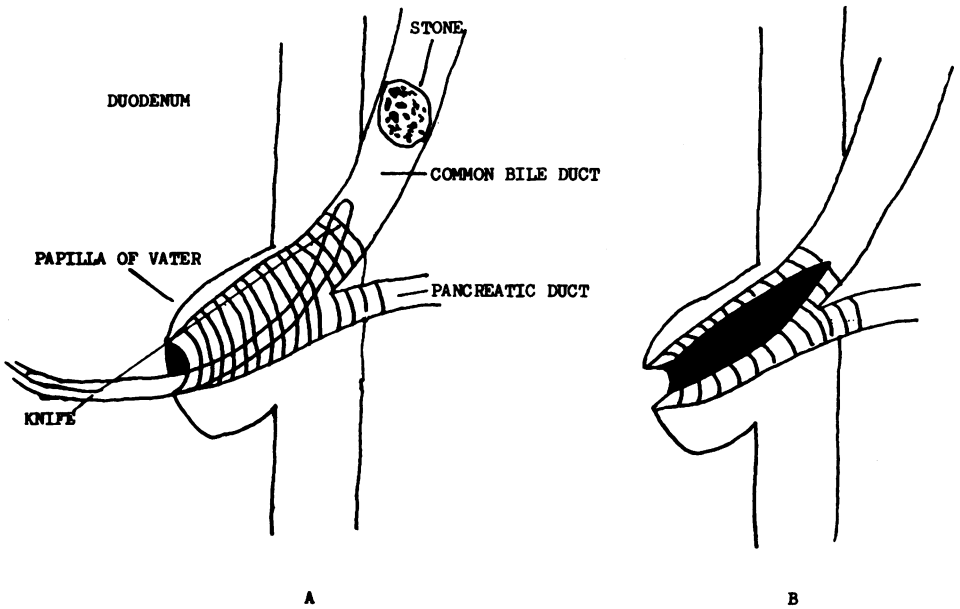

FIG.1A.
Illustration of sphincterotomy knife inserted selectively into the common bile duct in the cutting position.

FIG. 1B
Following electrosurgery the incision extends through the papilla and the muscles of the intramural portion of the distal common bile duct as it enters the duodenum.

was placed deep in the common bile duct. Radiographs were taken to check the position. The knife was then withdrawn until about 15 mm of wire were visible outside the papilla at about 12 o'clock (Fig. 1A and Fig. 2). The wire was tightened to produce a bow and diathermy current was applied in a controlled fashion to make it cut through the roof of the papilla and intramural common duct for a length of 1 to 2 cm (Fig. 1B). The length of cut was tailored to the size of the stones and the length of the intramural portion of the common bile duct as visualized endoscopically. The average time for the procedure was about 30 minutes but some took an hour or more. The presence of duodenal diverticula or altered anatomy from previous gastric or sphincter surgery sometimes made the procedure technically more difficult. The procedure for removal of duct stones after sphincterotomy was variable. In some patients, large or multiple stones were extracted immediately after the sphincterotomy using either basket forceps or a balloon catheter (Fig. 3). In others with smaller or single stones, these were allowed to pass spontaneously and only if they were still present at a check cholangiogram one to two weeks after the sphincterotomy, was any attempt made to extract them actively. In this group a long cannula was left in the bile duct after the endoscope has been withdrawn and this

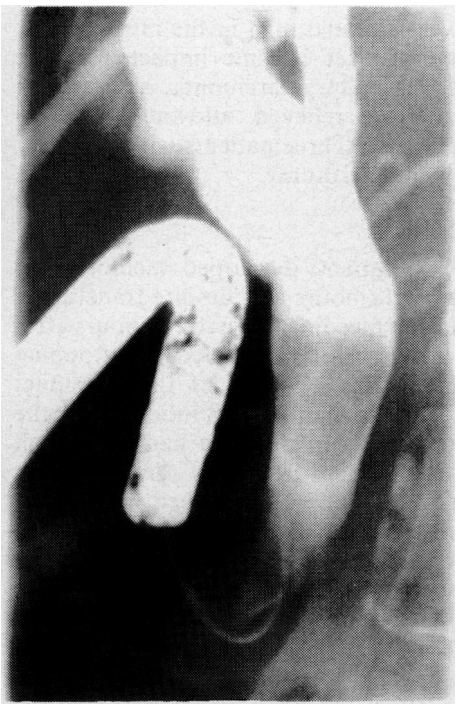

FIG. 2

Radiographic appearances of sphincterotomy knife in cutting position in lower bile duct. The wire has been tightened to form a bow.

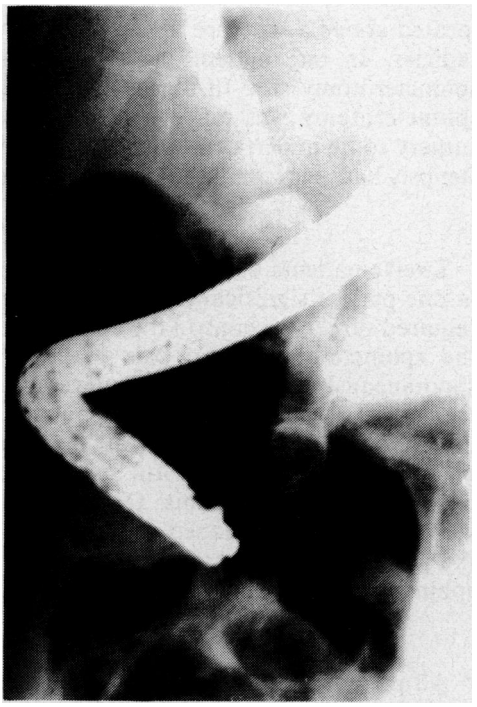

FIG. 3

Stone being removed from the bile duct by basket forceps.

facilitated repeated cholangiograms and drainage of the biliary system if a stone became impacted. This cannula also permitted flushing of the duct. Following sphincterotomy patients were allowed oral fluids within two hours and most were ambulant and eating normally on the following day.

RESULTS

Endoscopic sphincterotomy was successful in 89 of 96 patients (93 per cent). Nine patients required more than one attempt. In patients in whom the procedure failed, or in whom repeated attempts were necessary, it was impossible to place the diathermy wire deeply in the bile duct. Two of these patients had peri-ampullary diverticula, one had had a previous partial gastrectomy and three had peri-ampullary carcinoma. In the 84 patients with choledocholithiasis a successful sphincterotomy was made in 80 (95 per cent) and the bile duct was cleared of stones in 76 (86 per cent). The stones passed spontaneously in 41 and were extracted in 35. In 8 patients the stones could not be removed after sphincterotomy. In these cases the common bile duct was either packed tightly with many large faceted stones or the stones were

located above a stricture in the bile duct or were situated high in the intra-hepatic radicles. In one patient the snared stone and basket became impacted at the sphincterotomy site. In nine patients with peri-ampullary carcinoma, a successful sphincterotomy was made in five and jaundice was relieved, allowing definitive surgery to be undertaken under improved conditions. Three patients with papillary stenosis had improvement in symptoms after sphincterotomy.

COMPLICATIONS

Twelve patients developed complications. Two patients developed haemorrhage, in one patient significant bleeding occurred after 12 hours and despite transfusion required surgery to control the bleeding; in another bleeding occurred 48 hours after the sphincterotomy and was managed by transfusion, the bleeding stopping spontaneously. Eight patients developed cholangitis; in seven of these residual stones were present after the sphincterotomy. Intravenous antibiotics cured the infection within 48 hours in all but two patients; both of these had intact gall bladders. One had successful surgery but the other unfortunately died after her operation from septicaemia. One patient who did not have any retained stones after sphincterotomy developed pancreatitis. His symptoms settled with conservative therapy. In the patient with impaction of the basket forceps and snared stone at the sphincterotomy site the stone and forceps were successfully removed at operation.

FOLLOW-UP

All patients studied continue to be followed up either by myself or the referring consultant. To date there has been no evidence of sphincterotomy stenosis either symptomatically or endoscopically in those patients who have been subjected to a repeat endoscopic examination 6-18 months following the procedure. However, the overall period of follow-up is short — maximum 2½ years. Ten of the 40 patients with intact gall bladders had successful cholecystectomy after the acute illness had subsided. The remainder were elderly or had other serious medical problems and it was thought advisable to observe them without cholecystectomy. Three of these 30 patients have so far suffered attacks of cholecystitis.

DISCUSSION

Endoscopic sphincterotomy is an effective and remarkably safe method of removing stones from the common bile duct. In this series of 96 patients the success rate for achieving sphincterotomy was 93 per cent and for removing duct stones—86 per cent. Complications occurred in 12 and there was one death. These results are similar to those in other reports. In a recent large international survey the overall success rate for stone removal was 90.5 per cent with a mortality rate of 1.4 per cent.[3]

This endoscopic technique obviously has an important clinical role. The precise indications however can only be defined after careful comparison of its results and risks with those of alternative methods of treatment.

The overall mortality rate of cholecystectomy and choledocholithotomy is at least 3 per cent but the incidence of common duct stones and the mortality of their removal both increase with age.[2] Over 65 years the mortality rate increases to 5 per cent.[2] In older patients removal of stones from the duct by endoscopic sphincterotomy means that a simpler and safer cholecystectomy can be done later if necessary.

Between the age of 50 and 65 years the surgical mortality rate is about 1 per cent for cholecystectomy and common duct exploration, similar to endoscopic treatment.[2] The complication rate with choledocholithotomy however can be as high as 30 per cent,[4] much higher that that of endoscopic sphincterotomy. Furthermore it is not always possible to remove all stones from the bile duct and in about 5 per cent the post-operative T-tube cholangiogram shows a retained stone.[5] Consequently some surgeons recommend transduodenal exploration of the bile duct and sphincteroplasty to allow any retained stones to pass spontaneously.[6, 7] For similar reasons other surgeons recommend choledochoduodenostomy,[8] but this procedure is often associated with recurrent episodes of cholangitis due to stenosis at the anastamosis.[9]

In patients under 50 the mortality rate of conventional surgery is less than 1 per cent which is similar to or less than the mortality of endoscopic sphincterotomy.[2] Many symptoms in these patients come from the diseased gall bladder so it is clear that conventional surgery remains the treatment of choice in this age group where the gall bladder is intact. For similar reasons, the use of endoscopic sphincterotomy in the average young and fit patient with a retained stone remains controversial because long term results are not known. However, to date follow-up studies have shown no evidence of stenosis or cholangitis and it is increasingly difficult to convince young patients that they need a further abdominal operation when they know that stones can be removed by a simpler technique. The youngest patient in this series, a woman aged 26, refused to have further conventional surgery and insisted on having the endoscopic procedure performed.

In patients of any age with the gall bladder in situ endoscopic sphincterotomy is an effective emergency treatment for severe cholangitis, septicaemia or biliary pancreatitis. In the elderly or in those patients with severe complicating disease, cholecystectomy may be postponed indefinitely.

In those patients who present with common bile duct stones, months to years after cholecystectomy, secondary exploration of the bile duct may be incomplete in 20 per cent of cases and so a drainage procedure, either transduodenal sphincteroplasty or choledochoduodenostomy, is often added. This combined procedure has a higher morbidity and a mortality of 7 per cent.[7] Endoscopic sphincterotomy thus, has similar benefits to the combined procedure with reduced risks.

In the patient who still has a T-tube drain in situ after a cholecystectomy, other methods apart from surgery and endoscopic sphincterotomy are available including chemical perfusion i.e. saline perhaps with added heparin or sodium cholate and monoctanoin. The latter is probably the perfusate of choice and in a recent series this procedure was successful in 60 per cent.[10] Another method is that developed by Burhenne where a steerable instrument passed through the T-tube track is used to extract the stone. This procedure is remarkably safe and effective and does not damage the sphincter[11] but is only applicable when the T-tube used has been 16FG or larger. Perhaps endoscopic sphincterotomy should be reserved for those patients who have failed a Burhenne extraction or desolution therapy.

In this series nine patients with peri-ampullary carcinoma were subjected to endoscopic sphincterotomy. This relieved jaundice in all five cases in whom cannulation was achieved and so the conditions for the definitive surgical treatment

of the tumour were improved. Three patients with papillary stenosis, defined as biliary tract pain, biochemical evidence of cholestasis and radiologically verified stenosis of the ampullary common bile duct with delayed emptying of injected contrast material, were subjected to sphincterotomy with good relief of symptoms.

This study confirms the finding of earlier studies that endoscopic sphincterotomy is an effective and remarkably safe method of removing stones from the common bile duct and of relieving other causes of obstructive jaundice. However, further studies are required to clarify precise indications for the technique and its long term consequences.

SUMMARY

This study reports our experience of endoscopic sphincterotomy for common bile duct stones and other causes of obstructive jaundice. The procedure was attempted in 96 patients of average age 68 years. An effective sphincterotomy was achieved in 89 (93 per cent). Nine patients required more than one attempt. The bile duct was cleared of stones in 86 per cent. Immediate complications occurred in 12 patients, four requiring surgery and one patient died.

Endoscopic sphincterotomy is a valuable alternative to surgery and in the elderly or high risk patients is a therapeutic advance in the management of common bile duct stones and other causes of obstructive jaundice. The possibility of long term complications suggests the need for caution in using this procedure in young patients who are fit for operation, until the results of long term studies are available.

ACKNOWLEDGEMENTS

I am indebted to my consultant colleagues throughout the province who have kindly referred their patients to me and to my colleagues in the Radiology Department of Altnagelvin Hospital for their assistance and co-operation.

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SURGEON KIRK, MR. PRINGLE AND THE 'P & K' ARM

by

W. V. JAMES, F.R.C.S. and J. F. ORR, B.Sc.

The Rehabilitation Engineering Centre, Musgrave Park Hospital, Belfast

SURGEON Kirk served the Belfast Hospitals from 1897 to 1938 and is often mentioned in the medical history of Belfast. Whenever Surgeon Kirk is mentioned, there is reference to the P & K artificial arm, and this article aims to increase knowledge of that project.

Surgeon Kirk belonged to an age when innovation and strong views were not considered eccentric.[1] He would appear to have had a strong personality, yet is always remembered with affection. His worst defect would appear to have been a chilling stare if one disagreed with his views (Fig. 1).[2] It is said that he failed his Primary F.R.C.S. and declined to repeat an attempt at such an ill-conducted examination. It is claimed that he resigned from the British Medical Association after having an article rejected by the British Medical Journal. He wisely married Miss Constance Rome, who was Matron of the Children's Hospital from 1901 to 1908, where she was earning the princely sum of £60 per annum. He died in 1940, having lived at 21 University Square for 35 years.[3]

FIG. 1 *Surgeon Kirk*

The 1914-1918 war was savage, leaving 41,000 British ex-servicemen with artificial limbs, of whom 11,500 lost upper limbs. To the credit of the Government, it was appreciated by them that the artificial limbs of the day were very basic, and that the artificial limb industry was not organised to cope with the sudden increase in the volume of work. As a consequence, the Ministry of Pensions set about looking for suitable artificial limbs, and organising the artificial limb makers and firms to produce these limbs.

In March, 1918, the Duchess of Abercorn and Surgeon Kirk were invited to the Admiralty in London to consider the supply of artificial limbs to the returning soldier and sailor amputees. Just before the meeting, Surgeon Kirk spent ten days in London investigating the problem. It appeared that whilst the artificial legs were regarded as satisfactory at that time, the arms were clumsy, heavy, expensive and had grasping problems. He returned to Belfast inspired by the lack of knowledge of

the movements of the hand, and the lack of a suitable artificial hand. He carried out a series of dissections at the anatomy department and worked out a basic concept. He mentioned to his friend James Mackie that little seemed to have been done by the engineers to contribute to the production of a suitable artificial hand for the heroic amputees returning from the wars. James Mackie, who ran the large engineering firm of that name, introduced Surgeon Kirk to Alexander Pringle, and thus started the fruitful partnership of Pringle and Kirk, P & K.

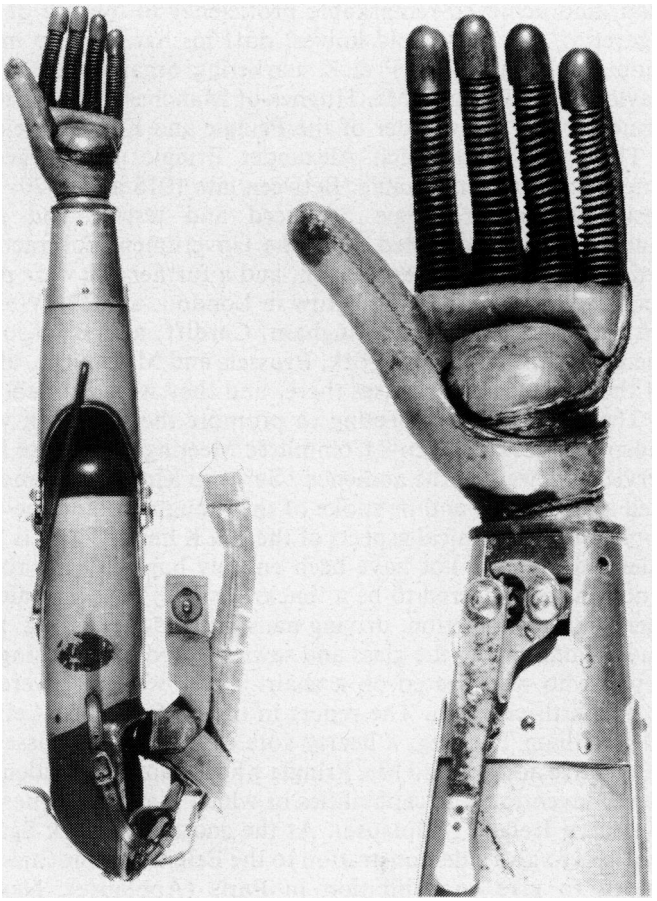
FIG. 2 *Mr. Alexander Pringle*

Alexander Pringle was born at Bessbrook in 1880 (Fig. 2). His two brothers were educated at Trinity College, Dublin, and became doctors, one at Manchester, and the other at Aughnacloy. His eldest sister married James Mackie, and persuaded her father to allow Alexander to escape a medical fate, and become an engineer. After his apprenticeship in Manchester, he went to Boston, U.S.A., in 1901. In 1913 he visited Belfast and James Mackie suggested that young Alexander should organise the tool room at Mackies on American lines.

Surgeon Kirk and Alexander Pringle read of the artificial hand introduced after the American Civil War that had fingers that could be moved by a cable attached to the chest. They experimented and found that the chest excursion was only some two inches, which inhibited the production of a really firm grip. They set themselves the task of designing a hand with a firm 'five-finger' grip. The four fingers consisted of coiled springs, with a heavy leather strap on the back of the finger. Inside the spring was a wire cable attached to the finger tip. When the cable was pulled, the 'D' section of the spring and the position of the leather backing caused the finger to bend to the opposite side (Fig. 3). The thumb was fixed in the earlier models and the fingers opposed to the ball of the thumb. Later models had a movable thumb which could be opposed to selected fingers. Initially the four finger cables were tightened by a small windlass.

Later models had a clever lever and rachet system that could crank the fingers open and shut (Fig. 4). The rest of the arm was fairly conventional. It used the latest material of that time called Certalmid, which was equivalent to the plastic of to-day. The substance was a celluloid-acetate type of mixture, but superior in lightness, strength, cheapness, absolute non-inflammability, rigidity and ease of manufacture.

The experiments were carried out, and the prototypes made in Mackies foundry, where Alexander had the use of the toolroom. Later, McBrides foundry in Alfred



FIGS. 3, 4
The whole artificial arm and the forearm with the level used to crank the fingers.

Street was used. Finally, when it was necessary to go into production, Ewarts Ltd. were of great assistance, and provided a site at 1 Clarence Street, Belfast. There was a small foundry on site, with workshops, fitting rooms and a showroom. The site was opposite the Ulster Hall, and is now occupied by a car showroom.

One of the first men to be fitted with a P & K arm was Sgt. Major Cox (Fig. 5), who had been in the Lifeguards at the time that he lost his arm. Sgt. Major Cox was a fine figure of a

FIG. 5. *Sgt. Major Cox doffs his hat with the artificial limb.*

man, and achieved remarkable proficiency in the use of his arm, and could light cigarettes, saw logs, hold knives, doff his hat, and do many other tricks. He was soon employed in the P & K marketing organisation, and also had Mr. Samuel Taylor of Belfast and Mr. Hughes of Manchester in his team. Between them, they demonstrated the wonder of the Pringle and Kirk artificial arm.

The speed with which Alexander Pringle and Surgeon Kirk developed their enterprise, was remarkable. Between late 1918 and 1920, the hand was researched, designed, the prototype produced and tested, and the intracacies of mass manufacture were sorted out. The Government contracted for a trial run of 180 artificial arms for ex-servicemen, and a further 200 were planned. Showrooms were acquired at 8 Southampton Row in London, and 132 West Nile Street in Glasgow, with fitting rooms at Birmingham, Cardiff, and Blackrock. In one advertisement there is mention of New York, Brussels and Melbourne, although there is no record of the presence of premises there, and they were probably agencies.

The first recorded meeting to promote the invention was at the Royal Victoria Hospital Working Men's Committee Meeting, and there is no doubt that many ex-servicemen were in the audience.[4] Surgeon Kirk spoke, and would seem to have been well appreciated, and he spoke of the thought behind the design. Alexander Pringle spoke on the technical aspects of the P & K hand. There is little doubt, however, that Alexander would not have been entirely happy in the role of orator, and that he would have preferred to be a 'backroom boy'. As a finale, Sgt. Major Cox and his men swung into action, driving nails into wood, writing, pouring water into a glass and drinking from the glass and sawing wood. The closing act was to lift a man and a boy who were seated on a chair. Those watching were very impressed with the P & K artificial arm. The report in the Belfast News-Letter said 'On the notice of Mr. William Topping, a hearty vote of thanks was passed to Surgeon Kirk for his instructive address and Mr. Pringle whose names were identified with the remarkably clever invention, the capabilities of which they had witnessed, and who belonged to Northern Ireland (Applause). At the end of the week Sgt Major Cox was to go to Brussels to give a demonstration to the Belgian Authorities (Applause). After that he hoped to give an exhibition in Paris (Applause). Next month they hoped to demonstrate the arm positively to the Canadian and the United States Governments (Applause)'. All this was heady stuff, but there are no subsequent records of these visits.

The meeting at the Royal Victoria Hospital was the first of many such promotional meetings in the United Kingdom. The P & K Arm Ltd., of which Alexander Pringle was now Managing Director, held demonstrations at the Meath Hospital in Dublin, and at the Comrades Club in Barrow.[5] In October, 1920, they took a stand at the London Medical Exhibition, and rated mention in the Daily Mirror,[6] Daily Herald,[7] and the Daily Telegraph.[8] The headlines in the Mirror read 'Almost Human Arm', and the Herald read 'Almost Human'. Sgt. Major Cox and his team had done well.

Alexander Pringle carried on with his prosthetic research, for in 1921, an advertisement appeared headed "Something new in artificial legs".[9] Beneath it was written "The knee joint automatically locks every time the bearer's weight is taken on the artificial leg". The Pringle family recalls that one of the prototypes of the knee-lock failed, and the guinea pig was almost arrested for being drunk and disorderly because of his odd gait pattern, and had to be rescued from the constabulary. This was another remarkable invention by Alexander Pringle, and is still used to-day.

The firm appeared to prosper. One possibly lucrative enquiry came from a South American Republic for a quantity of 'arms' for use in a forthcoming revolution. The P & K arm was, in fact, rather heavy, and other amputees did not seem to be as capable as Sgt. Major Cox at lifting glasses, writing, shovelling, and doffing their hats. The Ministry of Pensions, who had a virtual monopoly of the industry, held comparative tests of artificial limbs. At a demonstration at the Meath Hospital, Major Daly and Colonel Joynt demonstrated the 'Bray Arm', and a Mr. Ferris demonstrated the P & K Arm. The account in the Belfast Telegraph said under the heading "Maimed Heroes", "If the experts were astonished at the results achieved by the use of the Bray Arm, they were amazed at the advantages conferred by the P & K Arm. It is the invention of Surgeon Kirk and Mr. A. Pringle, engineer of Mackie & Son Ltd. of Belfast".

Whereas the P & K Arm carried out many functions imperfectly, other manufacturers were using a series of special interchangeable terminal devices doing a restricted job more efficiently. If movement of the terminal device was needed, the P & K Arm used a lever which had to be worked with the opposite hand, whilst the opposition used a shoulder harness, which meant that both hands could be used at once. It came down to a choice of a multipurpose artificial hand with a lever action, against an interchangeable terminal device that used shoulder power.[10] The P & K Arm was also heavier than its rivals. The Ministry preferred the competitors, and the loss of support meant that the main source of artificial limb orders was cut off, and business dwindled over the years. Alexander Pringle continued his development work, producing the 'Designascope', a development of the kaleidoscope, and the 'Pendograph' which turned out harmonic designs.

Surgeon Kirk was also a man with original ideas. In an era without antibiotics, it was reasonable to presume that antibodies were the answer to some problems, and it was known that the antibodies were in the serum. Surgeon Kirk believed that serum was the answer, and the older the serum, the more the antibodies it contained. He obtained blood from the abbatoir, from the oldest cattle available, separated off the red cells, and had the patients drink the nauseous fluid. Later, he dried the serum, and there was a danger that if you visited his ward at the Royal Victoria Hospital, you might be invited to have sandwiches with a slightly gritty taste. Later, the serum was compressed into little brown tablets. His friend Alexander Pringle designed and built the plant to produce powdered serum and pills. Sadly, the answer to mankind's ills was not a brown pill, in spite of changing from cattle to horse serum.

By 1937, the lease on the premises at Clarence Street expired and the landlords required the site for development. Rather than set up elsewhere, Pringle and Kirk decided that they had had enough, and sold the goodwill to Bradbury's Ltd., and some there can still remember selling the brown pills of horse serum. It is said that Surgeon Kirk lost money on his investment, but others feel that both Pringle and Kirk broke even. Surgeon Kirk carried on with all his other activities until he retired in 1938, and he died in 1940. Dr. R.W.M. Strain wrote of him in the Ulster Medical Journal "Many will remember his deep quiet voice, and his brown eyes and his gentle manner. He was both a gentleman and a definite character".

His friend Alexander Pringle returned to Mackie & Sons, in 1937, and during World War II produced some outstanding designs for speeding up the production of munitions—once again. When his wife, Grace, died in 1949 he retired to live with his

sister near Aughnacloy. He was a man interested in science. His hobbies were archaeology and geology and he belonged to the Belfast Naturalist Field Club. Latterly he took up gardening and bee-keeping. A brilliant man, a studious man, a practical man, and a likeable man. He died in 1959.

The P & K Arm was a remarkable effort. Considering that neither Pringle nor Kirk were familiar with the problems of artificial limbs in early 1918, and had researched, designed and produced an original artificial hand by 1920 without the benefits of modern techniques and equipment, it was a brilliant effort. The ideas used were original, and it is unfortunate that the lever technique was used, otherwise the design was excellent. The competition at the time was fierce. By 1921, questions were being asked about costs, and the Ministry of Pensions were paying £326,000 for artificial limbs in 1920, and £217,000 to repair them. At that time a conventional wooden limb cost in the region of £25, and a metal limb £80. The Ministry had to balance expensive perfection against cash available. Although the project failed commercially, neither Surgeon Kirk nor Alexander Pringle could be reproached about their excursion into prosthetics. They introduced new principles into both upper limb prosthetics that are still in use to-day.[11]

An aide in the physiotherapy department of the Ulster Hospital knew of the interest of the Rehabilitation Engineering Centre in rehabilitation and prosthetics. She asked if the Centre would be interested in her Aunt's artificial arm. Her aunt lost her arm in a mill accident in 1920, and this was the arm that was presented. This article has been written because a faded sign was seen on the artificial limb which said:-

The P & K Arm
1 Clarence Street, Belfast.

We are very grateful to John and Vernon, sons of Alexander Pringle, and to Michael, his grandson, for all the information about Alexander Pringle, and for the photographs of Alexander Pringle, Surgeon Kirk and Sgt. Major Cox.

We would also like to thank the Department of Medical Illustration of the Belfast City Hospital for the preparation of these old photographs for publication.

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ANTIGLIADIN ANTIBODIES IN DERMATITIS HERPETIFORMIS

by

S. A. McMILLAN, THELMA HUTCHISON, MARGARET HAIRE, GRACE ALLEN and AGNESE KELLY

Immunology Laboratory and Skin Department, Belfast City Hospital

DERMATITIS herpetiformis (DH) is an intensely itchy dermatosis of a chronic nature. Although the lesions most often consist of tense vesicles grouped on the extensor surfaces of the body, they may also be erythematous, urticarial or papular and more diffuse. As a result of the intense itch the lesions are excoriated and frequently present as small crusted areas. Thus other parameters are necessary to assist in diagnosis.

For many years therapeutic response to sulphones or sulfrapyridine was an important criterion in diagnosis, while more recently the diagnosis has been confirmed by the finding of deposits of immunoglobulin A (IgA) in clinically uninvolved skin. Since gluten sensitive enteropathy occurs in all patients with DH in varying degrees,[1] associated villous atrophy in jejunal biopsies has been used as an additional diagnostic aid. The presence of a serum antibody to gliadin, a component of gluten, has been associated with patients with gluten sensitive enteropathy,[2, 3] and we suggest that detection of this antibody may be an additional help in differentiating patients with DH from patients with other itchy skin conditions and may in certain cases eliminate the need for a jejunal biopsy sample.

PATIENTS AND METHODS

Patients

During the period April 1976 to December 1980, one hundred and thirty patients presented at the Skin Department, Belfast City Hospital, with an itchy skin rash. The age of these patients ranged from 9 years to 86 years with a sex distribution of 70F:60M. Serum and skin biopsy samples were obtained from all the patients for routine autoantibody screening and immunopathology. The final diagnosis of the 130 patients was based on clinical features and immunopathology. A diagnosis of DH was based on the clinical appearance of the rash, the response to dapsone, and the presence of IgA deposits in uninvolved skin. All patients at the time of sampling were on a normal diet and not on dapsone therapy.

Biopsy Specimens

Eliptical skin biopsies, excised with a scalpel from uninvolved areas of skin under local anaesthetic, were obtained from all 130 patients and were snap frozen in liquid nitrogen. Jejunal biopsies were obtained from 20/130 patients.

Immunopathology and Histopathology

Cryostat sections (5 μm thick) were tested by direct immunofluorescence using fluorescein isothiocyanate (FITC) conjugated sheep antibodies to human IgG, IgA,

IgM, C_3 and fibrinogen (Wellcome Diagnostics, England). Jejunal biopsies were stained by haematoxylin and eosin.

Serological Investigations

The sera of the 130 patients were tested for autoantibodies in the IgG, IgA and IgM classes to nuclei, smooth muscle, gastric parietal cells, mitochondria, thyroid, reticulin and gliadin.[4] Sera were only considered positive for antireticulin antibody (ARA) if the R1 fluorescence pattern described by Rizzetto and Doniach[5] was seen. IgG, IgA and IgM class antigliadin antibodies were detected by indirect immunofluorescence, as described by Unsworth et al.[6] Serum samples were tested on cryostat sections of rat composite tissues which had been exposed at room temperature to an aqueous solution of gliadin (Sigma Chemical Company) (0.1 mg/ml). The sections were first exposed to the patients' sera and after washing in phosphate buffered saline (PBS) for 30 minutes, they were exposed to FITC-conjugated sheep antihuman IgG, antihuman IgA and antihuman IgM (Wellcome Diagnostics, England) for a further 30 minutes. After a further hour's wash, the slides were mounted in glycerol saline, and were examined with a Leitz immunofluorescent microscope. Those sera with antigliadin activity gave a reticulin pattern similar to that of the R1 fluorescent staining of ARA on rat composite tissues not pre-treated with gliadin.

RESULTS

Clinical categories

The final clinical assessment of the 130 patients who presented with an itchy skin is as follows: Prurigo was the most common diagnosis (42/130 patients). Dermatitis herpetiformis was diagnosed in 26/130 patients and in a further five patients a diagnosis of DH was thought probable as these patients responded clinically to dapsone. However, IgA deposits were not detected in biopsies of their uninvolved skin, and repeat biopsies were not performed. Eczema was the third most common diagnosis (19/130). Four patients had dermatitis, three each urticaria or pemphigoid, two each nickel sensitivity or neurodermatitis. There was also one case each of bullous eruption, myeloid metaplasia, subcorneal pustular dermatosis, vasculitis, pityriasis lichenoides et varioliformis acuta and acne excoree. A diagnosis was not made in 15 patients.

Skin immunopathology

In 23/26 patients, whose uninvolved skin contained IgA deposits, the pattern was papillary while in the remaining three, it was linear in character. Sometimes deposits of IgM and C_3 were also found.

Villous atrophy

Jejunal biopsies were performed in 16 of the 26 patients with DH. There was significant villous atrophy of the jejunal mucosa in 11/16 of these patients and in 8 of these 11 patients AGA was found. Anti-gliadin antibody was not found in the five patients with DH with normal jejunal mucosa, nor in the group of patients without deposits of IgA in skin (probable DH) (Table). Normal mucosa was found in jejunal biopsy specimens in 4/5 of these patients.

TABLE

Titres of antibodies to gliadin and to reticulin in immunoglobulin classes G and A and findings of histopathological examination of jejunal biopsies in the 26 patients with DH.

Patient Number	*Titre[a] of antibody to gliadin*		*Titre[a] of antibody to reticulin*		*Jejunal Villous atrophy*
	IgG	*IgA*	*IgG*	*IgA*	
1	20	—	—	—	ND[b]
2	—	80	—	80	+
3	20	20	20	20	ND
4	40	20	40	—	+
5	—	40	—	—	+
6	20	—	—	—	+
7	—	20	—	—	+
8	80	20	—	—	ND
9	20	—	—	—	+
10	20	20	—	—	ND
11	20	—	—	—	+
12	—	40	—	—	+
13	—	320	—	320	ND
14	—	—	—	—	+
15	—	—	—	—	+
16	—	—	—	—	+
17	—	—	—	—	ND
18	—	—	—	—	—
19	—	—	—	—	—
20	—	—	—	—	ND
21	—	—	—	—	ND
22	—	—	—	—	—
23	—	—	—	—	—
24	—	—	—	—	—
25	—	—	—	—	ND
26	—	—	—	—	ND

a Antibody titre is expressed as a reciprocal of the serum dilution.

b Not done.

Serological findings

The sera of 13/130 patients contained antibody to gliadin in IgG and IgA classes only, and these patients were all diagnosed as DH. Five patients had AGA in IgA class; four patients AGA in IgG class and four patients had AGA in both IgA and IgG classes. In only four of the AGA positive patients was there a corresponding presence of antireticulin R1 antibody (Table). Other autoantibodies detected were not of significance.

DISCUSSION

The variety of skin conditions which present with an itchy skin indicates the need for simple tests to help in diagnosis. We present evidence that the presence of AGA in serum may be an additional screening test defining patients with DH in whom there is marked enteropathy. Antigliadin antibody has been detected in a number of patients with DH and coeliac disease and its presence is a good indicator of the degree of gluten sensitivity as expressed by mucosal damage.[2, 3]

In the present study detection of AGA in serum of 50 per cent (13/26) of the patients in whom DH was diagnosed, and the correlation between the presence of this antibody and atrophy of the jejunal mucosa is in agreement with the findings of Unsworth and his colleagues.[2] In all of our patients with AGA, from whom jejunal biopsies were obtained, villous atrophy was found.

In the five patients who were diagnosed as "probable" DH, IgA deposits were not found in uninvolved skin, although they did have a characteristic skin rash which responded to dapsone. Fry and Seah[7] have stated that more than one biopsy may be needed if IgA deposits are to be found. It is interesting to note that neither AGA nor ARA was detected in these patients, and in those from whom jejunal biopsies were obtained, the mucosa was normal.

Antigladin antibodies are not specific for patients with DH and they have been reported in a percentage of patients with other intestinal conditions such as coeliac disease, transient gluten intolerance, cow's milk sensitive enteropathy, Crohn's disease and ulcerative colitis.[3, 6, 8] In our series AGA was only found in those patients with DH and this is probably due to the fact that none of the other patients had clinical evidence of intestinal disease.

Antigliadin antibody in the IgA class has been reported to be a sensitive indicator of severe gluten sensitivity in patients with coeliac disease, and appears to be most likely to be found in this condition.[3] However, in patients with DH we have found AGA in both IgG and IgA classes in association with villous atrophy.

In this investigation, AGA were only found in patients with DH who had associated atrophy of their jejunal mucosa, and therefore the presence of AGA may be a useful additional test for the diagnosis of patients with DH who have marked gluten enteropathy and may eliminate the need for a jejunal biopsy in these patients. The presence of AGA may also be useful to monitor the effectiveness of a gluten-free diet in patients with DH.

SUMMARY

During the period April 1976 to December 1980, 130 patients presented at the Skin Department, Belfast City Hospital, complaining of an itchy dermatosis suggestive of dermatitis herpetiformis. Twenty-six of these patients were finally diagnosed as having dermatitis herpetiformis (DH) on the basis of the response of the rash to dapsone and the presence of IgA deposits in uninvolved skin. Antibodies to gliadin (AGA) were detected in 13 of these patients and in those patients from whom a jejunal biopsy was taken, the presence of AGA correlated with villous atrophy. We report that the presence of AGA may be of additional help in the diagnosis of DH and may, in certain cases, eliminate the need for jejunal biopsy.

We wish to thank the medical and nursing staff of the Skin Department and Gastroenterology Unit, Belfast City Hospital and also the staff of the Immunology Laboratory, Belfast City Hospital for their technical assistance. We would also like to thank members of the Histopathology Department, Belfast City Hospital for examination of the jejunal biopsies. We thank Mrs. J. Hamill who typed the manuscript.

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PREGNANCY AND DIABETES— THE IMPROVING PROGNOSIS

by

A. I. TRAUB, J. M. G. HARLEY, D. A. D. MONTGOMERY and D. R. HADDEN
Royal Maternity Hospital, Belfast

THE continuing fall in perinatal mortality for the general population highlights those conditions such as diabetes which are still associated with an unacceptably high incidence of intrauterine and perinatal deaths (Fig. 1). The management in Belfast of patients with pregnancy complicated by diabetes was originally reviewed in 1956[1] at which time the perinatal mortality was approximately 20 per cent, i.e. 1 in 5 pregnancies which progressed beyond 28 weeks gestation, resulted in a dead baby, a stillbirth or neonatal death within seven days of birth. Subsequently, a combined metabolic/antenatal clinic was established in the Royal Maternity Hospital, Belfast, in 1959, and over the following 8 years the perinatal mortality was reduced to 12 per cent.[2]

The purpose of this paper is to present the most recent results from the combined clinic over 10 years (1.1.72—31.12.81) and to discuss changes in the management of the pregnant diabetic which may further reduce the perinatal mortality and morbidity and, perhaps more importantly, reduce the incidence of fetal malformations.

PATIENTS AND MANAGEMENT

The patients under review were insulin-dependent diabetics diagnosed before pregnancy, apart from seven who were diagnosed during pregnancy and confirmed after delivery: their management followed clearly set out guidelines. At the booking visit to the clinic, all patients who required stabilization of their diabetes were admitted to hospital and discharged only when control was satisfactory. The importance of control was emphasized and those not admitted were given instruction in self-monitoring of capillary blood glucose. In the past this was carried out using visual assessment of a glucose-oxidase impregnated strip (Dextrostix, Ames). More recently, patients have been taught to use a portable reflectance meter (Glucometer, Ames) to read the strips and to check preprandial capillary blood glucose four times daily. Patients attended every two weeks unless more frequent visits were necessary; the results of venous plasma glucose levels (and latterly glycosylated haemoglobin) measured 48 hours previously by arrangement with their local hospital or health centre were available, as were the records of the patients' home monitoring. All patients were instructed to make minor adjustments in insulin dosage dependent on the preprandial plasma glucose result, and the overall trend was monitored at each

Royal Maternity Hospital, Belfast, BT12 6BB
A.I. Traub MD MRCOG, Senior Tutor.
J.M.G. Harley MD FRCOG, Professor of Clinical Obstetrics and Gynaecology.
Royal Victoria Hospital, Belfast, BT12 6BA
D.A.D. Montgomery CBE MD FRCP FRCPI FRCOG, Honorary Consultant Physician, Sir George E. Clark Metabolic Unit.
D.R. Hadden MD FRCPEd, Consultant Physician, Sir George E. Clark Metabolic Unit.

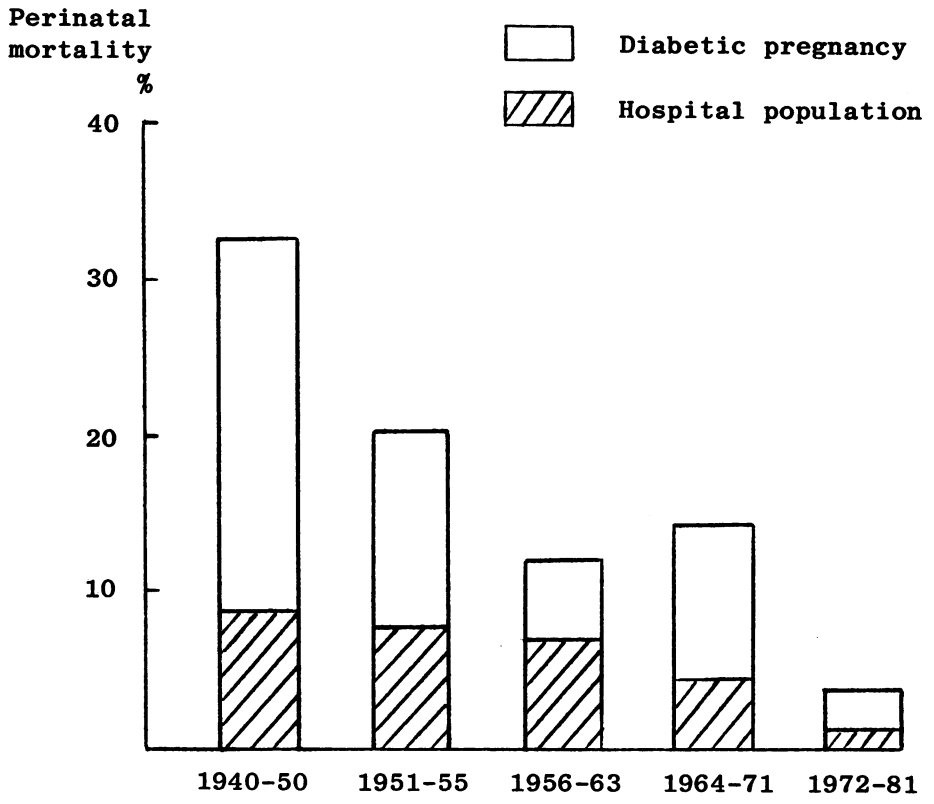

FIG. 1

Perinatal mortality in diabetic pregnancy compared with that of the hospital population. Royal Maternity Hospital, Belfast, 1940-1981.

clinic visit. The aim was to maintain the plasma glucose as close as possible to 5 mmol/l at all times. Admission to hospital was arranged if at any time there was difficulty with diabetic control or any obstetric complication arose, particularly pre-eclampsia or polyhydramnios.

In the thirty-second week of pregnancy all patients were admitted for closer supervision of their diabetes and continuous intensive assessment of fetal wellbeing by clinical examination and ultrasonic scanning every two weeks. In addition, urinary oestriols and serum HPL were measured and cardiotocography was carried out twice weekly. As inpatients they were referred to the diabetic eye clinic for ophthalmoscopic examination to detect possible diabetic retinopathy. After the thirty-sixth week an x-ray of the abdomen was obtained for further examination of the gestational age and to help exclude fetal malformation. A week later amniocentesis was performed and the patient delivered at 38 weeks if fetal pulmonary maturity was confirmed by a lecithin-sphingomyelin area ratio (LSAR) of greater than 2.0. Induction of labour or elective caesarean section was carried out after

consideration of many factors. A paediatrician was always present at delivery and the baby admitted to the nursery for observation for at least 24 hours.

RESULTS

One-hundred-and-sixty-nine insulin-dependent patients were treated, 86 per cent of whom had booked for confinement in the Royal Maternity Hospital, the remaining 14 per cent being transferred from other centres with complications such as poor diabetic control, severe pre-eclampsia or premature labour. Fifty-four per cent of patients resided in the Eastern Health and Social Services Board, the rest being evenly distributed among the other Health Boards in Northern Ireland.

Of the 169 pregnancies, seven ended as spontaneous abortions, one of which was at 24 weeks. The 162 which progressed beyond 28 weeks gestation included 4 sets of twins; therefore the number of babies born was 166. Of these, there were 161 live births, 5 stillbirths and 2 neonatal deaths; 3 of the 7 perinatal deaths were the result of congenital heart lesions. The perinatal mortality rate was 4.2 per cent and the stillbirth rate 3.0 per cent. Two further deaths occurred in the fifth week of life: in one case, the mother overlay the baby as a result of a hypoglycaemic coma, whilst another baby died from a congenital heart lesion. Both cases, by definition, are not 'perinatal deaths' but in each the maternal diabetes clearly made a major contribution. Thus, the total fetal loss in this series, including the 7 abortions, was 16 (10 per cent) (Table I).

TABLE I

Outcome in diabetic pregnancy, Royal Maternity Hospital, Belfast, 1972-1981.

PREGNANCIES		169
Spontaneous abortion		7
Twin pregnancy		4
INFANTS		166
Live birth		161
Stillbirth		5
Neonatal death		2
TOTAL FETAL LOSS	(16)	10%
STILLBIRTH RATE		3%
PERINATAL MORTALITY RATE		4.2%

The incidence of congenital abnormality was 16 per cent (Table II) and many of these were minor abnormalities such as tongue-tie or hypospadias. There were 11 major abnormalities, of which the most common was a heart defect: such lesions were responsible for 3 of the 7 perinatal deaths. The CNS abnormality was anencephaly and this pregnancy was terminated at 17 weeks. The bony abnormality was sacral agenesis, which although rare, has a well recognized association with maternal diabetes.[3] Only one baby had multiple abnormalities and this accounted for one of the perinatal deaths attributed to a heart defect.

TABLE II

Congenital fetal malformations in diabetic pregnancy, Royal Maternity Hospital, Belfast.

CVS	—	Heart lesions	8
CNS	—	Anencephaly	1
SKELETAL	—	Sacral agenesis	1
MULTIPLE	—	Heart, kidney, limbs	1
MINOR ABNORMALITIES, eg		Hypospadias	15
		TOTAL	26
		Malformation rate	15.6%

The most common obstetric problems were pre-eclampsia (30 per cent) and polyhydramnios (17 per cent). The incidence of urinary tract infection, anaemia and monilial vaginitis did not differ significantly from that of the general population. During the last two years five patients were found to have proliferative retinopathy which required laser photocoagulation during or immediately following the pregnancy.[4]

The mode of delivery was by caesarean section in 52 per cent, there being an added complication such as pre-eclampsia in half of these cases. The forceps delivery rate was 20 per cent and is considerably higher than that for the general population, this figure being largely influenced by the increasing use of epidural anaesthesia.

DISCUSSION

Perinatal mortality is the end-point by which the quality of antenatal and perinatal care is judged. It is defined as the number of stillbirths and deaths occurring in the first seven days of life per 1,000 live and stillbirths. The introduction of a combined metabolic/antenatal clinic at the Royal Maternity Hospital, Belfast, has brought about a considerable improvement in the prognosis for diabetic patients over the last 20 years, during which time the perinatal mortality rate has been reduced from 12 per cent to 4.2 per cent and the stillbirth rate from 19 per cent to 3 per cent. These results compare favourably with other large centres in the United Kingdom but are still approximately three times that for the general population.

The incidence of fetal malformation has proportionately increased and during this time congenital heart lesions were responsible for approximately half of the perinatal deaths. There is clear evidence that fetal abnormalities are more common in pregnancy complicated by insulin-dependent diabetes[5] and that with poor control in early pregnancy the incidence is further increased.[6] Data from Pedersen[7] suggested that control at the time of conception may be the most important factor and this has been confirmed by Fuhrman[8] who showed that pre-pregnancy counselling to achieve blood sugar levels at less than 8 mmol/litre around the time of conception significantly reduced the incidence of congenital abnormalities. In Belfast, the need for good pre-conceptional blood sugar control was first suggested in 1979[9] and subsequently Montgomery et al introduced an explanatory booklet for

patients attending the R.V.H. diabetes clinic; as yet no reduction in the incidence of congenital abnormalities has been noted.

The most significant improvement in achieving good diabetic control prior to and during pregnancy has been the introduction of capillary blood glucose self-monitoring by the mother, and this has been made sufficiently accurate in average hands by the use of a reflectance meter of which there are several makes now available. Since the introduction of the Glucometer (Ames) in 1979, it has become our policy to instruct all patients in its use when they are admitted to the antenatal ward following booking at the antenatal clinic. They are provided with this instrument while in hospital and for those who cannot afford to buy one, several are available for loan until confinement. Those unable to obtain an instrument are advised to use the Dextrostix strips with visual comparison with the scale on the bottle; this method provides a means of self-monitoring superior to random urine testing which used to be the routine for many diabetics. Just as good pre-pregnancy control is considered vital to reduce the incidence of congenital abnormalities, good plasma glucose control throughout pregnancy should reduce the incidence of late unexpected intra-uterine death. Such deaths may be attributed to acute fetal metabolic derangement secondary to an episode of rapid fluctuation of maternal plasma glucose and four occurred in our series despite the presence of normal placental function tests. It was because of this difficulty in predicting those cases most at risk from sudden fetal death that patients have been admitted in the past after 32 weeks gestation to allow optimal control of their blood sugars with, if necessary, daily adjustment of insulin dosage.

Similarly, the policy of delivering patients at 38 weeks was adopted to reduce the incidence of sudden intra-uterine death after this period; this gestational age was selected because the problems of prematurity are remote. However, in diabetic pregnancy the risk of respiratory distress syndrome is increased and, since the introduction of the amniotic fluid LSAR, diabetic patients have not been delivered until this ratio was greater than 2 unless there are other pressing indications. The false positive rate with this test is known to be increased in diabetes[10] and in the above series three babies developed respiratory distress syndrome when the LSAR was greater than 2. To overcome this problem, delivery is now deferred until the appearance in the liquor of phosphatidyl glycerol.[11]

The caesarean section rate in this series, while lower than previously, is still unacceptably high at almost 50 per cent; the rate for the general hospital population being approximately 10 per cent. In many cases the decision to deliver the patient by caesarean section was influenced by the presence in the uterus of a scar from a previous delivery by this method. However, the major contributory factor is the aim to deliver the diabetic patient prematurely at which time the cervix, particularly in the primigravid patient, is usually unfavourable for induction of labour. In centres where the uncomplicated diabetic pregnancy is allowed to progress a further two weeks to term it appears that a greater number of patients go into labour spontaneously with subsequent reduction in the incidence of induction of labour and caesarean section. Thus, with good diabetic control and adequate fetal surveillance such practice may be the only way to significantly reduce the caesarean section rate. However, as discussed above, it is very difficult to predict accurately fetal death in utero and one must question whether the increased risk of intra-uterine death would outweigh the risk of caesarean section.

For the future there should be increasing centralization of care for the pregnant diabetic, the benefits of which are evident from the continuing fall in the perinatal mortality demonstrated above and were clearly highlighted in the National Survey of Diabetic Pregnancies 1982 (unpublished data)[12] which showed that those centres delivering the largest number of diabetic patients produced better results, despite having to cope with referrals of the more difficult cases. The value of pre-pregnancy counselling is unquestioned and it is the responsibility of all physicians to undertake such counselling of their female diabetic patients in the reproductive age group. This provides an opportunity to offer contraceptive advice and should include counselling regarding the risks to the baby of poor blood sugar control at the time of conception. To provide such a service a pre-pregnancy clinic has been set up in the Royal Maternity Hospital, at which some patients who have been counselled attend at monthly intervals for assessment and appropriate adjustment of insulin. Other potential mothers are indentified at their own diabetic clinics and seen there more frequently. It is not yet possible to insist on attendance at a centralized pre-pregnancy clinic as is practised in East Germany, but it is very important that the desirability of good pre-conceptional diabetic control should be known to potential mothers.

SUMMARY

Over the last 10 years, 169 diabetic pregnancies were managed in the Royal Maternity Hospital, Belfast. The perinatal mortality was 4.2 per thousand and represents a considerable improvement over the 10 years reviewed. Congenital fetal malformations have become proportionately more common and accounted for almost half of the fetal loss.

The continuing improvement in perinatal mortality has largely been attributed to the intensive care of the pregnant diabetic by a team consisting of obstetrician, physician and neonatologist. However, to reduce perinatal mortality and morbidity it is essential that all insulin-dependent diabetic patients in the reproductive years should be counselled regarding the necessity for preconceptional diabetic control.

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PERTHES' DISEASE — A LONG TERM FOLLOW-UP

by

JOHN TEMPLETON
Consultant Orthopaedic Surgeon

and

A. D. L. GREEN
Orthopaedic Registrar

Musgrave Park Hospital, Belfast

PERTHES' disease is a condition affecting children's hips in which the upper femoral epiphysis apparently becomes avascular and then revascularises over the next few years.

We have undertaken a long term follow-up of patients with Perthes' disease to assess the outcome of the disease process over a long period of time with regard to the clinical condition of the hip. Most of the recent studies lay stress on the radiological assessment of the diseased hip reviewed over a relatively short period of time with little mention of the clinical condition of the hip with regard to pain, stiffness or function.

Because major decisions regarding the form of treatment are made on information gained from these relatively short term follow-up reviews, we felt that it was important to assess the long term clinical result of the hip, treated conservatively, in order to try to understand the natural history of the disease process so that a valid judgement could be made on more recent methods of treatment.

The age at onset of the disease process, the sex of the child, the Catterall[1] grading and the amount of lateral extrusion of the femoral head from the acetabulum in the early stages of the disease were studied.

METHOD

The clinical records of all patients diagnosed as having Perthes' disease of the femoral head prior to 1955 were reviewed at the Shriners Hospital in Montreal and Musgrave Park Hospital in Belfast. An attempt was made to review all those with a complete set of original x-rays and notes. All those patients who could be traced were examined by one or other of the authors and an x-ray of the hip joints taken at follow-up. Thirty-four patients with original x-rays were available for follow-up. Three patients had bilateral disease. This made a total of 37 hips available for study. The follow-up ranged from 23 to 48 years with an average follow-up of 32 years.

Twenty-two patients had been treated in a hip spica without abduction of the hips. Nine patients had been treated on a Jones abduction frame followed by a weight-relieving caliper and three were treated on bed rest alone. It was difficult to be specific about the length of time the different methods of treatment were applied because of the poor quality of the notes available.

The Harris[2] hip evaluation system was used to assess the hip joints at long term follow-up. The Harris system is based on clinical assessment only. This system

assesses pain, function capacity, range of motion and deformity of the hip joint. With regard to pain, 44 points are awarded if the joint is pain free, going down to 0 points if pain is crippling, confining the patient to bed. Perfect function in the hip is awarded 47 points with restricted function receiving less points. A full range of motion receives 5 points and absence of deformity 4 points, the points becoming less if restriction of motion or deformity is present. Based on these variables, a points scale with maximum 100 points is used:-

Pain	44 points
Function	47 ,,
Range of motion	5 ,,
Absence of deformity	4 ,,
TOTAL	100 points

Thus, a normal hip will receive 100 points while a painful hip with poor function capacity which is deformed and with a limited range of motion will have a low score.

We considered a score of 90 or above to be a satisfactory result and less than 90 to be unsatisfactory.

RESULTS

By the Harris hip evaluation system, 24 hips were found to be satisfactory and 13 to be unsatisfactory, according to our definition at long term follow-up.

With regard to the age at onset of the disease process, it was clearly shown that the younger the child at onset, the better was the long term result. As the age at onset increased, the number of satisfactory results fell, as shown in Table I.

TABLE I

Age of onset and results

Age at onset	*Results*	
6 years and under	10 Satisfactory	91 per cent
	1 Unsatisfactory	9 per cent
7 and 8 years	10 Satisfactory	66 per cent
	5 Unsatisfactory	33 per cent
9 years and over	4 Satisfactory	36 per cent
	7 Unsatisfactory	64 per cent

There were five female children in our series. Three (60 per cent) had an unsatisfactory result. Even though the numbers are small, this agrees with the other reports — Kelly[3] states that female children do less well than boys. The age at onset did not appear to modify the outcome.

An independent observer (R.A.M.B.), interested in Perthes' Disease, graded the original x-rays according to the Catterall classification. Because of the poor quality of the x-rays after many years storage and because lateral views were often not adequate, it was not possible to grade all the cases. Six hips could not be classified,

leaving 31 hips graded. The long term results in each of the Catterall grades are shown in Table II.

TABLE II

Catterall grade and result

Catterall grade	*Long term result*	
1	Satisfactory	4 (57 per cent)
	Unsatisfactory	3
2	Satisfactory	5 (83 per cent)
	Unsatisfactory	1
3	Satisfactory	9 (75 per cent)
	Unsatisfactory	3
4	Satisfactory	3 (50 per cent)
	Unsatisfactory	3

The ages of onset and outcome are shown in the different Catterall grades in Table III.

TABLE III

Grade, age of onset and outcome

Catterall grade	*Age at onset*	
1	Satisfactory	4, 4, 6, 9
	Unsatisfactory	7, 9, 12
2	Satisfactory	4, 5, 7, 7, 9
	Unsatisfactory	7
3	Satisfactory	5, 5, 6, 7, 7, 7, 8, 9, 9
	Unsatisfactory	7, 10, 10
4	Satisfactory	5, 5, 8
	Unsatisfactory	7, 7, 9

Our results show that the long term follow-up result did not correlate well with that predicted from the Catterall classification. However, because of the poor quality of the x-rays, it was not possible to confirm or deny the usefulness of the Catterall grading as a prognostic indicator in Perthes' disease.

An attempt was made to correlate the degree of extrusion of the femoral head on the early x-rays in our series with the final result. In order to quantify the extrusion of the femoral head, the length of the epiphyseal line lying lateral to the vertical line of Perkins was measured and expressed as a percentage of the total length of the epiphyseal line. This measurement was termed the extrusion index. The extrusion indices of 64 normal hip joints in children aged between 4 and 8 years was measured to find the normal range and none had an extrusion index greater than 20 per cent. In contrast, 28 per cent in the series had an extrusion index greater than 20 per cent (Table IV).

When Fisher's exact probability test was applied to the extrusion index of the normal group, compared to the extrusion index of the diseased hips there was found to be a significant increase in the extrusion index of the diseased hips with $P = < 0.001$. Of the nine with an extrusion index over 20 per cent, only one had an unsatisfactory result. This compares with 8 unsatisfactory hips with the index under 20 per cent. The one unsatisfactory case with an index over 20 per cent was a nine year old.

TABLE IV

Extrusion indices of normal hips in children aged 4 to 8 years show with extrusion indices of hips with Perthes' disease under study

Extrusion index	*Normal hips*	*Perthes' hips*
0—10 per cent	47	8
10—20 per cent	17	13
more than 20 per cent	0	9 (28 per cent)

DISCUSSION

Several long term studies on Perthes' disease of the hip have laid stress on the shape of the head radiologically. In this study, a clinical assessment of the hip was made at long term follow-up and quantified using the Harris hip evaluation scale.

The age at onset was shown to be a most important factor when the prognosis of Perthes' disease is considered. Young children aged six years and below tend to have a good clinical result well into the fourth decade. As the age at onset increases, the number of children with a good clinical result decreases and those nine years and above at age of onset had only 36 per cent doing well. This prognostic factor of the age of onset agrees with Ratliff's[4] work. As the younger children tend to do well irrespective of the method of treatment, perhaps a more conservative approach should be considered in this group.

The number of female children in this study was small, being only 5. These cases did less well compared to their male counterparts but this would have been expected from their age at onset. Kelly and Catterall also showed in their series that female children tend to have a poor prognosis.

The initial x-rays were graded according to the Catterall classification. It was difficult to be accurate in the classification because of the poor quality of the x-rays and the often inadequate lateral x-rays. The results predicted from the Catterall grading did not correspond to the long term clinical findings. When considering the accuracy of the Catterall grading, others have shown considerable observer variation, even with satisfactory x-rays (Hardcastle[5]). We are unable to confirm or deny the usefulness of the Catterall grading as a prognostic indicator.

The extrusion of the femoral head from the acetabulum was expressed numerically as the extrusion index, as previously described. Lateral extrusion is a "head at risk" sign and is thought to indicate a poor long term result. Salter[6] proposes that, with the loss of containment of the femoral head, pressure from the edge of the acetabulum will cause abnoral pressure on the femoral head that will lead to progressive deformity. In this series, nine hips had an extrusion index of

more than 20 per cent. The extrusion indices of the hips with Perthes' disease was significantly increased when compared to the extrusion indices of the normal hips studied as shown by Fisher's exact probability test.

Different authors have proposed different methods of achieving containment in order to try to improve the long term results but there appears to be little uniformity in the amount of containment achieved by these different methods.[6, 7, 8, 9, 10, 11, 12] Petrie[8] recommends 45° abduction when treating patients conservatively in his brace. The femoral osteotomy recommended by Somerville and others[11] achieves approximately 20° increase in varus angulation. We were surprised to find from our series that the hips with high extrusion indices did not do as badly as recent literature would lead us to believe.[13] The ages of onset of the children with very high extrusion indices were equally spread over the different age groups and only one child with a late age of onset had a bad result.

As the long term result in these severely extruded hips was not as bad as expected, careful consideration must be given before surgical containment is decided upon as extrusion of the head may not be such a bad prognostic indicator as thought at present.

SUMMARY

Thirty-four patients suffering from Perthes' disease in thirty-seven hips were reviewed over a three year period. Follow-up time was thirty-two years on average. Initial x-rays were reviewed and assessed according to Catterall's classification. Hips at review were assessed according to the Harris hip rating method. Twenty-two hips were considered satisfactory — i.e. with a Harris rating of 90 or above. Fifteen hips were considered unsatisfactory. As the age of onset increased, so did the chance of a satisfactory hip decrease. Females fared less well than males. Catterall's classification was not found to be a useful prognostic indicator. The degree of extrusion of the femoral head on the early x-rays bore no relationship to the final clinical state. Age alone is the best prognostic indicator of the clinical state of hips affected by Perthes' disease at least to the fourth decade.

We are grateful to Professor R. I. Wilson of Belfast and Dr. R. L. Cruess of Montreal for their help and encouragement; to Professor R. A. B. Mollan for assisting in the Catterall classification of the hips and to Miss Betty Beavis for her help in the preparation of the manuscript.

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MUCOCOELES OF THE APPENDIX

Their underlying epithelia, behaviour and associated tumours

by

JOAN M ALDERDICE MB BCh

Registrar in Histopathology, Belfast City Hospital

and

DOROTHY HAYES MD FRCPath

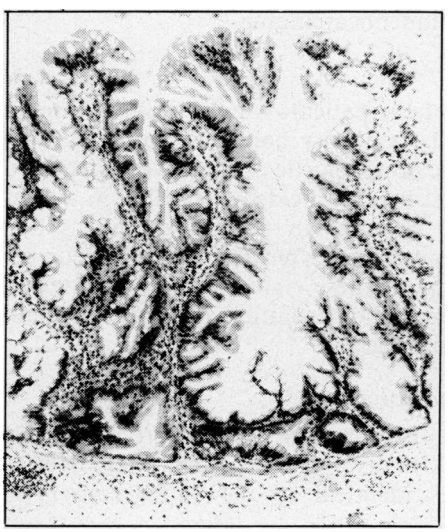
Consultant Histopathologist, Belfast City Hospital

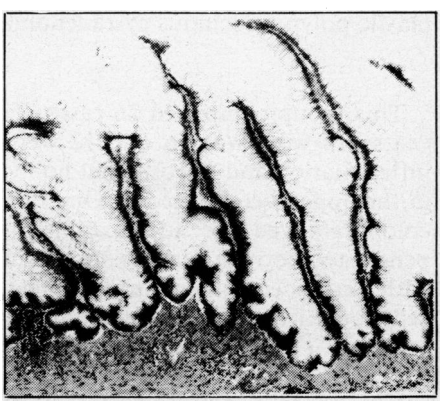
MUCOCOELE is a descriptive term for mucus accumulation in the distended lumen of an organ, and does not indicate the underlying pathology. This paper describes four distinct pathological entities identified in a series of 65 mucocoeles of the appendix.

The first category, designated as retention cyst, is due to simple obstruction of the lumen often associated with post inflammatory fibrosis or a faecalith. The diagnosis is restricted to those cases in which there is no evidence of any epithelial abnormality in the mucosal lining of the appendix other than flattening.

The second category, designated as metaplastic polyp, is characterised by mucosal glands whose deeper aspect resembles normal appendicular epithelium, but towards the lumen the glands become dilated and lined by goblet cells and cells with pink staining cytoplasm with pale vesicular nuclei and only an occasional mitotic figure. Papillary infolding gives a characteristic serrated appearance (Fig. 1).

The third category is designated mucinous cystadenoma. These tumours are identical to tubular and tubulo-villous adenomas seen in the colon. They exhibit a glandular or pure villous histology, and the neoplastic epithelium shows mild, moderate or severe dysplasia. Mucin production is usually very prominent and may lead to a flattened epithelium (Fig. 2).





(left)
FIG. 1 *Metaplastic polyp H and E × 60*
(above)
FIG. 2 *Mucinous cystadenoma H and E × 60*

The fourth category is that of cystadenocarcinoma. This is a mucinous adenocarcinoma which may show evidence of origin from a mucinous cystadenoma. The histology is fundamentally no different from mucinous adenocarcinomas of the colon, but when in the confined space of the appendix, luminal obstruction and accumulation of mucus leads to the formation of a mucocoele.

Rupture of a mucocoele may occur, with spillage of mucus into the peritoneal cavity. The outcome varies with the cause of the mucocoele and the potential to produce peritoneal dissemination.

Two recent series report an unsuspected association between appendiceal cystadenomas and separate primary tumours of the colon, either adenomas or carcinomas.[1, 2] One of these[2] suggests that the finding of appendiceal cystadenomas necessitates the subsequent screening of the large intestine for further neoplasms. These findings and conclusions are contrasted with this series. The simultaneous occurrence of mucinous cystadenomas of the appendix and ovary is also studied.

MATERIALS AND METHODS

A review of 65 cases of mucocoele of the appendix diagnosed in the histopathology laboratory of the Belfast City Hospital between 1968 and 1981 was carried out. Appendices showing only mild dilatation without evidence of mucus retention in the lumen, including three cases of primary adenocarcinoma without excessive mucus production, were eliminated from the study. Paraffin blocks from formalin fixed material with multiple transverse sections were available from all cases for review, and were stained by haematoxylin-eosin. Follow-up information was obtained from the hospital records for periods varying from eight months to fourteen years. The follow-up period was greater than two years in 55 of the cases.

RESULTS

Examination of the 65 cases of mucocoele allowed their separation into four well defined categories which were designated as retention cyst, metaplastic or hyperplastic polyp, mucinous cystadenoma and cystadenocarcinoma.

1. Retention cyst

This group comprised 26 cases. The ages of the patients ranged from five to 74 years; 14 were women and 12 were men. The majority had evidence of chronic inflammation and fibrosis, but no hyperplastic or neoplastic changes were identified in the appendiceal mucosa. One retention cyst was an incidental finding in a right colon removed for adenocarcinoma of the caecum. In four cases mucus had penetrated into the muscle coat and in a further eight cases perforation had occurred, with periappendicular mucus spillage. In none of these eight cases were epithelial cells identified in the mucus outside the serosa, and resolution followed appendicectomy. There were no simultaneous ovarian tumours.

2. Metaplastic polyp

This group comprised six cases. The ages of the patients ranged from 28 to 71 years; four were women and two were men. Only two of the patients were over 50 years of age. The histological picture was identical to the better recognised metaplastic polyp occurring in the colon.

In three cases the metaplastic polyp was the sole lesion in the appendix. In the remaining three cases it was accompanied by a mucinous cystadenoma, and one of these bore secondary serosal deposits of a caecal adenocarcinoma. Two of the cases which showed a metaplastic polyp and a mucinous cystadenoma in the appendix were associated with intact ovarian mucinous cystadenomas, and in both perforation of the appendix occurred, with periappendicular mucus spillage. One was complicated by post-operative drainage of mucus from the peritoneal cavity which eventually resolved. Epithelial cells were not identified in the periappendicular mucus.

3. Mucinous cystadenoma

This group comprised 31 cases, plus the three mentioned above associated with metaplastic polyps. The ages of the patients ranged from 20 to 81 years; 18 were women and 13 were men. In three cases mucus had penetrated into the muscle coat, and in a further 14 cases perforation had occurred, with periappendicular mucus spillage. Epithelial cells were not identified in the extraneous mucus. Three of the cases were complicated by post-operative drainage of mucus from the peritoneal cavity, but this resolved.

4. Cystadenocarcinoma

This group comprised two cases. The patients were 37 and 68 years of age and were both male. The older patient presented with a cyst-like mass of mucus circumscribed by a calcified fibrous tissue shell at the base of the appendix. No residual epithelial lining or evidence of tissue invasion was found, and the diagnosis was based on the malignant epithelial fragments in the mucus deposits outside the lesion, and this was confirmed by the subsequent clinical course. He survived for four years, and over this period required repeated evacuation of mucus from secondary peritoneal implants in the abdominal cavity. The younger patient died within a year of appendicectomy from disseminated malignancy.

DISCUSSION

The pathogenesis of appendiceal mucocoele has been a subject for considerable debate. Some emphasise proximal luminal obstruction by post inflammatory fibrosis[3,4] while others consider primary mucus-secreting neoplasms of the appendix to be paramount.[5] Retention cyst, or simple mucocoele is due to obstruction of the proximal lumen with retention of mucus secretions, usually on a post inflammatory basis, although in one case in this study the luminal obstruction was caused by an adenocarcinoma of the caecum. Metaplastic polyps, cystadenomas and cystadenocarcinomas produce copious mucus, and may cause secondary obstruction, and may also be associated with inflammation and fibrosis. Any one of these mechanisms may dominate in a particular case.

Metaplastic or hyperplastic polyps were first described in the appendix in 1972,[6] and are a rare cause of a mucocoele.[7] The lesion is analogous to the metaplastic polyp in the colon, a common finding in older patients, where it has traditionally been regarded as degenerative,[8] or a response to inflammation,[9] with no neoplastic potential. More recently, a possible relationship has been proposed between metaplastic polyps and villous adenomas,[10] the counterpart of cystadenomas in the appendix. It has been suggested that because areas of metaplasia may be found in villous adenomas, and because they exhibit similar enzyme patterns,[11] some villous

adenomas may be derived from metaplastic nodules.[12] Although in this study only six appendiceal mucocoeles contained metaplastic polyps, it is interesting that three were associated with cystadenomas.

Mucinous cystadenomas were the commonest cause of mucocoele in our study, exceeding simple non-neoplastic retention cyst, and caused the greatest distention of the lumen, often leading to a thin fibrous mucus-filled sac. Rupture with mucus spillage complicated fifteen of thirty-four cases, but epithelial cells were not present in the periappendicular mucus and follow-up did not identify any patients with progressive accumulation of mucus in the peritoneal cavity (pseudomyxoma peritonei). We consider the lack of epithelial fragments in the mucus is a useful negative finding in confirming the benign nature of this appendiceal tumour. Resolution has, however, occasionally been described in cases with apparently viable epithelial fragments in the periappendicular mucus[7] and this has been attributed to misplaced epithelium following rupture and not to invasion.[13]

The only cases of true progressive pseudomyxoma peritonei occurred in the two patients with cystadenocarcinomas and secondary carcinomatosis of the peritoneum. The clinical course was consistent. One died within a year of appendicectomy and the other died four years later following repeated clearance of mucus from the peritoneal cavity. It is therefore maintained, along with other authors,[1, 7, 13] that the condition known as pseudomyxoma peritonei is caused by peritoneal dissemination of a mucus-secreting adenocarcinoma and rupture of a benign mucinous tumour is always self limited.

Wolff and Ahmed,[2] and Higa et al[1] in their reviews of the appendix described an association between mucinous cystadenomas of the appendix and separate primary neoplasms of the colon. Adenocarcinoma of the colon was found in 21.4 per cent and 19.5 per cent of cases respectively and in Wolff and Ahmed's study one third of the patients had multiple adenomatous colonic neoplasms. This series of 34 cystadenomas did not confirm the association. Only one patient had a simultaneous colonic adenocarcinoma and follow up of all cases for periods varying from one to fourteen years did not provide evidence of the subsequent development of colonic tumours, either benign or malignant. Thus from our findings the diagnosis of an appendiceal mucinous cystadenoma does not necessarily confer a high risk of colonic malignancy and the neoplasm has the same prognosis as a single benign epithelial tumour found elsewhere in the large intestine.

A similar association noted by Shanks[14] of concurrent cystadenomas of ovary and appendix was observed in two of the 34 patients with cystadenomas. This was a much smaller proportion than Shanks who reported the concurrence in one third of cases and considered the association too great to be coincidental.

In conclusion, this study of 65 mucocoeles of the appendix showed four underlying pathological groups. Mucinous cystadenomas and non-neoplastic retention cysts predominated with metaplastic polyps and adenocarcinoma infrequent. The relationship of half the metaplastic polyps with cystadenomas was noted, a finding which is being increasingly identified in the intestine[15] although the significance is uncertain. We conclude that pseudomyxoma peritonei is caused by peritoneal implants of a mucus-secreting adenocarcinoma, and rupture of a cystadenoma into the abdomen will resolve following removal of the tumour. The high incidence of

associated adenocarcinomas of the colon previously described in one fifth of patients with cystadenoma of the appendix was not confirmed, indicating that the prognosis of this tumour is that of a single benign neoplasm.

SUMMARY

The pathology of 65 cases of mucocoele of the appendix was studied. Mucinous cystadenoma (34 cases) and simple retention cyst (26 cases) were the commonest underlying conditions, with metaplastic polyp (six cases) and cystadenocarcinoma (two cases) seen infrequently. In three of these cases metaplastic polyps and cystadenomas occurred simultaneously. Rupture with mucus spillage was self limited in the benign conditions, and pseudomyxoma peritonei was only encountered after peritoneal dissemination of cystadenocarcinoma. The previously described association of mucinous cystadenomas with separate primary tumours of the colon was not confirmed.

ACKNOWLEDGEMENTS

The authors thank the secretarial staff of the Belfast City Hospital histopathology laboratory for typing the manuscript and Mr. John Orchin, Senior Chief MLSO, for photographic expertise. We are grateful to the consultant surgeons in Northern Ireland for providing follow-up of their patients.

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Address correspondence to: Dr. Joan M. Alderdice,
Department of Histopathology, The Laboratories, Belfast City Hospital, Belfast BT9 7AD.

THE TREATMENT OF TROCHANTERIC FRACTURES OF THE FEMUR BY THE ENDER METHOD

by

G.F. McCOY FRCS, G.R. DILWORTH FRCS and H.A. YEATES FRCS

The Fracture Unit, The Ulster Hospital, Dundonald, Belfast

TROCHANTERIC fractures in the elderly are extremely common in orthopaedic practice. Indeed, in the United States, internal fixation of trochanteric fractures is the most commonly performed orthopaedic procedure. The incidence of this operation will undoubtedly increase as the population ages.[1] Treatment of such fractures is complicated by two factors:

(a) High morbidity and mortality associated with advanced age, existing systemic illness, lengthy operation and blood loss.

(b) The fracture site is subjected to high bending stresses which preclude early weight bearing when nail-plate fixation is used.

In 1966, Kuntscher[2] introduced a condylo-cephalic intra-medullary nail, claiming more stable reduction with reduced blood loss and risk of infection. Unfortunately, technical difficulties due to the rigid nature of the rod, and, a high incidence of post-operative knee pain, limited its use. Ender and Simon-Weidner,[3] and subsequently, Kuderna and Bohler[4] described fixation of trochanteric fractures with 4.5 mm diameter pre-bent flexible stainless steel rods introduced through the medial femoral condyle. Several series, detailing the efficacy of this method are now appearing in the English language literature.[4-9]

In the Fracture Unit at the Ulster Hospital we commenced using Ender's nails in June 1981. Initially, we reserved their use to the older, debilitated patient with the relatively stable fracture (Types I and II, occasionally Type III). Early results were very encouraging, and so, we extended the use of Ender's nails to younger, lower risk patients with more unstable fractures.

MATERIALS AND METHODS

Between June 1981 and May 1983, 23 patients (20 females and 3 males) with a mean age of 82.9 years (range 74-91) underwent internal fixation of femoral fractures by the method described by Ender in 1978.[10] The patient is anaesthetised (either general or spinal anaesthesia may be used) and placed on the Holley table. The fracture is reduced, the position being checked on the image intensifier. The legs are abducted to allow for access by the operator and the C-arm image intensifier. The patient is draped such as to expose a small area on the medial side of the knee. A complete set of nails, along with the tools illustrated in Figure 1 should be available. A skin incision 5-7 cm in length is made over the medial femoral condyle, running distally from the adductor tubercle. The fascia is split and the vastus medialis displaced anteriorly, exposing an almost flat bony surface, just above the tubercle. A nail is placed on the drapes with its distal end at the level of the entry hole, and the appropriate length determined with the aid of the image intensifier. The bone at the

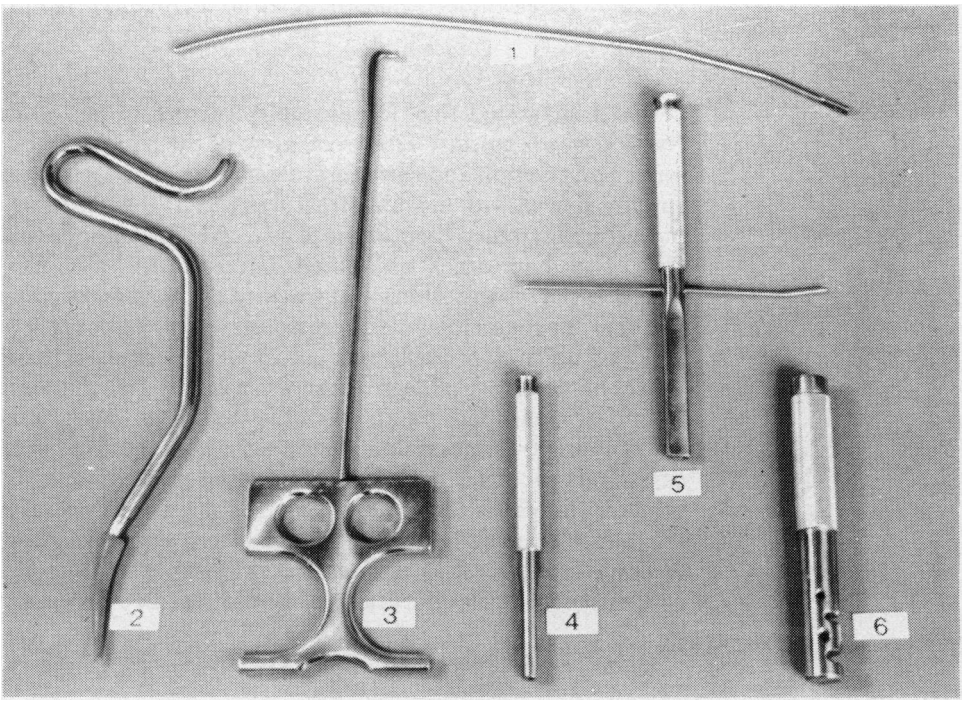

FIG. 1 *Tools required for Ender's nail fixation.*

1. A 37 cm Ender nail. 2. Awl used for penetrating the cortex. 3. Nail extractor. 4. Nail impactor. 5. Introducer with cross bar to control rotation. 6. Nail bender.

site of entry is penetrated carefully using the curved awl. This is performed using a twisting action, initially at right angles to the femoral shaft, but, following penetration, the awl is directed up the femoral shaft enlarging the entry hole. Undue force during penetration can result in supracondylar fracture of the femur, particularly when the bone is very osteoporotic. The entry hole should be sufficiently large to accept three nails with ease, otherwise, linear fracture of the shaft above the entry hole will occur.

The first nail is now inserted, and is hammered medially along the calcar into the femoral head. Two further nails are then inserted, and are placed so their distal tips are arranged fan-shape within the femoral head. If the medullary canal is wide, a fourth or even fifth nail should be inserted. The progress of the nail across the fracture site is checked on the image intensifier, and by rotation using an introducer, the correct position is obtained. A good reduction facilitates introduction of the nails, although accuracy of reduction is not as important as with blade fixation. The end result is as illustrated in Figure 2. The wound is closed in layers over a suction drain. The drain should ideally be removed within 48 hours, and subsequently, ambulation is encouraged.

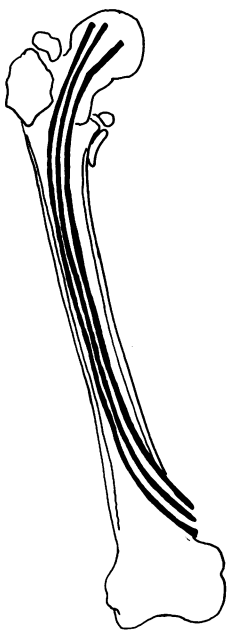

FIG. 2. *Three Ender's nails inserted in a fractured femur.*

Ender suggested that for unstable fractures a period of traction was necessary. However, none of the patients in our series had traction and early unprotected weight bearing was employed even with unstable fractures. All of the patients in our group sustained their fracture as a result of a minor fall. Only two had other associated injuries (one a Colles' fracture, the other a subcapital fracture of the contra-lateral femur). The majority were operated on within 72 hours, but delay of up to two weeks was occasioned by transfer from other hospitals. Eighteen patients had intertrochanteric fractures, four had basal fractures and one had a sub-trochanteric fracture. Spinal anaesthesia was employed in 15 cases, general anaesthesia in 8. Operating time averaged 45 minutes (range 22-95 minutes), which compares favourably to that for blade plate or compression screw fixation. Average blood loss, as estimated from swab weighting and contents of the suction drainage bottle was 210 ml (range 90-470).

RESULTS

Patients were graded pre-operatively according to their socio-mobility status. Grade 1 was fully mobile (perhaps with stick) and fully independent. Grade 2 was mobile but requiring assistance and supervision (such as occurs with residents of old peoples's homes). Grade 3 was virtually non-mobile and institutionalised. Accordingly, 13 of our patients were Grade, 1, 7 were Grade 2, and the remaining 3, Grade 3. Mental state and previous medical history were also taken into account in the grading. There were no intra-operative deaths. Three patients died within 3 months of operation (mortality 13 per cent), this comparing favourably with mortality rates in other series where sliding screw fixation was employed.[11, 12] The causes of death were cerebro-vascular accident, renal failure, and broncho-pneumonia.

There were two cases of superficial wound infection, but none of deep infection. Four cases remain as in-patients awaiting geriatric placement. Thirteen patients were ultimately discharged home (12 of these patients were pre-operatively socio-mobility Grade 1). Three were discharged back to old peoples' homes. The mean duration of stay of these 16 patients was 41 days (range 14-122).

Twelve patients had knee symptoms (swelling, pain or stiffness) in the immediate post-operative period. In only four cases did the symptoms persist beyond the first review (at 6 weeks post discharge). In eight patients an external rotational deformity of greater than 20° was present post-operatively. In all cases this gradually corrected itself. This incidence of rotational deformity, although transient, was considered cosmetically unacceptable in the younger patient, and, because of this, we restricted Ender's nail fixation to those over 70 years with suitable fractures. Time to full

weight bearing was much shorter with Ender's nails and we allowed unprotected weight bearing (from day three post-operatively) even in unstable fractures.

Based on pre-operative socio-mobility status and the type of fracture, we graded our results good (return to previous ambulatory status with minimal symptoms), fair (some mobility regained, but not as mobile as previously, or, persistence of troublesome symptoms), and failure (deaths as in-patients or no useful mobility regained). Accordingly, there were 15 good results, 3 fair results, and 5 failures. Of those who were ambulant, all showed radiological signs of union without any marked shortening within 16 weeks.

DISCUSSION

Condylo-cephalic pinning by the Ender method represents a new approach to the increasingly common problem of trochanteric fractures of the femur. Our results, admittedly from a small series, suggest the method is at least as good as conventional nail-plating or compression screw fixation. The advantages of Ender method are:

(a) It is based on sound bio-chemical principles. By fixing the fracture in relative valgus, the lever arm is reduced with intra-medullary Ender's nails. The bending movement acting on the proximal fragment is reduced by a factor of 2 or 3 (Figure 3). The nails, which lie along the lines of trabeculation are therefore, subjected to axial rather than bending forces.[13] This allows for early, unprotected weight bearing.[14]

(b) Blood loss and operative stress are less than for nail-plate or compression screw fixation. Operative time is also reduced.

(c) Risk of infection is low. The fracture site is not disturbed and the incision is far removed from sites of incontinence.

The incidence of post-operative pain, swelling and stiffness of the knee has been reported as high as 41 per cent.[8] We found a higher initial incidence (52 per cent), but the symptoms were, in most cases, transitory, and did not prejudice the end result. External, rotational deformity is a recognised problem, but again, tended to be temporary. Because of this rotational problem, we restricted Ender's nail fixation to those over 70 years.

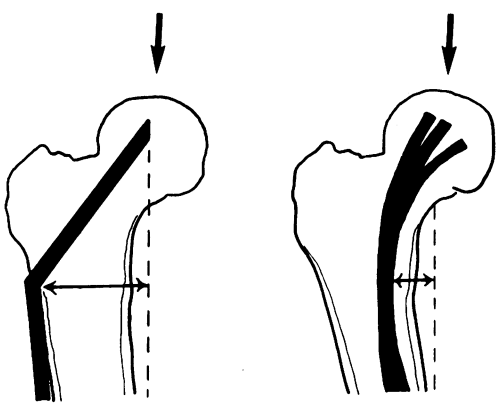

FIG. 3 *Comparison of bending moments in nail-plate and Ender fixation devices.*

Early resumption of unprotected weight bearing was one of the greatest practical benefits of this procedure. With nail-plate fixation, unstable fractures often require a period of weeks either non weight bearing or partially weight bearing if the fracture is to unite without fixation failure or varus deformity. In the elderly, this partially defeats the purpose of internal fixation i.e. early mobilisation. With Ender fixation

we were able to mobilise with full weight bearing even those with unstable fractures from the third post-operative day. No significant shortening or fixation failure occurred as a result of this. The method is, therefore, particularly suited to those elderly patients who can only be mobilised with full weight bearing.

In conclusion, we have been encouraged so far by our experience with Ender's nails. Their bio-mechanical advantage over nail-plating allows for early unprotected weight bearing, even in unstable fractures. They constitute, therefore, a most useful addition to the armamentarium for the treatment of trochanteric fractures of the femur.

SUMMARY

Between June 1981 and May 1983, 23 patients had trochanteric fractures of the femur treated with Ender's nails. There were 20 females and 3 males in the series, ranging in age from 74 to 91 years (mean 82.9 years). Operative time and blood loss were much less than with internal fixation with a standard blade plate. Time to full weight bearing was also shorter using the Ender method. All but one of our patients who had previously been mobile and independent were discharged home without deterioration in their socio-mobility status. There were three deaths (13 per cent), a figure lower than for internal fixation using standard blade plate or compression screw devices. We described the method of operation, discussed the advantages and disadvantages of the technique, and, finally, we proposed the Ender method as a useful addition to the armamentarium for the treatment of trochanteric fractures of the femur.

ACKNOWLEDGEMENTS

We would like to thank our colleagues, Mr. J. A. Halliday and Mr. A. L. Macafee for their permission to include their patients in this survey; the Medical Illustration Department of the Royal Victoria Hospital and Mr. Norman Ervine of the Medical Photography Department of the Ulster Hospital for their assistance with illustrations and photographs; and Miss Janet Collins for typing the manuscript.

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Correspondence to:
Mr. G. R. Dilworth FRCS, Consultant Orthopaedic Surgeon,
The Fracture Unit, The Ulster Hospital, Dundonald, Belfast.

TRUCUT NEEDLE BIOPSY IN BREAST LUMPS

by

ROBERT KERNOHAN MB FRCS and HUME LOGAN MCh FRCS

Breast Clinic, The Ulster Hospital, Dundonald, Belfast

THE clinical differentiation between benign and malignant breast lumps is fraught with danger. A small proportion of cases present with classical findings but in the majority it is essential to have a histological or cytological diagnosis before surgery is undertaken.

Trucut needle biopsy (TCN) of solid tumours is now established as a useful means of obtaining representative biopsy material and has been used widely in liver and kidney disease. However, its usefulness in the diagnosis of solid breast lumps remains controversial. To evaluate the technique we carried out 250 consecutive TCN biopsies and the results of the series are presented.

MATERIALS AND METHODS

Two hundred and forty-two women attending the Breast Clinic were subjected to TCN. Some had simultaneous fine needle aspiration (FNA) and some went on to have excision biopsy or mastectomy. Lumps smaller than 0.5 cm in diameter were not suitable for biopsy due to difficulty in accurately locating the lump with the trucut needle.

BIOPSY TECHNIQUE

The lump was steadied between the thumb and forefinger of the left hand and the overlying skin infiltrated with one ml of two per cent lignocaine. A small (5 mm) incision was made directly over the lump and the trucut needle (Travenol Laboratories Inc) was introduced through the wound. The obturator was then thrust into the lump and the sheath advanced, trapping tissue in the specimen notch. The complete needle was then withdrawn and the specimen placed in ten per cent buffered formalin. Pressure was applied to the wound for two to three minutes to arrest haemorrhage, after which a pressure dressing was applied. A satisfactory specimen was 1-2 cm long and up to 2 mm in diameter. If it was felt that the specimen was inadequate a further biopsy could be taken through the same incision. Once mastered, the procedure was usually painless, although five patients experienced some mild discomfort. Two hundred and fifty TCN biopsies were performed on solid tumours in 242 patients. When the biopsy was reported as carcinoma and the clinical findings were in agreement, mastectomy was undertaken. In biopsies reported as benign (fibroadenosis, fibroadenoma, etc), depending on the degree of clinical suspicion, either excision biopsy was undertaken or the patient was followed-up for a minimum period of six months to establish that the lump was benign. In a number of cases fine needle aspiration (FNA) was undertaken simultaneously and formed the basis of a previous report.[1]

RESULTS

The results are detailed in the Table. Of a total of 250 TCN, 40 specimens were considered to be unsatisfactory or inadequate by the pathologist. One hundred and five of the remaining 210 were reported as carcinoma and all of these were

TABLE

TCN compared with final diagnosis

TCN Diagnosis		*Final Diagnosis*	
		Benign	*Malignant*
Unsatisfactory biopsies	40	28	12
Benign	94	89	5
Suspicious	11	2	9
Malignant	105	—	105
TOTAL	250	119	131

subsequently confirmed by the histology of the mastectomy specimen. Thirty-nine of the 94 biopsies reported as benign disease had excisional biopsy and of these, five were carcinomas. A further 11 biopsies were labelled as 'suspicious' and consequently had excisional biopsies carried out, of which nine proved to be carcinoma. If these are excluded there were five false negatives in 94 patients which is 5.3 per cent. There were 74 patients who did not subsequently have an excisional biopsy. These have been followed up and to date have shown no evidence of malignancy.

Twenty-one of the 40 patients who had unsatisfactory TCN biopsies had excisional biopsies because of suspicion of malignancy and 12 proved to be carcinomas.

During the study TCN biopsies were taken by both a consultant and a number of junior doctors. Our figures show that both the consultant and the junior doctors had 100 per cent accuracy with biopsies reported as being malignant. Of the 80 biopsies performed by the consultant and the 62 performed by the junior doctors reported as not showing carcinoma, six (7.5 per cent) of the former and eight (12.9 per cent) of the latter ultimately proved to be malignant. This is not a significant difference (X^2 0.62 d.f. = 1, $0.5 > p > 0.3$).

DISCUSSION

Cancer of the breast is still responsible for the greatest number of deaths from malignant disease in women and the incidence appears to be rising.[2] Prognosis is thought to be improved by early diagnosis[3] and therefore any method which contributes to this deserves due consideration. Also, more attention is now being paid to the psychological complications which arise from breast disease and many surgeons like to discuss the treatment with the patient before surgery. An excisional biopsy has several main disadvantages: (1) it normally requires a general anaesthetic, (2) the incision may affect the choice of incision for definitive surgery and (3) many surgeons do not feel that frozen section examination of the biopsy should be followed by immediate definitive surgery. These objections are largely overcome by TCN biopsy. Furthermore, when excisional biopsy is carried out, most surgeons are reluctant to send part of the specimen for oestrogen receptor assay in case that portion contains the entire carcinoma, thus causing a false negative histology report. Consequently, most lumps are sent in their entirety for histology. In the case of a diagnosis obtained with TCN the remaining tissue can be sent for assay at definitive surgery.

It has been postulated that as with FNA accuracy should improve with experience.[4] Our figures suggest that this is not the case and the technique is equally suitable for senior surgeons and those in training.

Concern has been expressed regarding the seeding of the needle track with tumour cells. This has been investigated with regard to FNA by Robbins et al[5] who registered the survival times of 1463 patients with mammary carcinoma submitted to radical surgery and compared the survival rates in patients who had FNA with those who did not. They found that the two groups did not differ in their ten year survival rates as long as the needle track was excised at mastectomy. Although FNA cannot be strictly equated with TCN, we feel that TCN is a safe procedure. We would also stress that TCN is a simple technique which can easily be performed in a normal outpatient clinic as no special facilities are required. Patient acceptance is high and apart from mild bruising, no complications have been experienced. Confidence in the technique has increased with experience and, provided it is used in conjunction with clinical judgement, it is a safe, cheap and virtually painless method of making a reliable diagnosis. Since we have had no false positive results, we agree with Elston et al[6] that when TCN is reported as showing a carcinoma definitive surgery can be undertaken with assurance. However, caution should be exercised with benign TCN biopsies and in patients where there is the slightest doubt that the lump is benign, excision biopsy should be undertaken.

In conclusion, we have found the technique of trucut needle biopsy useful in the pre-operative diagnosis of solid breast lumps and advocate that the technique plays an increasing role in the diagnosis and management of these patients.

SUMMARY

The technique of trucut needle biopsy (TCN) is described. Two hundred and fifty consecutive TCN were performed in 242 women and 84 per cent of these provided satisfactory biopsies. There were no false positive results. In 14 satisfactory biopsies the diagnosis of carcinoma was not made and these were considered to be false negative results. TCN was found to be a reliable means of pre-operative diagnosis when the biopsy showed carcinoma, enabling mastectomy to be undertaken safely, rendering excisional biopsy and frozen section unnecessary.

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Correspondence to:
Mr. R.: M. Kernohan FRCS,
Department of Surgery, The Queen's University of Belfast,
Grosvenor Road, Belfast BT12 6BJ.

AN ANALYSIS OF THE ADMISSIONS TO THE CORONARY CARE UNIT AT LAGAN VALLEY HOSPITAL

by

W. W. DINSMORE, M.R.C.P. and K. R. LOGAN, M.R.C.P.

Lagan Valley Hospital, Lisburn, Northern Ireland

IT has been known for many years that up to 45 per cent of the deaths from myocardial infarction occur within the first hour of the onset of symptoms.[1, 2] It is recognised that initiation of intensive care within the very early hours of infarction[3] may prevent death. While the delays in initiation of intensive care have been analysed in studies from teaching hospitals,[2] there are few reports from district hospitals. Therefore, it was decided to analyse the admissions to Lagan Valley District Hospital which serves a mixed urban and rural population of 83,000. We analysed the delay times which occurred both before and after the patients called for medical help. Account was taken of the distance the patients lived from the hospital in order to see if this influenced the delay time. As patients admitted were unselected by the staff of the coronary care unit, the final diagnoses were recorded, in order to determine whether effective use was being made of the coronary care unit facilities.

Because a coronary care ambulance could theoretically reduce the delay before initiation of intensive care, it was hoped that by providing information on the actual delays, comparison with other studies would enable a rational decision to be made on the possible effectiveness of a coronary care ambulance in this situation.

PATIENTS AND METHODS

We studied prospectively all patients admitted to the unit from January to June 1982. The patients were admitted directly by general practitioners or were self-referred through the '999 system' or casualty.

Each patient had a questionnaire filled in as soon as was appropriate after admission. This included the patient's name, age and distance from the hospital at the time of the attack. The time of onset of the patient's chest pain or major presenting symptom was noted along with the time at which help was summoned and the time at which they arrived at the hospital coronary care unit. The method of referral was noted (general practitioner, '999', casualty). The final diagnosis was recorded and whether the patient survived.

The criteria for diagnosis of myocardial infarction were: (i) typical chest pain, (ii) indubitable evolving ECG changes and/or significant and typical rises in CKMB, CK, AST and LDH enzymes.

RESULTS

There were 221 admissions in the six months. Of these, four were admitted for diagnostic monitoring, three were patients transferred from other hospitals following insertion of intra-cardiac pacemakers, 11 had taken overdoses of drugs requiring cardiac monitoring (e.g. anti-depressants) and one immuno-suppressed patient was admitted for isolation. There was no further analysis of these 19 patients as they were not admitted because of suspected myocardial infarction. Of the remaining 202 patients 82 (40 per cent) had proven acute myocardial infarction.

The mean age of the patients in the infarct group was 64.0 years (range 30-89) and the mean age of the non-infarct group was 61.8 years (range 29-89). There was no statistical difference ($t = 1.09$, $df = 200$, $0.3 < p < 0.20$).

The duration of the pain before calling for help (e.g. General Practitioner, 999 call or casualty) was analysed in the two groups and is shown in Table I. The time taken was recorded to the nearest five minutes and the times were subsequently grouped as shown. The median time taken before calling for help in the infarct group was two hours (range 0-7 days) and in the non-infarct group it was also two hours (range 0-8 days). Of the 23 patients without myocardial infarction who were admitted at 24+ hours, five were patients with crescendo angina which did not progress to infarction. The time taken between the call for help and admission to the coronary care unit is shown in Table II. The time taken was estimated to the nearest five minutes. The overall median time before arrival at hospital in the patients

TABLE I

The time between the onset of pain and the summoning of help

Time (Hours)	*Myocardial Infarction Patients*		*Non-Myocardial Infarction Patients*	
	No.	*Per cent*	*No.*	*Per cent*
1	32	39.0	33	27.5
1–	8	9.8	25	20.8
2–	13	15.8	11	9.2
4–	10	12.2	13	10.8
8–	5	6.1	8	6.7
12–	5	6.1	7	5.8
24+	9	11.0	23	19.2
Total	82	100	120	100

TABLE II

Interval between "call for help" and initiation of intensive coronary care

Time (minutes)	*Myocardial Infarction Patients*	*Non-Myocardial Infarction Patients*	*Total*
15	2	3	5 (2.5%)
15–	2	6	8 (4.0%)
30–	10	17	27 (13.4%)
45–	14	12	26 (12.9%)
60–	25	29	54 (26.7%)
10–	9	24	33 (16.3%)
120–	15	14	29 (14.4%)
240–	5	15	20 (9.9%)
Total	82	120	202

admitted was 1 hour 10 minutes. The average distance from which the patients travelled to the hospital was 3.8 miles (range up to 17 miles). Thirty-one patients (15 per cent) lived more than 10 miles from the hospital. In this sub-group the delay before arrival at hospital was 90 minutes.

During their attack 149 patients (74 per cent) contacted their general practitioner, 33 patients (15 per cent) used the '999' emergency system and 17 patients (8 per cent) were admitted through casualty. Two patients were admitted from the general wards and one patient was admitted from the outpatients.

Of the 82 patients admitted with definite myocardial infarction, 12 (14.6 per cent) died and 70 (85.4 per cent) survived. Six patients with congestive heart failure complicated by myocardial infarction died (five were due to late ventricular fibrillation). Two patients with complete heart block died within 30 minutes of admission as did one patient who developed complete heart block 24 hours after admission. Two patients with cardiogenic shock at admission developed asystole. One patient went into asystole five hours after presentation.

DISCUSSION

The 40 per cent of patients with chest pain diagnosed as having myocardial infarction corresponds well with the 42 per cent found in cardiac ambulance calls in Belfast.[4] In another study in which patients were selected by the staff of the coronary care unit, 47 per cent were eventually diagnosed as myocardial infarction.[5] Under our present system the patients are admitted directly to the coronary care unit, reducing administration time and we would suggest that the figure of 40 per cent who turned out to have a myocardial infarction represents an effective use of the coronary care facilities. (Many of the patients with other diagnoses were moved quickly to the general wards). The survival rate of 85 per cent in patients with myocardial infarction is similar to studies from other district hospitals.[5]

The average distance travelled by the patients was 3.8 miles and therefore the hospital ambulance had a round trip of 7.6 miles. There are no directly comparable figures available but the time taken to transport the patient to the hospital was an obvious cause of delay in initiating coronary care. In the 15.3 per cent of patients living greater than 10 miles from the hospital, there is greatest scope for reducing the delay before initiation of coronary care, by means of a coronary care ambulance.

Whereas the median time taken to call for assistance was 90 minutes in Edinburgh[2] and 77 minutes in Belfast,[2] we found a median delay of 120 minutes. There was no difference in the median "call" time taken by patients who had a myocardial infarction and those who did not. This is in accord with other studies.[7] At Lagan Valley the total delay before initiation of coronary care was 3 hours 10 minutes. This compares favourably with other studies from hospitals without a cardiac ambulance, which reported delays of five to eight hours.[1, 2] This reflects the "direct admission" policy of the unit which reduces administrative time.

In studies from Belfast on people who have had a fatal myocardial infarction outside hospital, 14 per cent survived the first two hours and it is among this group that there is opportunity for improvement of the mortality figures,[2] as some of these patients will have ventricular fibrillation which may be treated. Belfast studies have shown that whereas there is an overall mortality of 19 per cent in patients admitted

three hours or more after the beginning of their attack, this mortality is only 10 per cent among patients admitted within three hours.[7] This has been ascribed to a reduced incidence of pump failure and shock.

Patient education would be expected to reduce the "call" time of two hours. However, Julian[8] reports that cardiologists with infarcts waited for a median time of 48 hours before calling their doctor. He suggests that the time taken to call for help is directly related to the suddenness and severity of the onset of the attack.[8] Evidence from Belfast suggests that when a cardiac ambulance is available, general practitioners refer patients more quickly and there is a progressive increase in the number of patients coming under intensive care soon after the onset of their coronary attack.[4]

In conclusion, the median time taken before initiation of intensive coronary care in patients with myocardial infarction could possibly be reduced from 3 hours 10 minutes to 1 hour 40 minutes as in the Belfast study.[4] The patient with a myocardial infarction is not only in urgent need of pain relief but is also at great risk of dying. There is substantial evidence that the risk may be reduced by early intervention.[3, 4, 5, 6, 7] The evidence in this paper suggests that while there is room for improvement in delay times, the scope is not as great as in the "pre-coronary care era".

SUMMARY

Two hundred and two patients with suspected myocardial infarctions were admitted to Lagan Valley Hospital during a six month period. Of these, 40 per cent had a myocardial infarction. The median time before calling for help was two hours and before admission to the coronary care unit was a further 1 hour 10 minutes. Mortality rate of patients with myocardial infarction in the coronary care unit was 15 per cent.

Our thanks are due to Dr. M. E. Scott for helpful advice and comments and to Dr. J. D. Merrett for statistical analysis.

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A SOCIAL AND MEDICAL SURVEY OF THE EXTREME ELDERLY IN A MIXED TOWN AND COUNTRY PRACTICE IN NORTHERN IRELAND

by

M. S. GLENN, M.B., M.R.C.G.P.

Ballymoney Health Centre

BALLYMONEY is a market town of approximately six thousand inhabitants situated near the north coast of Northern Ireland. A purpose-built health centre serves the needs of 12,800 patients in the town and the surrounding area. Two practices share the facilities with other health care workers.

The practice studied had 9,180 patients and there were three full-time principals and one trainee assistant. In addition there were two health visitors and two district nurses attached. For the past fourteen years all patients in the practice reaching the age of sixty-five years have been offered an opportunity for an examination of their state of health and social needs. This work is undertaken by health visitors and district nurses and referrals are made to the general practitioner or to social services as necessary. This work and other aspects of the programme of care of the elderly have been reported by Burns.[1, 2] The present study set out to obtain information about the extreme elderly — a group not previously studied in detail.

METHOD

The study population was found using the age-sex register. Only those patients living at home were studied — those in residential accommodation and those temporarily or permanently in hospital were excluded. Initially it was intended to study all those whose ages were recorded as eighty-five years or over. However, in some cases the patients did not agree with the date of birth recorded on their records and so ultimately all patients recorded as aged eighty-three years and over were studied. There were forty-three patients in the group — fifteen male and twenty-eight female.

Each patient was visited at home and assessed. The results of the assessment were recorded on a questionnaire and later analysed by computer. The codes for recording health problems were taken from the RCGP/CPCS Classification of Morbidity for the National Morbidity Survey 1970-1971.[3] The drugs being used were coded using the prescription analysis therapeutic classification prepared by the Pharmaceutical Section of the Northern Ireland Health and Social Services Board, November 1975.

The questionnaire was formulated to obtain information in five main areas of interest:-

1. Supervision by relatives and medical and nursing staff.
2. Active health problems and drug treatment.
3. Physical capacity.
4. Orientation.
5. Behaviour.

Copies of the questionnaire may be obtained from the author at 17 Grange Park, Dunmurry, Belfast BT17 0AN.

Physical capacity was assessed by considering eleven aspects of daily living relating to mobility and the ability to attend to personal hygiene. A score of 1 was awarded if the patient could accomplish the task unaided and a score of 2 if help was required. The scores were added and interpreted as follows:-

Less than 14	No significant handicap
Between 15 and 19	Moderate handicap
20 or above	Severe handicap

Orientation was assessed by asking seven simple questions such as name, age, address and the name of the prime minister. A score of 1 was awarded for a correct answer and a score of 2 for an incorrect one. The scores were added and interpreted as follows:-

7 or 8	Mentally clear
9 to 11	Moderate confusion
12 to 14	Severe confusion

In assessing behaviour relatives were asked if the patient was noisy, disruptive, wandering, demanding or depressed. The frequency of these problems was considered. A score of 1 was given if they never occurred, a score of 2 if they occurred occasionally (2 days or fewer out of 5) and a score of 3 if they occurred frequently (3 days or more out of 5). When added the sum of the scores was interpreted as follows:-

5 to 6	Good behaviour
9 to 11	Occasionally troublesome
12 to 15	Frequently troublesome

The questions in the areas of orientation and behaviour were based on the work of Wilkinson and Graham-White.[4]

RESULTS

In the study by Burns[1] of the same practice in 1969 there were 18 patients aged 85 years and over. In 1982 there were 30 over 85 years, 415 aged 75 to 84 and 723 in the age group 65 to 74 years. Of the 43 patients aged 83 years and over (15 men and 28 women) living in private homes — 63 per cent were living with younger relatives. One man and 10 women were in residential accommodation. The one man and six women living alone were regularly visited by relatives. Most were seen daily.

Forty per cent of the study population were on the general practitioner's "chronic visiting list" and were seen weekly or monthly. The majority of those visited regularly by the general practitioner were also visited regularly by the district nurse (Table I).

Multiple disease conditions were common and 86 per cent had at least two active clinical problems. The problem mentioned by most patients was osteoarthritis. Other common problems were chronic bronchitis, peripheral vascular disease, congestive heart failure and dementia. The high level of drug use was disappointing — 90 per cent of patients were receiving drugs (Table II). The most frequently prescribed drugs are shown in Table III.

TABLE I

Regular visiting by members of the primary care team

(The figures in parentheses are percentages)

	District nurse	*General practitioner*	*Health visitor*
None	27 (63)	26 (60)	37 (86)
Once a month	4 (9)	14 (33)	6 (14)
Once a week	7 (16)	3 (7)	0
More frequently	5 (12)	0	0

TABLE II

Patients receiving regular drug treatment

Number of drugs	0	1	2	3	4	5 or more
Number of patients	4	4	8	14	4	9

TABLE III

Principal types of drugs being taken regularly

Type of drug	*Number*	*Percent*
Diuretics	22	51
Cardiac (e.g. digoxin, G.T.N.)	18	41
Non-steroidal anti-inflammatory	9	21
Analgesics	8	18
Laxatives	7	16
Vitamins	7	16
Peripheral vasodilators	6	14
Hypnotics	6	14

Seven out of 43 patients had moderate or severe physical handicap, 12 had mild handicap and 24 had no significant handicap. Those with poor physical capacity were usually living with younger relatives. Those with defects of orientation (8 were mildly confused and 4 moderately or severely confused) lived with younger relatives as did the three whose behaviour was occasionally troublesome and the one who was frequently troublesome.

DISCUSSION

The oldest age groups in our community are very important as it is estimated that the increase in population aged 85 years and over between 1976 and 1996 will be 42 per cent.[5] The population aged 60-69 years will decrease in the same period.

A high level of family support was found. This has obvious implications for the correct administration of medicines and the early reporting of new episodes of illness and contrasts markedly with that seen in four urban areas of England and reported by Abrams.[6]

The morbidity observed corresponds well with that seen in previous studies.[3] Polypharmacy is a most difficult problem and there are about 4000 admissions to geriatric units annually because of adverse drug reactions[7] and of course many other drug related problems are dealt with in other hospital departments and at home. Although only 14 per cent suffered heart failure 51 per cent were taking diuretics. Williamson and Chopin's study[7] also found that diuretics were the most frequently prescribed drugs although not those which gave rise to the greatest number of adverse reactions. Thirty-five per cent were taking digoxin but the need for maintenance digoxin in patients in sinus rhythm had been questioned by Johnston and McDevitt.[8] The low level of usage of hypnotics and sedatives is gratifying.

The moderate/severe physical handicap group contained almost all who scored badly on orientation. Detailed comparisons and analysis of the data showed no association between physical capacity and behaviour or between orientation and behaviour. Forty-two per cent of patients had a full score on physical capacity, orientation and behaviour. Although the number of patients scoring badly on orientation and behaviour was small (12 per cent) this still represents a formidable problem for family and attendants. Were it not for the high level of family support, institutional care would be the only alternative.

SUMMARY

A survey of all the patients aged 83 years and over attached to a general practice in Ballymoney, Northern Ireland was carried out. Forty-three patients lived at home and only 16 per cent lived alone. Regular visiting by both relatives and the health care team occurred. Although 56 per cent had no physical handicap and 72 per cent had no defect of orientation 91 per cent were receiving prescribed drugs. Family ties are strong in this community but the small number of handicapped and confused people caused a considerable strain. The need for constant review of prescribing and vigilance for adverse drug reactions is emphasised.

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I would like to thank my trainer Dr. C. Burns and the staff of the Health Centre for continuous help and encouragement. Mr. Colin Todd and Mr. David Atherley of the Computer Services Department, The New University of Ulster helped in the analysis of the data.

PREVALENCE AND SURVIVAL OF PATIENTS WITH CYSTIC FIBROSIS IN NORTHERN IRELAND, 1961-1971

by

G. B. NEVIN
Reader, School of Life Sciences, Ulster Polytechnic

N. C. NEVIN
Professor, Department of Medical Genetics,
The Queen's University of Belfast

A. O. REDMOND
Consultant Paediatrician,
The Royal Belfast Hospital for Sick Children, Belfast

CYSTIC fibrosis (CF) is the most common autosomal recessive disorder in Caucasian populations, with a prevalence at birth of approximately 1 in 2,000. The prevalence shows considerable geographical variation, ranging from 1 in 377[1] to more than 1 in 10,000.[2] Although most of this variation can be attributed to methods of ascertainment and diagnosis of CF, some may be due to true geographical variation. Before 1960, most children with CF died as a result of chronic suppurative lung disease in early childhood. However, in recent years there has been a marked improvement in the survival rates.[3] This paper examines the geographical variation in the prevalence and also the survival of CF patients born in Northern Ireland during 1961-1971.

METHODS

In the mid-1960s the population of Northern Ireland was 1,484,800 with a birth rate of 22.5 per 1000.[4] Multiple sources of ascertainment were employed to identify patients with CF born in the period 1961-1971. These sources included, consultant paediatricians and hospital diagnosis lists, genetic counselling clinic records, autopsy reports, and laboratory results of sweat electrolyte investigations. In addition, all general practitioners were circulated with a questionnaire requesting information relating to any patient under their care who had CF. The Cystic Fibrosis Group was asked to identify any CF patient born in the study period.

For each CF patient, the following information was recorded: date and place of birth, clinical symptoms, age at diagnosis, and confirmatory laboratory investigations. Each family was visited and a family history obtained. Criteria for inclusion in the study was as follows: the patient had to be born in Northern Ireland during the years 1961 and 1971, have a typical clinical history and, in addition, must have either an elevated sweat sodium or chloride, or have shown macro- and microscopic autopsy findings. Patients fulfilling these criteria were considered to be definite CF cases. Some patients who had an affected sib and raised sweat electrolytes but without clinical symptoms were considered to be probable CF cases. All patients reported as having CF but with incomplete information on diagnosis tests were considered as possible CF cases.

RESULTS

A total of 200 patients of all categories of CF was born in the period 1961-1971. There were 184 definite cases, 2 probable cases, and 9 possible cases, of CF. Five cases were excluded as two were born outside Northern Ireland, and in 3, the diagnosis of CF could not be confirmed. With a total livebirth population of 362,224 and 184 definite CF cases, the prevalence was 1 in 1969. The prevalence increased to 1 in 1857 when probable and possible cases of CF were also included.[5] The prevalence according to the patient's year of birth ranged from 1 in 1210 (1965) to 1 in 3712 (1967) (Table). Of the 184 definite cases of CF, 19 (10.3 per cent) had meconium ileus. In 1961, the mean age of diagnosis was 12.2 months (range 1 to 36 months), whereas in 1971, the mean age of diagnosis was 14.3 months (range 1 to 61 months).

TABLE

Total livebirths, number of definite cases of cystic fibrosis by year of birth

Year	*Livebirths*	*CF Cases*	*Prevalence*
1961	31,915	16	1/1994
1962	32,565	10	1/3256
1963	33,414	15	1/3342
1964	34,345	21	1/1635
1965	33,890	28	1/1210
1966	33,228	17	1/1954
1967	33,415	9	1/3712
1968	33,173	15	1/2211
1969	32,428	17	1/1907
1970	32,086	20	1/1604
1971	31,765	16	1/1985
	362,224	184	1/1969

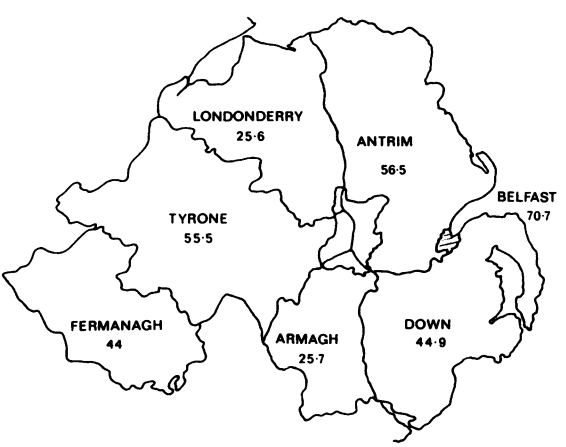

Figure 1. *Geographical distribution of cystic fibrosis in Northern Ireland, showing the prevalence per 100,000 livebirths by County.*

The geographical distribution of the patients was determined from the family history and hospital records, and compared with the number of livebirths in the same area. Figure 1 shows the prevalence per 100,000 livebirths ranged from 25.6 in County Londonderry to 70.7 in the County Borough of Belfast, compared with the overall prevalence for the Province of 50.8.

During the follow-up period, 95 (51 per cent) of CF patients in the survey had died. Figure 2 shows the cumulative survival for CF patients without meconium ileus, for patients

with meconium ileus, and for all CF patients. It will be seen that for all CF patients the highest mortailty was in the first year of life, particularly for CF patients with meconium ileus. The survival rates for patients with meconium ileus showed that 26 per cent, 52 per cent, and 84 per cent, had died by the end of the first week, by the second month, and by the end of the first year, respectively. Of the CF patients without meconium ileus, 21 per cent had died within the first year, 35 per cent by their fifth year, and 46 per cent by their tenth year.

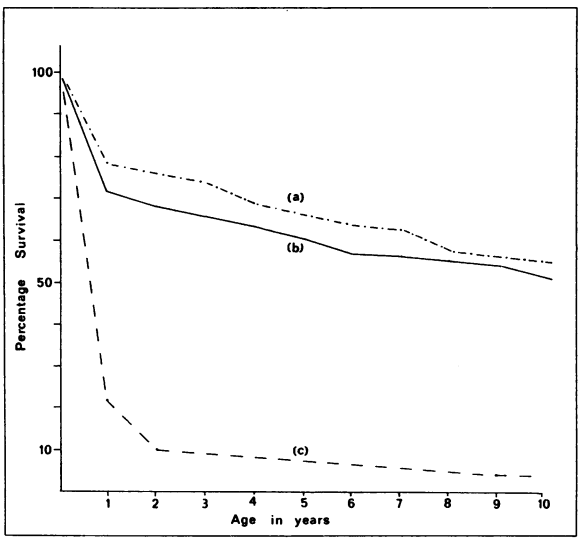

Figure 2

Survival curves for cystic fibrosis patients born during 1961-1971:-
(a) patients born without meconium ileus;
(b) all patients with CF; and
(c) patients with meconium ileus.

DISCUSSION

The prevalence of CF in Northern Ireland was estimated as 1 in 1969 livebirths when only definite CF cases are considered, but when probable and possible cases also are included the prevalence figure rises to 1 in 1857.[5] The prevalence figure is similar to that for areas of the United Kingdom and for Ireland. The overall prevalence per 100,000 livebirths was 50.8. Interestingly, the prevalence of CF was low in Counties Londonderry (25.6) and Armagh (25.7) being about half that estimated for the whole Province. No clear explanation for this is available. It is unlikely that the lack of paediatric facilities in these areas during the period could explain the low prevalence, as the prevalence rates for Counties Tyrone (55.5) and Fermanagh (44.0) are comparable to the overall population prevalence. Again, the high prevalence rate (70.7) for Belfast has no clear explanation. It has been suggested that large deviations in the frequency of CF are not improbable and they may well be caused by chance alone.[6]

The prognosis for patients with CF has improved dramatically. During the period 1930-1950, more than 80 per cent of children with CF died before the age of one year. From the Hospital for Sick Children, London, for the period 1964-1968, George & Norman[7] reported that 89 per cent of CF children born without meconium ileus were alive five years after diagnosis. In the present survey, only 65 per cent of CF patients born without meconium ileus were alive five years after the diagnosis. However, examination of survival rates for 1961 reveals that five years after diagnosis only 4 of 13 (30 per cent) CF patients born without meconium ileus were

alive, whereas for 1971 there was an improvement with 11 of 14 (79 per cent) CF patients born without meconium ileus still alive. In the study period only 16 per cent of patients born with meconium ileus were alive five years after diagnosis.

Although the survival rates for Northern Ireland are below the United Kingdom average, there has been an improvement from 1961-1971. A number of factors has probably contributed to this improved survival. Most important are probably the wide range of antibiotics available and the recognition of the importance of prompt treatment of all respiratory infections in CF children. However, in the present survey earlier diagnosis does not appear to be the determining factor as the mean age at diagnosis, both in 1961 and in 1971 were similar. It will be interesting to examine the survival rate over the period 1972-1982. An increased awareness of CF in the Province, earlier diagnosis, improved treatment, and with more children with CF attending special clinics for management, a much better prognosis for CF patients can be expected.

SUMMARY

For the years 1961-1971, the prevalence of cystic fibrosis in Northern Ireland was estimated as 1 in 1857 (50.8 per 100,000 livebirths). A geographical variation was noted with low prevalence rates in Counties Londonderry (25.6), and Armagh (25.7), and a high prevalence rate (70.7) in the County Borough of Belfast. Survival studies of CF patients born without meconium ileus showed only 65 per cent alive 5 years after diagnosis. For patients with meconium ileus only 16 per cent were alive 5 years after diagnosis. During the period of the survey, life expectancy of CF patients had improved; of those patients born in 1961 without meconium ileus, 30 per cent were alive, whereas for those born in 1971, the figure was 79 per cent.

We wish to thank all the paediatricians, general practitioners, pathologists, for allowing us access to their patients and records, and all the families for their co-operation in the study. The investigation was undertaken during the tenure of a research grant from the Cystic Fibrosis Trust.

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SPINAL EXTRADURAL HAEMATOMA: Report of Two Cases

by

ROBIN A. JOHNSTON BSc, FRCS and IAN C. BAILEY, FRCS

Division of Neurosurgery, Royal Victoria Hospital, Belfast

Case 1

A 66 year old woman was sitting quietly at home when she experienced a sharp pain in the epigastrium and in the region of the lower thoracic spine. She was admitted to hospital and over the next 24 hours the epigastric pain settled but the thoracic pain became worse. After 36 hours she was found to have developed a paraparesis with urinary retention.

On admission to the neurosurgical unit clinical examination did not disclose any abnormalities outside the nervous system. She had grade 2-3 power in the right leg and grade 3-4 power in the left. Muscle tone was diminished, her deep tendon reflexes were normal and both plantar responses were extensor. All modalities of sensation were intact in the legs but light touch and pinprick were diminished between the 9th and 12th dermatomes bilaterally. Above T9 sensation and power were normal.

A lumbar myelogram carried out shortly after admission revealed an incomplete obstruction at the T11 level. This was thought to be an extradural type of compression (Figure 1). The cerebrospinal fluid (CSF) was straw coloured with a protein of 0.98 gm/l with 36 leucocytes and 29 erythrocytes.

At operation the laminae of T10 and T11 were removed. As soon as the ligamentum flavum was opened, solid extradural clot extruded under pressure. Further exposure showed that the clot covered the dorsal surface of the dura over the 10th and 11th vertebral levels. The haematoma was removed and the dura was opened. The spinal cord was noted to be compressed and was not pulsating initially although CSF flowed freely from the subarachnoid space. No specific source for the extradural haematoma was identified and control of bleeding during operation was not difficult. Following surgery routine coagulation tests were carried out but no abnormality was disclosed.

The patient gradually regained normal power in both legs and sensation over T9-T12 dermatomes returned. Her back pain was relieved and her gait much improved. Two weeks later she was returned to the referring hospital for continuing rehabilitation, where she went on to make a good recovery.

Case 2

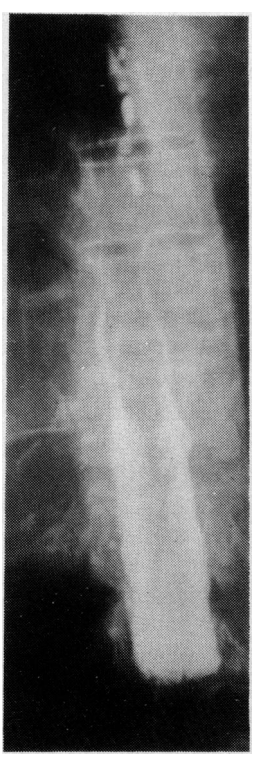
In May 1982 a 43 year old male civil servant experienced cervical pain which radiated into his right shoulder. The onset of pain was not associated with any particular activity and initially he was treated for what was considered to be a ligamentous injury or perhaps a prolapsed disc. Twenty-four hours later he developed paraesthesiae along the medial aspect of both forearms. This persisted for a further three days after which he was admitted to an orthopaedic unit for bed rest

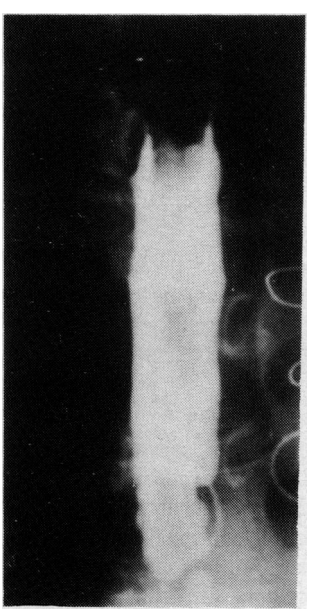
and cervical traction. On the day after admission he developed a quadriparesis with urinary retention and he was transferred to the neurosurgical unit.

The patient gave a medical history of familial hyperlipidaemia and a triple coronary artery bypass procedure had been carried out in 1980. He was receiving treatment for two transient cerebral ischaemic episodes which had occurred within the previous two years. His medication included warfarin, persantin and aspirin.

Examination showed a complete paralysis of the legs and partial weakness of both arms. The right arm had grade 3 power at the elbow and wrist and grade 2 power in the intrinsic hand muscles. The left arm was slightly stronger but had a severe weakness of the hand muscles. There was complete loss of sensation below T8 and partial loss below C7 on the right and C8 on the left. The muscles were flaccid and reflexes were normal in the upper limbs but absent in the lower limbs.

Before myelography his prothrombin time was 11 per cent and thrombotest 6 per cent. Fresh frozen plasma was infused and a lumbar myelogram was performed. This demonstrated a complete block of the extradural type at the level of T2 (Figure 2). The CSF was yellow with 2.7mg/l protein and with 38 white cells and 19 erythrocytes. Immediately following the myelogram a laminectomy was carried out and the dura exposed between C6 and T2, displaying a dark blue extradural haematoma. This was gently removed from the dorsal surface of the dura. No specific bleeding point was identified.





(left)
FIG. 1
Case 1.
Incomplete obstruction at T11 in the lumbar myelogram.

(right)
FIG. 2
Case 2.
Myelogram showing complete extradural block at T2.

Post-operatively further fresh frozen plasma was infused and anticoagulation therapy was recommenced 48 hours later. Within a few days of operation the patient's sensory deficit had virtually disappeared and he regained power in his upper limbs especially in the hand muscles on each side. There was, however, virtually no early return of motor function to the lower limbs and he still required a urinary catheter. Further management was continued at a spinal rehabilitation unit but he remained paraplegic at six months.

DISCUSSION

The infrequent occurrence of spontaneous spinal extradural haematoma makes its clinical diagnosis unlikely before surgical exploration has been undertaken. Back pain and the subsequent development of neurological signs will suggest a differential diagnosis that includes disc prolapse, extradural abscess, dissecting aortic aneurysm and extradural tumour. Acute vascular lesions of the spinal cord such as haematomyelia and spinal artery thrombosis are not usually associated with pain while the neurological sequelae immediately follow the occlusion. The main differential diagnosis is a prolapsed intervertabral disc and this is important because the direction of surgical approach would then be anterior in the cervical and thoracic regions.[1]

The clinical features of spinal extradural haematoma and disc prolapse are similar whether they occur at the cervical, thoracic or lumbar levels.[2] Pain is the usual presenting symptom and may well have a radicular distribution. The onset of neurological signs may be delayed by hours, days or in a small percentage of cases by weeks. The pain often subsides with the onset of neurological symptoms which usually take the form of a flaccid motor weakness, urinary retention and disturbance of sensation. Variations in the neurological deficit have been reported including the Brown-Sequard syndrome[3] and rarely no sensory deficit.[4]

The cause of the free interval is not easy to explain, especially considering that it may be hours or weeks in duration. In our two cases the free interval was 36 hours in Case 1 and 5 days in Case 2. Paraesthesiae did develop after 24 hours in the latter but the onset of quadriparesis was delayed for five days.

Most cases of spinal extradural haematoma are apparently idiopathic and about one quarter are associated with anticoagulant therapy.[5] Everyday trauma caused by heavy lifting and minor falls has been implicated without evidence to show that these are anything more than coincidental factors. The combination of anticoagulation therapy and minor trauma may be significant. Major trauma involving the spine does not seem to be associated with compressive extradural haematoma.

Once the diagnosis is suspected a myelogram should be carried out without delay. With extradural haematoma a complete or partial obstruction is almost always demonstrated.

The only effective treatment is prompt and adequate decompression of the spinal cord by laminectomy and evacuation of the haematoma. Results show that this will cure or greatly improve the majority of patients, especially in the younger age group.[6] Delayed decompression usually means a poor neurological result and conservative management is not recommended. In both of our cases the spinal cord was compressed by the haematoma but cord pulsation returned when it was evacuated. One patient has made a very satisfactory recovery while the second to

date remains paraplegic although his dependence has been reduced by the return of function in his hands.

SUMMARY

Extradural haematoma is a rare cause of spinal compression. Its aetiology is unknown but about one quarter of cases are associated with anticoagulant therapy. The main diagnostic difficulty is in distinguishing spinal extradural haematoma from a prolapsed intervertebral disc. This is important in order that the correct surgical approach be made. The condition often responds favourably to early decompression and our recent experience of two cases is reported.

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Correspondence and reprints:
Robin A. Johnston BSc, FRCS,
Institute of Neurological Sciences,
Southern General Hospital, Glasgow G51 4TF.

EPIDURAL OPIATES AND DEGENERATIVE BACK PAIN

by

WILLIAM I. CAMPBELL, MB, FFARCS(I)

Senior Registrar Anaesthetics, Royal Victoria Hospital

THE relief of acute pain by epidural and intrathecal opiates has been widely explored in the past few years. The existence of spinal opioid or endorphin receptor sites explains the excellent analgesia which can be achieved by these routes. It is interesting that endorphin levels in the cerebrospinal fluid have been shown to be markedly lower than normal in both acute and chronic pain.[1] Most studies using spinal opiate administration have been in patients with acute pain.

Patients with intractable pain due to degenerative bony changes in the spine are most frequently managed with non-steroidal anti-inflammatory agents, but these have to be taken frequently, are not without side-effects, and often are ineffective. The aim of this study was to find whether such pain could be alleviated for a prolonged period using a single administration of epidural opiate.

PATIENTS AND METHOD OF TREATMENT

Twenty consecutive patients with chronic back pain were referred to the pain relief clinic after full investigation by a consultant, usually an orthopaedic surgeon. All had a history of back pain for more than one year, and had degenerative changes in the spine.

All patients were examined and pain level assessed, using a visual analogue scale (Figure)[2] This is a simple and reliable method of subjective pain assessment. The scale is a 10 cm line on which the patient indicates pain severity ranging from no pain to the worst pain imaginable.

Figure. *Visual analogue scale used to determine the severity of pain*

NO PAIN — **THE WORST PAIN I COULD IMAGINE**

Please indicate the severity of your pain with a mark on this line

All patients were admitted to hospital for a 48 hour period. The injection was carried out over the nerve roots corresponding to the painful area, the patient lying on the painful side. The needle position within the epidural space was confirmed using 0.25 ml Myodil X-ray contrast media. Diamorphine 2 mg in 4 ml plain bupivacaine 0.25 per cent was then injected. The patients were observed closely while remaining in the same posture for the next 30 minutes, and then transferred to the ward, where respiration in particular continued to be observed by the nursing staff.

The patients' assessment of their pain was repeated at 24 hours, and any other complications noted. 8 weeks after discharge, pain scores were again measured, and in those where pain had returned, alternative treatment was arranged. The remainder, in whom pain relief was still good, were seen and assessed again at 6 months.

RESULTS

Of the 20 patients, three were male and seventeen female, aged between 32 and 75, with a mean age of 50. Fourteen were taking non-steroidal anti-inflammatory analgesics on a regular basis. None had any other serious condition.

Using the visual analogue scale described, the mean severity of pain before treatment was 8.1 (SE 0.7). By twenty-four hours 19 patients had marked relief of their symptoms, with a mean pain score of 2.1 (SE 1.6), one observed no difference. By eight weeks, 8 patients were still receiving benefit — mean score 2.7 — but by six months pain had returned to pre-treatment levels in all 20 patients.

The number of patients who had good pain relief at each time of assessment is shown in the Table — good pain relief has been arbitrarily defined as a fall in pain score of 3 cm or more from the initial value on the visual analogue scale.

There were no serious side-effects. The incidence of minor problems was as follows—nausea 3, vomiting 2 and itching 5 patients.

TABLE

Numbers of patients with marked pain relief following a single epidural injection of opiate

Time after injection	*Number of patients*	*Good pain relief*	*Significance compared to control score*
24 hours	20	19	$Chi^2 = 32.5$, $p < 0.001$
8 weeks	20	8	$Chi^2 = 7.66$, $p < 0.001$
6 months	20	0	ns

DISCUSSION

Low back pain is a common and disabling disorder likely to affect most people during their lifetime. Conventional methods of treatment have limited success and potential problems. Epidural opiates have been used in the management of various types of chronic pain. They act largely at specific opioid receptor sites in the spinal cord to inhibit nociceptive transmission.[3] The duration of analgesia following epidural opiates in the management of chronic pain greatly exceeds that in acute pain, but duration of analgesia does not increase in proportion to the dose of drug administered.[4]

Morphine has been the most commonly used drug for this type of work, but diamorphine was used in this study because of its greater lipid solubility, and its ready availability in a preservative-free preparation. The higher lipophilicity of diamorphine aids neural uptake, and also facilitates removal from the CSF, therefore reducing the likelihood of cephalad transfer of the drug to cause respiratory depression.[5] The use of these opiates by epidural injection does not appear to lead to any local tissue damage.[6]

The complications listed are those which have been reported following epidural or intrathecal use of opiate drugs. The incidence of nausea and vomiting and of itch are

similar to those reported elsewhere. Urinary retention was not a problem here, but is a common complication in postoperative cases. Respiratory depression, usually delayed by 4-18 hours, is the single most worrying complication to follow intraspinal opiate administration. The incidence of this may be about 4-7 percent,[7] and it is probably due to spread of opiate within the CSF to reach the vital centres in the brain-stem. The possibility of this complication requires close postoperative observation.

The pain relief achieved in the patients studied was judged to be worthwhile, and it was free of any serious complications, and so should be a useful in-patient procedure for management of this type of pain.

SUMMARY

The duration of pain relief resulting from a single epidural injection of diamorphine was studied in 20 patients suffering from chronic back pain of more than 1 year's duration, and with radiologically demonstrable degenerative changes. Pain severity was measured using a visual analogue scale. Each patient received 2 mg diamorphine in 4 ml plain bupivacaine 0.25 percent by the epidural route.

No serious side-effects were encountered, although transient nausea or itching occurred in some patients. The procedure was considered safe and useful for the in-patient management of this type of pain. Follow up study over six months indicated relief of pain for more than two months in 40 percent of the patients.

The author wishes to thank Dr. M. Mehta for his advice and permission to study his patients.

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ASSOCIATION OF CONGENITAL RENAL AND INTESTINAL LESIONS

by

S. R. POTTS, F.R.C.S. and B. LEE, F.R.C.S.

The Royal Belfast Hospital for Sick Children

TRACHEO-OESOPHAGEAL fistula and oesophageal atresia (TOF) duodenal atresia, anorectal anomaly and exomphalos are known to have a significant association with renal abnormalities.[1-4] The incidence of the association varies depending on the primary gastrointestinal condition and the reported series but is sufficiently common in all to merit consideration of the routine investigation of neonates with these conditions by way of intravenous pyelogram and micturating cystogram. Such a policy had gradually been introduced since 1977 in the Royal Belfast Hospital for Sick Children and the diagnostic yield of this policy to December 1982 is presented.

METHODS

The records of all neonates with primary diagnosis of tracheo-oesophageal fistula, duodenal atresia, imperforate anus or exomphalos were investigated to determine the presence or absence of renal abnormalities. In cases where the child was deceased and no renal study was performed, post mortem records were examined.

The policy to investigate these children was not uniformly applied initially but has been almost total since 1980.

RESULTS

Eighty-three cases were examined, 31 had no radiological investigation of the urinary tract, 9 had an incomplete investigation i.e. only one of either intravenous pyelogram or micturating cystogram. Thirty-seven abnormalities were discovered in 28 patients (54.6 per cent of the cases with partial or complete radiological investigation or 65.1 per cent of the cases with full radiological investigation). Fourteen cases died before investigation: one abnormality was reported at post mortem in this group—ureteral obstruction queried as secondary to posterior urethral valves.

Of the 42 T.O.F. examined eight cases not radiologically investigated developed urinary tract infections which would now be regarded as an indication for intravenous pyelogram and micturating cystogram in itself. In none of these cases was radiological investigation carried out. The reasons for these omissions could not be ascertained.

The 14 cases with duodenal atresia contained eight with Down's syndrome. Six died before investigation (4 Down's syndrome). No abnormalities were revealed at post mortem.

Six cases out of 25 cases of imperforate anus died before investigation. No abnormalities were revealed at post mortem. Thirteen cases had abnormalities other than an intestinal fistula to the urinary tract.

The occurrence of normal and abnormal urinary tracts in the various groups is presented in Table 1.

TABLE 1

Results of Clinical and Radiological Investigations

Diagnosis	*Abnormal*	*Normal*	*Incomplete*	*Early Deaths*	*Total*
Oesophageal atresia tracheo-oesophageal fistula	12	13	17	—	42
Duodenal atresia	2	1	5	6	14
Anorectal anomalies	15	4	—	6	25
Exomphalos	—	3	—	6	9

Table 2 shows the distribution of more common urinary anomalies in the series. Other less common disorders included crossed renal ectopia (4 cases), persistent urachus (1 case), urogenital sinus (1 case), vesico-ureteric junction obstruction (1 case): renal dysplasia (2 renal moieties) in two separate cases.

TABLE 2

Distribution of Most Common Anomalies

Diagnosis (single moieties)	*Tracheo-oesophageal Fistula (cases)*	*Anorectal Anomalies (cases)*	*Duodenal Atresia (cases)*
Vesico-reflux —22	8	7	2
Agenesis — 4	3	1	—
Hydronephrosis — 5	2	2	—

DISCUSSION

The co-existence of multiple congenital abnormalities in many situations is fully documented and it is consequently recognised that certain associations exist in specific circumstances. Such a situation is the case with four major conditions affecting the gastrointestinal tract, T.O.F., duodenal atresia, imperforate anus and exomphalos all of which carry a high association with cardiac, skeletal and renal abnormalities.

It is with the renal lesion in these conditions that we are concerned in this study as they occur sufficiently frequently[1-4] to merit routine investigation following diagnosis of the gastrointestinal lesion, and cover the entire spectrum of renal abnormalities making prediction of the nature of the anomaly impossible except in the anorectal anomalies where a fistula from the terminal bowel to the urinary tract is assumed if it is not present in the genital tract or perineum.[4] It is therefore justifiable to investigate these children radiologically. Having pursued an

investigative policy for six years, which was initially not enforced consistently but now has been routinely applied for two years, our findings underline that this policy should continue as 50 per cent of the cases investigated had abnormalities which were significant. Although the cases of exomphalos did not reveal any abnormalities of the renal tract it is assumed that this is accounted for by the small number and the high percentage of deaths prior to investigation: on the basis of the experience of other authors[3] we will continue to investigate exomphalos for associated renal anomalies.

It may be argued that if these cases are of long term significance—this particularly applied to vesico-ureteric reflux which may resolve spontaneously — they would eventually become manifest clinically and that pursuing an expectant policy would obviate investigation of those with no abnormality. The danger with such an approach is identical to that with urinary tract infection in children generally, namely that the symptomatology is notoriously misleading and often minor even in the presence of gross pathology. There is therefore a great risk in what is already a threatened group of patients that a correctable lesion may be overlooked until organ failure is unavoidable.

SUMMARY

Eighty-three neonates with congenital gastrointestinal disorders carrying a known association with urinary tract abnormalities were investigated. Thirty-seven abnormalities were discovered in 28 patients.

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EARLY POST OPERATIVE MANAGEMENT FOLLOWING MENISCECTOMY

by

A. D. L. GREEN, FRCS, G. F. W. PRICE, FRCS, D. BAIRD, FRCS

Department of Orthopaedic Surgery, Altnagelvin Hospital, Londonderry

ARTHROTOMY of the knee joint for the removal of a torn or degenerate meniscus is a common orthopaedic procedure. Demands on bed occupancy are usually high. Different methods of management have been advocated in the early post operative period ranging from weight bearing and knee bending within twenty four hours after operation[1] to ten days bed rest in hospital and non weight bearing with the knee in a Robert Jones bandage.[2]

This paper compares two methods of management in the early post operative period. In one, the patient had an extension splint applied for two weeks and was allowed to weight bear twenty four hours after operation. The second group were managed non weight bearing using crutches for two weeks and encouraged to bend the knee. Patients were discharged home as soon as they had good quadriceps muscle control and were apyrexial.

The aim of this study is to assess if patients could safely be discharged from hospital early and to compare the two groups during rehabilitation.

PATIENTS AND METHODS

Forty one patients were admitted from the waiting list for exploration of the knee joint. Pre operatively they were taught static quadriceps exercises. An effusion was present in twenty six patients (63 per cent), quadriceps wasting was present in thirty patients (73 per cent) and thirteen (32 per cent) had a locked knee. Patients were selected into two comparable groups for age, sex and side of joint involved. A standard arthrotomy was performed with a general anaesthetic and a pneumatic tourniquet was used.

The first group had the wounds dressed with a double layer of wool and crepe bandage with a light metal alloy gutter extension splint applied over the dressing. Weight bearing was commenced twenty four hours post operatively. The second group had a similar bandage applied and were allowed up after twenty four hours for managed non weight bearing with crutches. The outer dressing was removed after forty eight hours leaving a single layer of wool and crepe bandage for support and knee bending was commenced. All patients were encouraged to continue static quadriceps muscle exercises.

When good quadriceps muscle control had returned and no pyrexia or other complications were present, the patients were allowed home if home conditions were suitable. Thirty four patients (72 per cent) were discharged within three days of operation. Four were discharged within seven days and the remaining three were discharged within ten days, one having social problems and the other two required intensive physiotherapy for poor quadriceps muscle control.

Sutures were removed after fourteen days in all patients and the knees clinically examined. The wound was inspected, any effusion present was graded as mild, moderate or severe and the quadriceps muscle bulk in both knees was assessed by measurement of the circumference of the thigh at a fixed point above the knee joint. A support bandage of double Tubigrip was applied and all patients allowed to weight bear and encouraged to knee bend. Physiotherapy as an out patient was arranged to supervise rehabilitation exercises. A review appointment was made six weeks after surgery and a final examination of the knee made.

RESULTS

Following meniscectomy on forty one knees, twenty were treated with an extension splint and twenty one treated non weight bearing with early mobilisation. A medial meniscectomy was performed on twenty five knees with sixteen having a lateral meniscectomy.

Examination at fourteen days following surgery showed that patients mobilised early had a greater number of moderate effusions, nine (43 per cent) compared to two (10 per cent) in the splinted group. After six weeks those patients mobilised early still had more persisting effusions (Table). The difference in the groups has a statistical significance with $P = < 0.05$. Three patients in the group mobilised early had an extension lag fourteen days after operation but this had cleared at the final examination. No patients in the splinted group had an extension lag. There was no difference in the amount of quadriceps wasting between the two groups at either examination.

TABLE

Effusions present in knee joints at two weeks and six weeks post operatively

	Effusion at two weeks				*Effusion at six weeks*			
	None	*Mild*	*Moderate*	*Severe*	*None*	*Mild*	*Moderate*	*Severe*
With splint	4	14	2	0	18	2	0	0
Without splint	2	10	9	0	12	9	0	0

DISCUSSION

Smillie[2] advises that patients should not be allowed home before ten days following meniscectomy. Our practice is to discharge patients home early because of demands on hospital beds provided that physiotherapy progress is satisfactory and that the temperature is normal. Seventy two per cent of patients were discharged within three days of operation. No wounds became infected and wound healing was not delayed.

The patients with knees splinted in extension in the early post operative period were found to have fewer effusions compared to the group whose knees were mobilised early both at the two week and six week examination. They also had better quadriceps muscle control in the early rehabilitation period as there were no cases of extension lag in this group compared to three in the group mobilised early. This agrees with Nelson[3] that the inflammatory reaction produced by arthrotomy

resolves more rapidly when the knee is rested, leading to a quicker recovery of quadriceps function. Our findings also agree with Wynn Parry[4] who advised that effusions occurring during rehabilitation following meniscectomy should be treated by immobilisation of the knee in a back splint.

SUMMARY

Two different methods of post operative management following arthrotomy of the knee are compared. Those splinted in extension for fourteen days post operatively had fewer effusions during the rehabilitation period and better control of quadriceps muscles. Early discharge from hospital following arthrotomy of the knee produced no adverse effects.

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DR. WILLIAM DRENNAN—HIS LIFE IN GEORGIAN IRELAND

by

HUME LOGAN, M.Ch., F.R.C.S.

Consultant Surgeon, The Ulster Hospital, Dundonald

WILLIAM DRENNAN was born in Belfast in 1754, the last of 9 children, only three of whom survived childhood. His father was the Reverend Thomas Drennan, Minister of the First Presbyterian Congregation, Rosemary Street, Belfast and he was a Dissenter throughout his life. William was educated at the school of Belfast in Church Lane which had been in existence for nearly one hundred years when he went there. In 1769 he went to Glasgow University where two years later he obtained his M.A. at the age of seventeen. It is not known how or where he spent the next two years, but in 1773 he went as a medical student to Edinburgh — a university which was popular amongst the Northern Irish at this time, principally because of its excellence, but also because of the low cost of tuition. Dublin University required a student to spend 12 years before obtaining his M.D. and was not favoured by the Ulstermen.

From the time he went to Edinburgh until his death in 1820 he had a fairly constant correspondence with his sister Martha (Matty) McTier of which nearly one thousand five hundred letters are preserved in the Northern Ireland Public Records Office, and provide a unique picture of the life of a doctor in Ireland in the late eighteenth and early nineteenth centuries. The letters are even more important to historians as Drennan was deeply steeped in politics and a synopsis of many of them was published in 1931.[1]

From reading the letters written while he was a medical student one gets the impression that student life has not changed very much in two hundred years. The main difference is that up till 1840 the thesis for the final M.D. had to be written in Latin and the examination was also conducted in that language. However, the role of the Irish medical student remains much the same as Drennan wrote 'A student of medicine is a term of contempt, but an *Irish* student of medicine is the very

Dr. William Drennan. Detail from an oil painting by Robert Home, December 1786, originally in possession of Mrs. Duffin, Belfast.

Based on a talk given to the Ulster Medical Society, 20th January, 1983.

highest complication of disgrace'. He also wrote of a typical day in Edinburgh as follows:-

> 'I rise a little after 6 in the morning and am resolved (not with one of my Belfast resolutions) to continue this custom. I strike my flint, blow my tinder and light my match with as much assiduity as John the Painter; and after preparing for my classes, at about 8 o'clock, if it be a good morning I give stretch to my legs for half an hour in the meadow which lies near my lodging — when I return I take my academical breakfast of bread and milk and then issue out to the labours of the day — from 9 till one I am tossed about with the wind of doctrine thro' different parts of the University; from 9 till 10 at the Practice; from 10 till 11 at Chemistry, my second attendance at both; from 11 till 12 at the Materia Medica a class which treats of medicine, their nature, use and application — from 12 till one at the Infirmary from which I derive much more benefit than when last time here. Yet still it is a disagreeable place to me and I never enter it without thinking of those lines of Milton 'Despair tended the sick, busiest from couch and over them triumphant death his dart shook, but delayed to strike'— From one until 3, I make it a rule to walk and chew the cud of what I have heard, and either soar to the sublime Calton where as Johnson expressed it, I can see the dusty world look dim below or pace along with my fellow mortals in the meadow or the park — After dinner I have seldom more than an hour's attendance at College and that is on Midwifery from half an hour, after 5 unil 7 I am generally in useful and agreeable company, and from that until 10 I read or write — Saturday and Sunday are constant vacation days at College; on these days I make an Epicurean Breakfast of tea and toast, then idle away an hour at a Coffee-House; call on my friends, walk into the country &c, and in the evening have some select friends . . . '

Drennan considered himself a competent Latin scholar and he wrote the thesis for his M.D. in that language. It was titled 'Venesection in the Treatment of Continued Fevers' and was delivered in September 1778 the year in which he graduated.

He returned to Belfast, but little is known of the two years he practiced there, except that he was not very successful, although he received a vote of thanks from the Charitable Society for introducing a scheme of innoculation against small pox into the Charitable Society House in 1782. He also read a paper to the Society in the same year on this subject.

Late in 1782 Drennan moved to Newry, at this time an important town in the southern part of County Down. Its importance was due to the fact that it was a port and was connected to a large hinterland by the Newry Canal, the first part of which was completed in 1742 and was the first major canal in the British Isles. When Drennan lived there it boasted a population of around ten thousand — a figure not very different from that of Belfast. Drennan, still a bachelor lived in rented accommodation with his man servant. The latter gets a prominent place in the correspondence because of his unreliability, drunkeness and gambling. He looked after Drennan's horse (before it was stolen), powdered his wig and dressed his hair, apart from doing many other chores and running errands. Perhaps it was the servant who serviced Drennan's bath for we read 'I have had the fortune of meeting with an excellent bath not one hundred yards from my door . . . It is a large and deep trough

placed in a little garden house, and as convenient as possible for immersing the whole body — I have made use of it 4 or 5 times and I rise between 8 and 9 (which laudible practice I hope to continue) for the sake of getting all over before the necessary business of the day'.

Drennan's main practice was as an obstetrician although he gives us little insight into this part of his work. However, there were several occasions when he had to be out of Newry for up to seven days for a confinement. He did realise nevertheless, how important it was to be successful in this type of practice as he wrote after twins were safely delivered 'How fragile is our professional character—had she died at this time, I should not perhaps have one patient more in this line so sensible is the female mind to unfavourable impressions. When any fatal accidents happen—want of good-luck is sufficient'.

Measles, typhus and tuberculosis were common in Newry and there really was little that Drennan could do about these conditions. Typhus was treated in many ways and the logic of their uses is as baffling to us today as it must have been to our colleagues of yesteryear. Emetics, clysters, purging, bleeding, blistering, etc. were all employed and it can only be said that it is fortunate that any patients survived — in fact, those who did not receive any treatment were probably the lucky ones!

Small pox was also common and it was in this field that Drennan probably did most good by innoculating material from the pustules of infected patients into those in whom he hoped to stimulate immunity. He often related how ill the recipients became, but he did not seem to have any deaths from innoculation. This was of course before Jenner's work with cow pox and in the later years Drennan practiced this form of vaccination. He also had cases of small pox — 'I have been kept for some days past in some anxiety with regard to the fate of C. Browne's child who has been very ill in the small pox of the natural kind and has suffered much both the violence of the disease and even of the remedies necessary in it'.

When the child recovered 'not a scar remained to deface her beauty which in her mother's eyes is among the first considerations'. We can see from this report that Drennan had some reservations about his therapy which is again apparent when he talks of another patient whose illness he described as hysterical 'She is now taking the same medicines with some variety of form, she before tried without success, and I am really apprehensive that she will die of the disease or of the Doctor'. He had another patient 'who in a fit of despair, cut his throat . . . I found him nearly dead on the floor, with great loss of blood, and most frightful wound which we got stitched up, and instead of finding himself out of this life in a moment, he has been lingering a sort of living death ever since'.

This must not have been Drennan's only case of trauma as it was a very violent time. Drennan on one occasion wrote to his sister asking her to purchase a sword stick for him as 'I am rather out of town and often out late at night'. Duelling was also common in Ireland and Drennan did not escape. As a result of some unintended trivial insult Drennan felt obliged to issue a challenge and he met his adversary at 8 o'clock the next morning. However, after much discussion in the field, honour was achieved by both sides without a shot being fired.

There were two other doctors in Newry when Drennan arrived — one left shortly after this but the other, — a Dr Templeton — was Drennan's main competition and

in fact was a constant irritation to him. Drennan's first disappointment was that Templeton did not call and welcome him to Newry — perhaps a portent of things to come, but led Drennan to believe that Templeton 'has no great confidence in his knowledge of the proper business of a Physician and whose manners from all accounts, would be very irreconcilable with the suppleness and insinuation necessary to Dublin practice'. Drennan and Templeton were soon to upset each other by Drennan being asked as a second opinion on a patient. He asked Templeton to attend, but he did not do so and Drennan gave his own directions. Templeton later followed with his prescription. Drennan remarked 'that it was totally unprecidented for 2 Physicians to attend a patient, each administering medicines which might possibly be counteracting each other, or doubling quantities necessary to be ordered endanger the sacrifice of the patient to the Doctors, if not to the disease'. Drennan suggested that the situation could not continue and suggested that Templeton should consult with him but Templeton 'swore to God he never would'.

Another episode was described by Drennan in another letter. 'Templeton has a sort of spy about here whom he affects to recommend, a young man who has never studied at any University, but practices gratuitously among the lower people who in return puff him off in their best manner — I don't fall out with him which would make me appear to fall into Templeton's manner myself, but assent to little matters without formally consulting with him . . . This young man one Cowan — was at Glasgow when I was there on *General* study, and sat along with me for his Degree of Master of Arts, where I can answer with a safe conscience he did not answer a single question except 2 and in those 2 I prompted him — he got his degree'.

Later we read that Cowan was used by Templeton to try experiments 'that he does not seem to sanction but which might injure the rest of the practitioners — perhaps I am ill-natured, but I smell somewhat of a deep villainy in Templeton'. Drennan, of course took some of Templeton's patients which must have annoyed the latter, but Drennan at least showed some charity when Templeton became ill, remarking that Templeton 'looked extremely ill and feeble and I think will not be a very long liver'. Later Templeton is carried about in his chair — a hard fate for an old man — but harder it would be for a young one — I wish him and his a comfortable livelihood sincerely, provided he and they act with candour'.

Templeton and Cowan were not the only competition Drennan had in Newry — in fact, he complained 'this town abounds with quacks both male and female'. Also 'there are 6 apothocaries shops in the place: the principal 2 are rivals and one of them complains that Dr Templeton having put his son as apprentice to the other, has on that account shewn him unjust partiality'. These men annoyed Drennan by taking the easy cases and leaving the physicians the bad ones or calling them in when the others went wrong.

One other medical attendant's position in the medical hierarchy is best described in Drennan's own words 'I was introduced at Halliday's to a Surgeon Macartney, a decent, sensible lad, who treated me the *Doctor* with all possible respect and deference'. One feels that the humble surgeon knew his position in the presence of the mighty physician and the attitudes of the two parties may not have changed much today, but two hundred years ago the unfortunate surgeon was not a university graduate and usually came from a more humble background.

Drennan's practice in Newry was not very successful and he only averaged an income of about £200 per year. However, he did not like the town nor its inhabitants and decided to move to Dublin in 1789. He does not give any clear reasons for this move and we can only speculate that it was either to move into a more acceptable environment, to increase his medical attainment, or perhaps to involve himself in politics. He had always had an interest in politics and at one stage considered going to America to fight in the American War of Independence. The American War of Independence had a profound affect upon politics in Ireland for several reasons. Firstly, the feeling of the Americans towards British taxation and colonial system was similar to that of the Irish and there was a strong feeling amongst the dissenting protestants of the North to shake themselves from the British crown at this time. Secondly, the garrisoned British soldiers were withdrawn to fight in the American war and there was a considerable risk that if the French were to join in on the American side, as they did, that Ireland might be invaded. The vulnerability of the population of Belfast was increased by an American privateer, The Paul Jones, sailing into Belfast Lough in April, 1778 and capturing a British ship. This greatly increased recruitment into the Volunteer Company which had been formed in Belfast in 1777. The Volunteers were a predominantly protestant organisation and while at first, their role was defensive, it later became very much more political gaining strength from the success of the Americans and also as the result of the French Revolution in 1779. Drennan joined the Volunteers while a medical student in Edinburgh and although he does not appear to have played an active part in the organisation, he was very politically conscious and active. While he was in Newry he wrote many political pamphlets under the pseudonym of Orellana or Irish Helot. It may have been the political activity in the capital which drew Drennan to Dublin, but it also nearly led to his death.

In 1790 Wolfe Tone set up a small club of nine people which included Drennan to study politics and write essays etc. It did not survive very long, but while it existed Tone must have known of Drennan's political views especially as he asked Drennan to join this club. Drennan felt that Ireland should be separated from Great Britain and should become a republic and he also had been encouraged in these views by the American War of Independence and the French Revolution. He had written in 1784 to Matty's husband (Samuel McTier) that he thought a secret brotherhood should be established and consequently it is likely that Wolfe Tone knew of this suggestion of Drennan's. Tone had written a pamphlet on the Emancipation of Roman Catholics which had been widely circulated in the North and appealed strongly to radicals in Belfast. By 1791 the Volunteer movement had begun to change and it had become much more political with many companies being frankly republican. As a consequence of Tone's paper he was invited by a committee from the Second Belfast Company of Volunteers under the Chairmanship of Samuel McTier to come to Belfast in 1791 and this meeting resulted in the formation of the Society of United Irishmen. After his meetings in Belfast Tone travelled back to Dublin where a Dublin Branch was set up under the Presidency of Drennan who wrote the Test or Declaration of the United Irishmen which was signed by the members. He also published a pamphlet 'An Address to the Volunteers of Ireland' which was nearly his undoing because it resulted in him being tried for sedition in 1794. He was acquitted on a point of law — much to the disappointment of some of the jury before whom he was tried, as they being landowners tended to be members of the

protestant ascendancy. After his trial he attended some meetings of the United Irishmen but he did not take a very active part in politics as there was a more violent attitude adopted by the United Irishmen which led to the rebellion of 1798. However, he continued in a passive way to observe all that was going on in politics and to write to Matty about them.

Apart from politics Drennan spent most of his time in Dublin trying to establish himself as an accoucheur. He did not seem to be very successful in this line and in fact never made as much money as he did in Newry, perhaps because of his political activity. While his obstetric practice may not have been extensive it is a great pity that some of his views on this subject were not more widely known. Matty wrote to him in 1793 concerning the setting up of a lying-in-hospital for women in Belfast and in reply Drennan stated that he was opposed to all hospitals as he thought that the puerpural fever which was endemic in them killed more patients than were saved by doctors. He advocated cleanliness and frequent washing with simple water 'the sovereign remedy against all infectious diseases . . . WASH AND BE CLEAN should be the motto over the door of every hospital'. He also thought that the money raised for the hospitals was squandered on servants etc. and would have been better employed if doctors were paid to attend to the women in their own homes. Nevertheless, the Lying-in-Hospital was started in Belfast and Matty was the first Secretary. From small beginnings in Donegall Street, it has gone from strength to strength and today is the Royal Maternity Hospital.

After going to Dublin Drennan met an English school mistress called Sarah Swanwich. They wished to marry but did not have sufficient money to do so until 1800 despite earlier pleas for help by Matty to her mother for funds for her brother. They had seven children only four of whom survived to childhood. The eldest, Thomas was brought up in Belfast by Matty but died suddenly at the age of 11. The third and fourth children both died in their first year and Drennan had a post-mortem examination carried out on the second of these which showed that he had two intussusceptions. The symptoms which preceded the death of both these infants were remarkably similar and perhaps there was a common aetiological factor. Sarah Swanwich, the sixth child married John Andrews of Comber who was land steward to Lord Londonderry at Mount Stewart and the Andrews family still flourishes in the Comber area. John Swanwich the seventh child followed in his father's footsteps and became a doctor and was appointed to the staff of the General Hospital (now the Royal Victoria Hospital) on the death of A.G. Malcolm. He was a well known physician and the fourth President of the Ulster Medical Society in 1865.

As a physician in Dublin, it cannot be said that Drennan was a great success. His income was small, never quite reaching the amount he had made in his better years in Newry. He in fact, only made a couple of hundred pounds per annum when other physicians were making thousands. Why he had so little success we do not know, but there certainly was criticism of his management of some of his relations in the correspondence with his sister. One would have thought his political activity would have increased his practice, but the opposite might well have been the case. It might also have resulted in taking up too much of his time which he should have spent with his patients. Whatever the casue, his income was such that he was constantly impoverished, and as a result when a wealthy cousin died in 1807, a year after his mother, he inherited a considerable fortune and he decided to give up medical

practice and return to Belfast. At first he lived in the centre of Belfast, in what is now Donegall Square, but later he moved out to a small mud walled, thatched cottage which had been occupied by Matty. Many years earlier she had given it the name Cabin Hill and this was the site of the present Preparatory School for Campbell College. In the grounds there is a stone on which the name Drennan is inscribed and it is thought that he sat on this stone when he was composing his poetry.

Little is known of Drennan's domestic life in Belfast as there was no need for him to correspond with his sister and consequently there is no record. He took an interest in two bodies which are important to us today. The first of these was the formation of the Belfast Medical Society which has always been regarded as having taken place in 1806. Drennan is recorded as having been on a Committee of six to look after the affairs of the Society. He did not return to Belfast until the Autumn of 1807 and it is unlikely that he would have been on the Committee had he not been living in Belfast when it was formed. No explanation for this discrepancy has been discovered. The Society ultimately amalgamated with the Belfast Clinical and Pathological Society, which had been founded by A.G. Malcolm, to form the Ulster Medical Society in 1862. Drennan made valuable donations to the Belfast Medical Society and was its third President in 1808.

Soon after his return to Belfast he became deeply interested in the foundation of the Belfast Academical Institution which later became the Royal Belfast Academical Institution or Inst. He was one of the most active members of the Friends of the New Institution, as well as being a member of the Board of Visitors, and he delivered the inaugural address when the school was opened on the 1st February, 1814. In this oration he outlined the history of the formation of the Institution and its further objects. It could not then have been predicted that it was ultimately to give rise to a medical school which later became the Faculty of Medicine of Queen's University.

With John Hancock of Lisburn and John Templeton, a botanist, he started the Belfast Monthly Magazine which was first published in September, 1808. It covered a wide range of subjects concerning the arts, biography, medicine, and politics, and Drennan's style can be found in many of the articles. It continued to be published regularly for six years, the last edition being printed in December, 1814.

Drennan did not practice medicine in Belfast, but he was made a Consulting Physician to the Fever Hospital in 1810 and was recorded as still holding this position in the report of the hospital for 1819. It was an honorary position and did not carry any clinical responsibility. Drennan really lived the life of a gentleman from 1807 till his death in 1820. The precise cause of this is not known, but his son recorded that it was 'from affection, principally of the liver'. He was interred at the New Burying Ground of the Belfast Charitable Society in Clifton Street and the two conditions regarding his funeral which he had made in his will were observed. He had requested that his coffin might be carried by six protestants and six Roman Catholics which showed his ecumenical outlook and his deep desire that Ireland should be a country with a united population without religious or sectarian division. He also desired that the cortège should pause outside the gates of the Academical Institution which showed the interest he had in the college itself and education in general. There can be no more fitting tribute to Drennan's life and work that that written by A.G. Malcolm 'A man of the highest integrity, and splendid talents; not even his enemies could conceal their admiration of his genius and character'.

REFERENCE

1 *The Drennan Letters,* Belfast: His Majesty's Stationery Office 1931.

I wish to thank the Director and Staff of the Northern Ireland Public Records Office for access to the Drennan Letters and Miss A. Park for typing the manuscript.

BOOK REVIEWS

HORMONES AND ATHEROSCLEROSIS. By R. W. Stout. (Pp viii + 208. £24.95). Lancaster, Lancs: MTP Press, 1982.

IT is always a pleasure to receive a volume produced by a colleague and one's pleasure is enhanced when the book turns out to be an excellent monograph on an important subject. Atherosclerosis, the aetiology of which remains to be elucidated, is the most important disease affecting adults in the Western world. It leads to premature death in males during the years of their greatest productivity and usefulness in the community and it is a source of death and serious morbidity in countless others in older age groups. In Northern Ireland we have good cause to fear the ravages of atherosclerosis since the death rate for coronary artery disease here is one of the highest in the developed world.

In this monograph Professor Stout reviews the association between abnormalities of hormone secretion and atherosclerosis. A substantial section of the book (75 pages) is devoted to diabetes and atherosclerosis and the influence of diabetes on lipid metabolism. Professor Stout is a recognised expert in this field and his exposition is both lucid and authoritative. A further important section of 57 pages explores the relationship between the sex hormones and atherosclerosis. While the preponderance of atherosclerosis in younger men compared to women of the same age is well recognised it still remains difficult to draw precise conclusions about the relationship of the sex hormones to the disease process. Finally abnormalities of other major hormones such as thyroid hormone, growth hormone, cortiosteroids, renin and cyclic AMP and their relationship to atherosclerosis are discussed in turn.

This is a first rate monograph on an important topic and is thoroughly recommended. It is well written and produced and there is an extensive bibliography. The author can be warmly congratulated on producing a most useful book which will undoubtedly enhance his already established reputation as an authority in the field.

DADM

CLINICAL MANAGEMENT OF ELECTROLYTE DISORDERS. By Mary G. McGeown. (Pp xvii + 202, Illustrated, £27.50). The Hague and Boston: Nijhoff, 1983.

WHEN I first came as a resident pupil to Wards 3/4 in the Royal Victoria Hospital — was it 1956? — it was well recognised by us students that this was the place where they really understood electrolytes. When I came into the clinical room the reason why was clear — the long row of copper sulphate solutions on the shelf, into which it was the pupil's duty to pipette drops of serum to determine plasma specific gravity. Armed with this knowledge one quickly became consultant on fluid balance matters to other students and even house physicians, from less well equipped wards. After a month, with Professor Bull's lucid mind and iron logic to support me, it became clear that these matters were very simple and straightforward, although often made extremely obscure and confusing in textbooks. "Belfast is good at electrolytes" we boasted to students from other less advanced medical schools.

And so it was. And so it still should be, although the waters have been muddled rather than clarified by 25 years of new biochemical techniques and ever more complex notions and potions. Dr Mary McGeown still represents the distillation of clinical experience derived from her early association with electrolyte disorders of all types. This book is not for renal units or regional referral centres although those working there should be very grateful to read it. It is a practical guide which should be in every ward, medical or surgical, paediatric or geriatric, intensive care or longstay, and known and understood by all the medical staff. Dr McGeown exemplifies the simple exposition and clear instruction for the use of straightforward solutions in everyday clinical practice that has been the hallmark of the Belfast approach to electrolyte management.

Anyone who has tried to write a medical text will envy the easy style and simple layout of this book. Anyone reading the book will find not only clear, logical and simple instructions on what to do, but also an elegant summary of the reason why.

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THE most important and most costly industrial disease is contact dermatitis and the most common cause of that is chromate sensitivity. This collection of monographs, edited by Dr Desmond Burrows is timely and fills an important gap in our literature. Chrome is very widely used in industry and its use is increasing yearly, no less than 124 different jobs in industry where workers are exposed to the toxic affects of chrome are known.

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Anyone doing research work in industrial dermatitis must have easy access to this publication and it certainly should be in every scientific, as well as in every medical library.

The publishers are to be congratulated on the beautiful presentation of the book. JMB

POSTGRADUATE MEDICINE. By I. J. T. Davies FRCP, FRCPE. Fourth Edition, (Pp x + 563, Figs 36. £17.00). London: Lloyd-Luke Medical Books Ltd., 1983.

THIS is now the fourth edition of a textbook first published in 1969. At that time it rapidly achieved a deserved popularity among those of us preparing for the membership examination and this must remain its major market. The format has remained essentially the same with a useful introduction to each chapter emphasizing points in the history and examination, and in the investigation of each system which would be valuable in elucidating clinical problems. Thereafter the material is of necessity presented in a rather didactic form. One would, however, have few quibbles with the advice on investigation and management given. Attempts have been made to keep the material up-to-date but these have to some extent been patchy. One might expect membership candidates to be able to discuss mitral valve prolapse and coronary artery spasm but these have received scant attention. A further deficiency is the absence of a chapter on haematology which would be of benefit particularly in the written section of the examination. Advice to membership candidates to read broadly and to obtain their knowledge from review articles or monographs on particular topics is usually wishful thinking. A well used copy of Postgraduate Medicine where one can easily turn up lists of possible diagnoses will remain popular on the shelves of aspiring membership candidates. Perhaps, however, a list of further reading with a short sentence describing the content of each reference might be of more value than the information on eponyms which Dr Davies has introduced.

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COMMON DILEMMAS IN FAMILY MEDICINE. Edited by John Fry. (Pp xiv + 401, Illustrated. £15.95). Lancaster, Lancs: MTP Press, 1983.

I enjoyed reading this book. John Fry, the well-known general practitioner from the South of England has assembled over fifty general practitioners, almost half of them from various parts of the English-speaking world. He has asked them to look at a score of dilemmas a family doctor will certainly meet in his clinical or administrative work. For each of the dilemmas, one or more of the authors address the various issues involved, usually substantiating their arguments with references from work in that particular field. When the case has been made for and against, the chapter ends with a commentary. This is a short and usually balanced critique from Dr Fry and his two closest collaborators, Dr Wes Fabb from Australia and Professor John Geyman from the United States, both of whom are well known in the postgraduate and undergraduate fields respectively.

Being often taught on 'extreme' cases as a student, the general practitioner then practices in relative isolation with patients who do not exhibit disorders in their classical forms and, in any case, are individuals with their own views, part of a family and community. More than others he has to work in the grey areas of uncertainty and make decisions as well as help patients make decisions for their own good. This book attempts to encompass the precise technical assessment as well as the personal hunch and shows that divergent views are tenable on a variety of topics.

Many issues are discussed — when to treat moderate hypertension, where to treat acute myocardial infarction, what to tell dying patients, how to manage alcoholic patients. Day-to-day decisions about antibiotics, psychotropic drugs, teamwork, numbers of patients, policy on house calls are just a few of the chapters in this interesting book.

The reader will not finish this work in one sitting. Indeed it will provide a source which can be returned to several times. Authors are to be found on the opposite side of an argument to that which they usually occupy, though this does not detract from their usual cogency. Given more space and the right price, I believe that further dilemmas could with advantage, be added — repeat prescriptions, out-of-hours calls; non-accidental injury to children, abortion, compliance with medication, management of breast cancer etc. Postgraduate GP students as well as trainers will obviously relish this book but I believe that significant amounts of undergraduate learning would be rehabilitated by the approach of this book.

PMR

THE HEALTH CARE MANUAL. By John Fry and Gordon Fryers. (Pp 320. £3.95). Lancaster, Lancs: MTP Press, 1983.

THIS book largely succeeds in portraying as clearly as possible the wide range of products available for self-care and their various uses. As a reference book it may still be daunting to some patients because of the depth of knowledge displayed albeit in simple terms. Many under-privileged patients are not leisure time readers and would need to be frequently stimulated to buy the book. The book gives belated recognition to the fact that self care should be an important facet of medical care. Section 4 of the book is less readable and less easy to resource. Products are listed in considerable detail in the general index. Some, in bold print, give use and side effects and others, in small print, offer a wide selection but omit full details of use etc. The success of the book in terms of achieving the aims of its authors will depend upon its acceptability in practice as a quick easy reference, when people feel the need for medical advice for common ailments. This review expresses some reservations about the type of patient who is likely to benefit. Nevertheless the authors have gone a long way towards helping many to cope better with illness by listing useful information, which they can resource fairly easily in time of need. WGI

THE NATURE AND NURTURE OF TWINS. By Elizabeth M. Bryan. (Pp 223. £9.95). London: Baillière Tindall, 1983.

THE author, a paediatrician, has drawn on her considerable experience of this subject to produce a readable and informative book. It is written primarily for paediatricians but there is much to interest all who are concerned with the care and management of twins. The book provides a comprehensive over-view of twinning with emphasis on the practical, financial and emotional problems which devolve on a mother and the rest of the family in looking after two babies at the same time. Growth and development, schooling, handicap or death of a twin and adoption are some of the subjects discussed. An extensive and helpful list of references is also provided. IJC

COMMON DILEMMAS IN FAMILY MEDICINE. Edited by John Fry. (Pp xiv + 401, Illustrated. £15.95). Lancaster, Lancs: MTP Press, 1983.

I enjoyed reading this book. John Fry, the well-known general practitioner from the South of England has assembled over fifty general practitioners, almost half of them from various parts of the English-speaking world. He has asked them to look at a score of dilemmas a family doctor will certainly meet in his clinical or administrative work. For each of the dilemmas, one or more of the authors address the various issues involved, usually substantiating their arguments with references from work in that particular field. When the case has been made for and against, the chapter ends with a commentary. This is a short and usually balanced critique from Dr Fry and his two closest collaborators, Dr Wes Fabb from Australia and Professor John Geyman from the United States, both of whom are well known in the postgraduate and undergraduate fields respectively.

Being often taught on 'extreme' cases as a student, the general practitioner then practices in relative isolation with patients who do not exhibit disorders in their classical forms and, in any case, are individuals with their own views, part of a family and community. More than others he has to work in the grey areas of uncertainty and make decisions as well as help patients make decisions for their own good. This book attempts to encompass the precise technical assessment as well as the personal hunch and shows that divergent views are tenable on a variety of topics.

Many issues are discussed — when to treat moderate hypertension, where to treat acute myocardial infarction, what to tell dying patients, how to manage alcoholic patients. Day-to-day decisions about antibiotics, psychotropic drugs, teamwork, numbers of patients, policy on house calls are just a few of the chapters in this interesting book.

The reader will not finish this work in one sitting. Indeed it will provide a source which can be returned to several times. Authors are to be found on the opposite side of an argument to that which they usually occupy, though this does not detract from their usual cogency. Given more space and the right price, I believe that further dilemmas could with advantage, be added — repeat prescriptions, out-of-hours calls; non-accidental injury to children, abortion, compliance with medication, management of breast cancer etc. Postgraduate GP students as well as trainers will obviously relish this book but I believe that significant amounts of undergraduate learning would be rehabilitated by the approach of this book.

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THE Preface to this book states: "The book is directed primarily at the medical student, house officer and practising physician. However, ... a considerable portion of this Review has been devoted to a discussion of the relevant basic science aspects". This is indeed the case, and the initial chapters contain a comprehensive but concise account of topics such as cell structure, microbial genetics and metabolism, antimicrobial chemotherapy, host-parasite relationships, and immunology. There is liberal use of illustrative photomicrographs and explanatory line drawings, but there is perhaps rather more detail in these chapters than would be required by the average medical student or physician. They do, however, provide an excellent survey of the scientific background to modern medical microbiology for those who wish to extend their knowledge of these subjects.

In the remainder of the book there is systematic coverage of medical bacteriology, mycology, virology and parasitology. Clinical aspects of the subject are emphasised, with regular sections in most chapters on pathogenesis, clinical features, diagnostic laboratory tests, treatment, and control and prevention. Full consideration is given to the types of specimen required for diagnosis in various clinical situations, and to the different diagnostic methods which are available. Useful lists of recent references are included at the end of each chapter.

Publication of this Review every two years enables the authors to keep it up-to-date, and topics of current interest in microbiology such as the staphylococcal toxic shock syndrome, campylobacter infections, pseudo-membranous colitis and legionellosis are all mentioned. The chapter on the hepatitis viruses provides a clear account of this subject which should be particularly useful to clinicians who are treating patients with different forms of viral hepatitis.

The American authorship of this book is reflected by minor differences in approach and emphasis when compared with current British textbooks. Nevertheless, in my opinion this is one of the best medium-sized texts on Medical Microbiology which is presently available and it can be confidently recommended to those who wish to acquire a better understanding of the science of microbiology, as well as obtaining a comprehensive and up-to-date review of its clinical and applied aspects which are more directly relevant to most medical students and clinicians. It must certainly rank as a "Best Buy" amongst books on this subject.

TSW

ILLUSTRATED ENCYCLOPAEDIA OF DERMATOLOGY. By L. Fry, F. T. Wojnarowska and P. Shahrad. (Pp vii + 567, Illustrated. £8.50). Lancaster, Lancs: MTP Press, 1983.

THE book is aimed at filling a gap between small text books of dermatology and standard large reference books and is written in particular, for those embarking on a career in dermatology, general practitioners or primary physicians with a special interest in skin diseases. It seems to me the authors have succeeded in their aims. As it may be judged from its title, the diagnoses are listed alphabetically. Each subject is dealt with strictly under the headings of: presentation, differential diagnosis, aetiology, investigations, treatment, natural history and prognosis. These sections are very well set out and there are generous illustrations with histiograms of age incidence, diagrams of disease distribution and sex incidence for most conditions which means information can be speedily obtained. There are illustrations and diagrams on almost every page, so as well as being a good reference book it would lend itself to use as a textbook.

There are minor defects. Lack of any references might be a handicap when some treatments are dealt with simply by a brief mention, for instance, oral psoralans in vitiligo or retinoids in acne. There are omissions in treatment such as pimozide in parasitophobia and no mention of proprietary preparations of aluminium chloride for hyperhydrosis, particularly when making of this preparation is tedious and time consuming and is detailed. A section on pathology would have been useful.

These, however, are minor criticisms and I consider this book excellent value. It must be one of the cheapest text books on dermatology and yet it is by far from being the least comprehensive.

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The material presented is without doubt comprehensive but such a tabulated style is unable to offer any discussion on management problems. Therein lies the strength or weakness of such a book — it assumes a basic knowledge and thus offers a tidy presentation of obstetric facts suitable for revision.

There are some areas of management which could be considered out-of-date, for example, the need for diazepam in mild pre-eclampsia or the value of diuretics in the more severe state of this syndrome. In the fast developing area of antenatal fetal assessment no mention is made of fetal cardiotocography. However, the general thrust of the book offers broad dogmatic statements which on the whole are a fair reflection of current obstetric thinking. With such a proliferation of short obstetric text books now available to the midwife or medical student this volume may suffer from the rigours of competition. Any prospective buyer would do well to sample other "companions" before any commitment to purchase.

EBB

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THIS is the English edition (by Dr Gunn) of a detailed, step-by-step instruction manual for the full physical examination of patients. It is the product of Dr Lordwick and members of the "Skills Laboratory" of the Medical School in the University of Limburg, Holland. The basic aim is that students should acquire the medical skills of patient examination in a systematic and reasonably standardized manner.

This is an important book, being one of the few publications that provides a reliable reference to the student, reinforcing introductory clinical teaching. Nobody would deny the importance of the initial clinical methods course at Queen's. Yet teachers and students are acutely conscious of the unevenness with which such methods are learnt or are practiced, given the pressure of work on various units and the number of students concentrated in teaching hospitals.

A basic concept of this book is that the acquisition of medical skills should occur with minimal dependence on teachers and patients. The book does convey to students as exactly as possible how a given examination should be carried out. Each examination has a heading stating its purpose. The procedure to be followed is then itemised, amply illustrated by photographs and diagrams. The student is kept to the task of examination as considerations of pathology and differential diagnosis are not dealt with in the text but the opportunity for such discussion is indicated.

The subtitle — "An Atlas for General Practice" was at first intriguing especially as the myth that general practitioners do not examine their patients is still abroad, though only with a fraction of the force it once had. Indeed the heresy of one generation, — that of general practitioners teaching clinical methods, could become the practice of the next generation. This is particularly pertinent considering the numbers of ambulant and chronically ill patients available in general practice and the amount of time students properly spend there. Increasing use of this book, despite the price of the hardback form of almost £20.00 would ensure that such time was well spent.

PMR

PROBLEMS IN PERIPHERAL VASCULAR DISEASE. By P. E. A. Savage. (Pp 118. £7.95). Lancaster, Lancs: MTP Press, 1983.

THIS rather elegant book emerges as a further publication amidst a proliferating mass of literature and volumes which reflect the rapid burgeoning of vascular surgery as a specialized discipline. As the author himself acknowledges in the preface, he has relied heavily on well-established tomes on arterial and venous disease which are in general use.

As one book in a 'problem series' designed to help the general practitioner, I feel that the author has tried very hard to negotiate a difficult path between a basic undergraduate text on the one hand and a detailed reference source for a vascular surgeon on the other. In large measure he has succeeded in this venture.

The book is made up of a series of chapters systematically laid out, carefully written and free of jargon. The synoptic annotations in the margins are useful pointers for quick reference, at the same time breaking up rather heavy slabs of dark print.

The topics, I am pleased to note, include some which have received emphasis in recent years, e.g., spinal stenosis, impotence, critical limb ischaemia and percutaneous transluminal angioplasty, which will serve to update the reader on current practice in vascular surgery. Given that only one hour of the whole teaching curriculum at Queen's Medical School is allocated to cover all aspects of vascular surgery, this book may be the average general practitioner's first opportunity to bridge that gap.

The subject of vascular surgery lends itself to and is assisted by visual representation and I have no doubt that a few line drawings would have been appreciated by the reader.

The volume is lucid, concise and very good value at £7.95 and should have a place in a trainee practitioner's library.

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THIS is the English edition (by Dr Gunn) of a detailed, step-by-step instruction manual for the full physical examination of patients. It is the product of Dr Lordwick and members of the "Skills Laboratory" of the Medical School in the University of Limburg, Holland. The basic aim is that students should acquire the medical skills of patient examination in a systematic and reasonably standardized manner.

This is an important book, being one of the few publications that provides a reliable reference to the student, reinforcing introductory clinical teaching. Nobody would deny the importance of the initial clinical methods course at Queen's. Yet teachers and students are acutely conscious of the unevenness with which such methods are learnt or are practiced, given the pressure of work on various units and the number of students concentrated in teaching hospitals.

A basic concept of this book is that the acquisition of medical skills should occur with minimal dependence on teachers and patients. The book does convey to students as exactly as possible how a given examination should be carried out. Each examination has a heading stating its purpose. The procedure to be followed is then itemised, amply illustrated by photographs and diagrams. The student is kept to the task of examination as considerations of pathology and differential diagnosis are not dealt with in the text but the opportunity for such discussion is indicated.

The subtitle — "An Atlas for General Practice" was at first intriguing especially as the myth that general practitioners do not examine their patients is still abroad, though only with a fraction of the force it once had. Indeed the heresy of one generation, — that of general practitioners teaching clinical methods, could become the practice of the next generation. This is particularly pertinent considering the numbers of ambulant and chronically ill patients available in general practice and the amount of time students properly spend there. Increasing use of this book, despite the price of the hardback form of almost £20.00 would ensure that such time was well spent.

PMR

PROBLEMS IN PERIPHERAL VASCULAR DISEASE. By P. E. A. Savage. (Pp 118. £7.95). Lancaster, Lancs: MTP Press, 1983.

THIS rather elegant book emerges as a further publication amidst a proliferating mass of literature and volumes which reflect the rapid burgeoning of vascular surgery as a specialized discipline. As the author himself acknowledges in the preface, he has relied heavily on well-established tomes on arterial and venous disease which are in general use.

As one book in a 'problem series' designed to help the general practitioner, I feel that the author has tried very hard to negotiate a difficult path between a basic undergraduate text on the one hand and a detailed reference source for a vascular surgeon on the other. In large measure he has succeeded in this venture.

The book is made up of a series of chapters systematically laid out, carefully written and free of jargon. The synoptic annotations in the margins are useful pointers for quick reference, at the same time breaking up rather heavy slabs of dark print.

The topics, I am pleased to note, include some which have received emphasis in recent years, e.g., spinal stenosis, impotence, critical limb ischaemia and percutaneous transluminal angioplasty, which will serve to update the reader on current practice in vascular surgery. Given that only one hour of the whole teaching curriculum at Queen's Medical School is allocated to cover all aspects of vascular surgery, this book may be the average general practitioner's first opportunity to bridge that gap.

The subject of vascular surgery lends itself to and is assisted by visual representation and I have no doubt that a few line drawings would have been appreciated by the reader.

The volume is lucid, concise and very good value at £7.95 and should have a place in a trainee practitioner's library.

AABBD'S

HANDBOOK OF HOSPITAL MEDICINE. By P. J. Mitchell, P. Platt and C. Wren. (Pp vii + 182. £4.75). Lancaster, Lancs: MTP Press, 1983.

THIS little book is designed to provide guidance in practical management for the busy young doctor in a hurry. It is clearly laid out and well written. It fits comfortably into the pocket of a white hospital coat, for easy access.

The main thrust of the work is to give clear and unequivocal advice on management in emergency situations, where the diagnosis is clear. Anyone who wishes to have a consideration of the finer diagnostic points in difficult cases should look elsewhere. Only a few words are given to describe the main features of the conditions being discussed. A few suggestions are given for further reading, but a serious candidate for the MRCP examinations would note some omissions from the lists.

A strong point for the senior undergraduate student or house doctor is that practical ward procedures are clearly and accurately described. I can not make any serious criticism of the advice given on the management of a wide range of conditions. It is safe and orthodox.

I feel I can recommend this book to students and junior doctors. It is well presented and keenly priced.

SH

SYMPOSIUM ON MEDICAL MANAGEMENT OF MALIGNANT DISEASE. Edited by R. Passmore. (Pp 108, Illustrated. £7.00). Edinburgh: The Royal College of Physicians of Edinburgh, 1983.

THIS little book contains seven papers, four of which are named lectures at the Royal College of Physicians of Edinburgh. Three of the most important forms of cancer, namely lung, breast and testes, are discussed together with papers on cancer in childhood and the elderly. There is a general article on the role of the medical oncology unit and an excellent summary on Cancer Control by Sir Richard Doll which is an article that has been published elsewhere several times in various forms. The book only runs to about 100 pages and is a compact summary of the current non-surgical management of cancer. As such it is recommended to postgraduates who may be studying for higher degrees.

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