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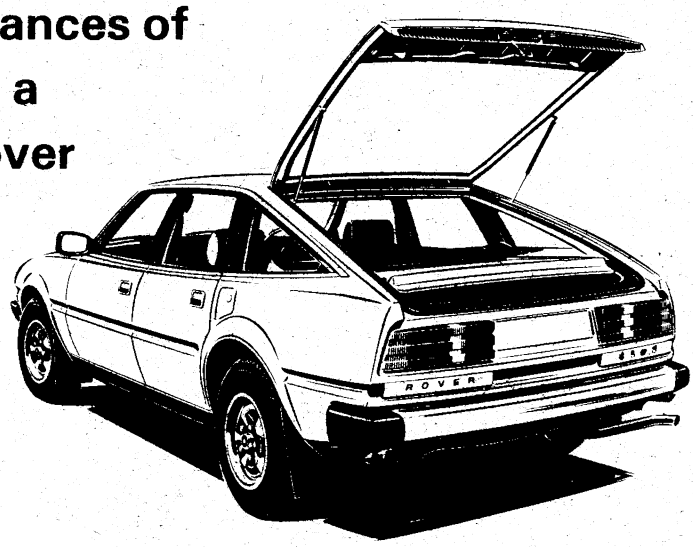

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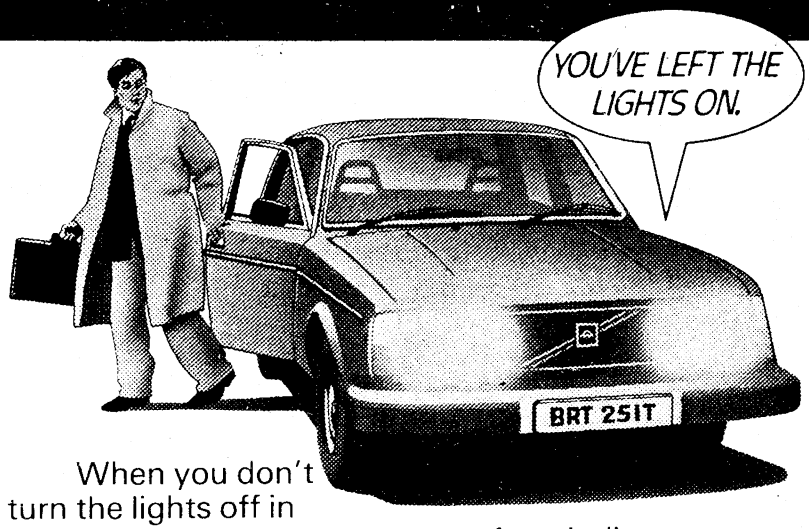

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ULSTER MEDICAL JOURNAL

PUBLISHED ON BEHALF OF THE ULSTER MEDICAL SOCIETY

VOLUME 48 1979 No. 2

CONGENITAL MALFORMATIONS IN INFANTS OF DIABETIC MOTHERS

by

A. C. A. GLASGOW, J. M. G. HARLEY, D. A. D. MONTGOMERY

Royal Victoria and Royal Maternity Hospitals, Belfast

INTRODUCTION

DURING the last two decades the outcome of pregnancy in the diabetic has improved greatly. In the Royal Maternity Hospital, Belfast, for example, the total fetal loss and perinatal mortality during the years 1972-78 have been 4.3 and 3.2 per cent respectively, whereas in earlier years figures well in excess of 10 per cent were common everywhere. In view of this the contribution of congenital malformations is assuming increasing importance as a factor in the survival of infants of diabetic mothers. Over the years the occurrence of congenital malformation in diabetic pregnancies has been the subject of some controversy but it is now generally accepted that the incidence is about two to four times greater than in the general population.

The purpose of this paper is to record the incidence of congenital malformations in infants of diabetic mothers born in the Royal Maternity Hospital, Belfast, during the years 1963 to 1978 inclusive, to assess their contribution to perinatal mortality and to consider ways in which this risk could be reduced.

PATIENTS AND METHODS

The series includes all diabetic women and their offspring treated in the Royal Maternity Hospital during the years 1963-78. Diabetic mothers attend the Antenatal Diabetes Clinic in the Royal Maternity Hospital, where they are seen by a Consultant Obstetrician and Physician who assume joint responsibility for their care during pregnancy, labour and the puerperium. Patients are referred from the Diabetes Clinic at the Royal Victoria Hospital, from the Greater Belfast area and other parts of the Province at the discretion of physicians, obstetricians or general practitioners.

Early referral is essential to establish good control as soon as possible and assess the gestational age of the fetus. Patients attend at fortnightly intervals, or more frequently if necessary. Before each visit mid-morning and mid-evening (2½ to 3-hour post-prandial) plasma glucose levels and urine tests for glucose and acetone (four tests in 24 hours) are available. An effort is made to keep plasma glucose values below 7.2 mmol/1 when ambulant and below 6.0 mmol/1 when resting in hospital. The nature and severity of the diabetes is classified according to the method proposed by White (1971). There are nine grades, A to I, of increasing severity. Women with abnormal glucose tolerance tests detected in pregnancy (Grade A) were excluded from the present series unless the abnormality was confirmed postpartum.

Careful control of the diabetes is attempted with twice daily soluble insulin or a combination of Soluble and Isophane (NPH) insulin, although since 1976 the highly purified pork preparations (Montgomery, 1979) have been used almost exclusively. Patients are maintained on diets with a total daily energy value of 7,500 to 8,500 kilojoules. Women of average weight are allowed to gain 6 to 10 kg during pregnancy. In the absence of complications the well controlled patient is admitted to hospital between 32 and 34 weeks of gestation to ensure even stricter control of the diabetes and to diagnose and treat any obstetric complications promptly.

In hospital a plasma glucose series (fasting, 1200, 1730 and 2200 hours) is obtained at least twice weekly. In special circumstances plasma glucose values are measured in the early hours of the morning (0200 to 0300 hours) to detect nocturnal hyper- or hypoglycaemia. Fetal wellbeing is monitored by serial urinary oestriols, human placental lactogen and biparietal diameter measurements by ultrasonic scan. At 37 or 38 weeks the lecithin-sphingomyelin ration is measured on a specimen of liquor obtained at amniocentesis. If this value is 2.0 or greater, delivery is effected within 48 hours. The timing of delivery, however, depends on the degree of diabetic control, the presence and severity of pre-eclampsia, the previous obstetric history and any other factors conferring special risks that might necessitate early delivery.

Provided the cervix is favourable and there are no obstetrical complications, labour is induced surgically followed by a syntocinon infusion. If labour has not begun within 12 hours or is not progressing satisfactorily, caesarean section is performed. During labour, patients receive an infusion of 10 per cent dextrose and diabetic control is maintained with injections of small doses of short-acting insulin, 4 to 6-hourly, or by continuous intravenous infusion of insulin and frequent measurement of plasma glucose levels. Expert paediatric care is provided from the moment of delivery for resuscitation and neonatal management.

For the purpose of this investigation a *congenital malformation* is defined as a structural abnormality present at birth and recognizable with the naked eye, by radiological investigation or alternatively at necropsy. A *major congenital malformation* is defined as one which caused death or affected a major organ system causing serious incapacity.

RESULTS

During the 16 years (1963-78) there were 195 consecutive diabetic pregnancies of which 184 lasted 28 weeks or more. There were 11 recorded abortions. Of the 184

viable pregnancies, 19 babies had congenital malformations (10.3 per cent). During the same period the fetal malformation rate in the Belfast area (control group) was 4.0 per cent. There were, however, a total of 24 malformations (a total malformed rate of 13.0 per cent) in the affected infants; 15 had one malformation each, three had two, and one infant had three lesions. Seven, or just over one-third, of the congenital malformations proved fatal in the perinatal period (36.8 per cent). They accounted for four of the 13 stillbirths and three of the ten neonatal deaths and were thus responsible for just under one-third of the perinatal deaths (30.4 per cent). Eleven abortions were recorded, one of which was excluded because it was performed for therapeutic purposes. Of the remaining ten, eight were spontaneous, one was missed and one was inevitable due to a complete procidentia. The recorded incidence of abortion in the diabetic pregnancies was 5.1 per cent, while that for the general pregnant population in the Belfast area was 8.7 per cent during the year 1976. The average maternal age of the patients in this series was 26.1 years, parity was 1.1, booking date was at 12 to 13 weeks and the incidence of previous miscarriage was 26.3 per cent. Table 1 shows the nature of the congenital malformation in the babies of the diabetic mothers compared with the findings in the general population.

TABLE I

Nature of congenital malformations in babies of diabetic mothers, compared with the general population

Type of congenital malformation per 1,000 births	*Diabetic mothers*	*General population*
Central nervous system	*16.2*	*3.5*
Cardiovascular system	*38.0*	*6.5*
Genitourinary system	*10.8*	*0.7*
Skeletal system	*27.1*	*1.1*
Major malformations	*59.7*	*25.3*

A more detailed breakdown of the lesions into severe and less severe malformations is given in Table II. Two women twice delivered a child with a congenital malformation. The first gave birth to a baby with a ventricular septal defect and an overriding aorta. A second child had an accessory auricle and asymmetry of teeth. The second woman gave birth successively to a malformed fetus with anencephaly, a healthy child, one with transposition of the great vessels and ventricular septal defect and finally a healthy child.

CONTROL OF MATERNAL DIABETES

The vast majority of the patients (93.4 per cent) were treated with insulin. Table III shows the method of diabetic management related to the outcome of the pregnancy. Most of the mothers of the malformed babies were on insulin, as would be expected in view of the high predominance of insulin treated mothers, but two women, one on a hypoglycaemic agent and one treated by diet alone, had malformed babies.

TABLE II

*Analysis of malformations by systems (*major malformation)*

System	*Non-fatal*		*Fatal*	
Central nervous			*Microcephaly	1
			*Anencephaly	2 (c, d)
Cardiovascular	*VSD and patent ductus ...	2	*VSD and overriding aorta	1
	*VSD	1 (e)	*ASD and absent tricuspid valve	1
			*Single atrium and transposition of great vessels	1
			*Transposition of great vessels and VSD ...	1
Genitourinary	Bilateral inguinal hernia ...	1		
	Unilateral inguinal hernia ...	1		
	Hypospadias	2		
	Unilateral undescended testis ...	2 (b)		
	Gonad (ovotestis) palpable in the groin	1		
Skeletal	*Sacral agenesis	1		
	Deformed great toe	1		
	Webbing of toes	1		
	Camptodactyly	1 (a)		
Others	Asymmetry of auricle	1		
	Haemangioma of scalp ...	1 (a)		
	Asymmetry of auricle	1		

(a) Intrauterine contraceptive device expelled at birth.
(b) Maternal thyrotoxicosis, on carbimazole treatment, in one case of undescended testis.
(c) Laparotomy at 13 weeks gestation for suspected ovarian cyst, in one case of anencephaly with polyhydramnios from 26 weeks gestation.
(d) Polyhydramnios from 34 weeks in other case of anencephaly.
(e) Polyhydramnios from 31 weeks.

TABLE III

Method of diabetic management related to fetal outcome

Diabetic management	*Result of pregnancy*	
	Normal baby	*Malformed baby*
Insulin	155	17
Hypoglycaemic agents	3	1
Diet only	3	1
Total	161	19

Although great efforts are expended to maintain good control of the maternal diabetes (the aims have been stated already), success is not always achieved. Control of the diabetes was judged to be good in the third trimester if the average plasma glucose 3 hours after breakfast and the evening meal was less than 7.2 mmol/1. Plasma glucose values between 7.2 and 8.4 mmol/1 were regarded as fair, while values greater than 8.4 mmol/1 were unsatisfactory and designated poor. When these criteria were adopted for the 172 patients on insulin, 59 had good control (34.3 per cent), 46 had fair control (26.7 per cent), and 71 (41.2 per cent) had poor control. Unfortunately, data on the degree of diabetic control at conception and during the first trimester are not available since most women booked for their confinement at the end of this period. In general, however, we suspect that the patient's degree of control in the third trimester mirrors fairly faithfully the control in the earlier months.

Table IV shows the fetal results related to the degree of control of the maternal diabetes during the last trimester. It can be seen that the incidence of congenital malformations increases as the degree of maternal diabetes control deteriorates. However, the numbers are too small for statistical analysis.

TABLE IV

Control of maternal diabetes in the third trimester related to the outcome of pregnancy

Diabetic control			*Outcome of pregnancy*	
	No.	*(percentage)*	*Normal baby*	*Malformed baby*
Good	59	(32.1)	55	4
Fair	46	(25.0)	40	6
Poor	71	(38.5)	63	8
No record	8	(4.3)	7	1
Total	184		165	19

TABLE V

Classification of maternal diabetes according to White's method, related to the outcome of pregnancy

Outcome of pregnancy	*White's classification*				*Not recorded*	*Total*
	B	*C*	*D*	*F*		
Normal birth	71	65	25	2	2	165
Congenital malformation	4	9	3	0	3	19
Abortion	4	3	1	0	3	11
Stillbirth	5	4	1	0	3	13
Neonatal death	5	4	1	0	0	10

Table V compares the outcome of the pregnancy in relationship to the classification of the maternal diabetes. Congenital malformations were commonest in Group C with nine infants affected, an incidence of 13.8 per cent, while four of Group B (5.6 per cent) and three of Group D (12.0 per cent) were affected.

DISCUSSION

In 1865, Lecorché reported the occurrence of hydrocephalus in diabetic mothers. However, the increased frequency of congenital malformations was not fully recognized until the second half of this century, when a number of authors (White, 1949; Koller, 1953; Reid, 1956; Driscoll, Benirschke and Curtis, 1960) drew attention to this finding in the offspring of diabetic mothers. On the other hand, some authors found no such increased frequency (Given, Douglas and Tolstoi, 1950; Reis, De Costa and Allweiss, 1950; Cardell, 1953; Farquhar, 1959). More recently, however, further reports have confirmed increased fetal malformations (Table VI).

TABLE VI

Incidence of malformation rates in infants of diabetic mothers from various centres

Author	*Date*	*City*	*Number*	*Malformation rate (percentage)*
Mölsted-Pedersen et al	1964	Copenhagen	853	6.4
Watson	1968	London	197	10.7
Farquhar	1969	Edinburgh	329	7.9
Yssing	1973	Copenhagen	749	11.0
Soler et al	1975	Birmingham	701	8.1
Komrower	1977	Oxford	213	9.8
Pedersen	1977	Copenhagen	1,452	8.0
Present study	1979	Belfast	184	10.3

In 1964, Pedersen and his colleagues from Denmark found a malformation rate of 6.4 per cent in 853 infants of over 1.0 kg birth weight, compared to 2.1 per cent in the control group. Major malformations occurred in 5.2 per cent as opposed to 1.2 per cent in the control group which is statistically significant. Watson (1968) found 10.7 per cent of 197 infants to have congenital malformations with a 5.6 per cent incidence in her control group, while Farquhar (1969), in a later study, found 7.9 per cent of 329 infants born after 24 weeks to be affected. He thought that this was higher than in the general population but found precise comparison impossible. Similarly, Yssing (1973), in a review of the work of the Danish group, confirmed that 11 per cent of 749 infants with a birth weight of over 1.0 kg surviving the neonatal period were affected, with congenital heart lesions and skeletal malformations predominant.

Rowland, Hubbell and Nadas (1973) specifically investigated congenital heart disease in these infants and found an incidence of 4.0 per cent in a series of 470 babies. Transposition of the great vessels, ventricular septal defects and coarctation of the aorta together formed over half of their 19 reported cases. Soler, Walsh and Malins (1976) in a study of 701 infants born between 1950 and 1974, found 8.1 per cent affected, a rate of three to four times greater than in the general population of Birmingham. In particular, cardiovascular system malformations were noted in 2.3 per cent (eight being fatal) compared to 0.21 per cent in the general population. Similar high rates in diabetic babies as opposed to control infants were reported by Komrower (1977) and Pedersen (1977) with the major emphasis on cardiac and skeletal malformations.

The present study confirms these findings. The incidence of fetal malformations in the Royal Maternity Hospital, Belfast, is about two-and-a-half times more frequent in babies of diabetic mothers (10.3 per cent) than in the general population (4.0 per cent). They were responsible for, or contributed largely to, a third (30.4 per cent) of the perinatal deaths in these babies during the period of the survey. Cardiovascular anomalies were the most frequent finding and occurred in over a third of infants affected (36.8 per cent). They accounted for six of the eleven major malformations and for four of the seven deaths. Our findings show that infants of diabetic mothers have a six-fold increased risk of a cardiovascular malformation than the general population. Three other babies died, one with microcephaly and two with anencephaly, but it is improbable that these are related to diabetes. More likely they reflect the high incidence of these lesions in the offspring of mothers in Northern Ireland as a whole.

Mölsted-Pedersen, Tygstrup and Pedersen (1964) suggested that the increased incidence of congenital malformation in infants of diabetic mothers was due to a "divergent gene pattern" and an "abnormal intrauterine environment" due to maternal vascular complications, a view supported by Rowland, Hubbell and Nadas (1973) who felt that hereditary and environmental factors interacted to various degrees. More recently, Pedersen (1977) has underlined the importance of an "incomplete metabolic compensation in the metabolic state during the first trimester". Our own findings show that in the third trimester the worst controlled mothers had the greatest number of malformed infants, a fact not brought out in previous studies. No figures are available for the early weeks of pregnancy when organogenesis is occurring, but we suspect that a mother who is poorly controlled

in the latter months of pregnancy is unlikely to be better controlled at the time of conception and in the first critical weeks following implantation. If this is so, and we have no reason to believe otherwise, it is possible, indeed probable, that indifferent or poor diabetic control with high plasma glucose levels may be a factor in the causation of fetal malformations. Since the achievement of good control of the metabolic state is regarded by all workers as the ideal to be aimed at during pregnancy it seems logical to recommend the same degree of control at conception and during the early weeks of fetal development. To do so, however, means that pregnancy in the diabetic woman must be a planned event with diabetic control carefully monitored for some weeks prior to conception. The recognition then of ovulation in a cycle, followed by a sustained rise in the progesterone level confirming conception, should be the signal to maintain as complete normalization of the plasma glucose as possible until pregnancy is ended.

In order to attain this ideal situation, considerable changes will need to take place in our attitudes to pregnancy in the young diabetic woman. Education about the risks of pregnancy to their offspring and the importance of good diabetic control at the time of conception will be needed as well as advice on family planning. At marriage, the diabetic woman should be referred for contraceptive advice, if needed, and when pregnancy is desired attention to the control of the diabetes can be stepped up. If contraception is not requested then careful control of the metabolic state will be necessary before the marriage takes place. Such a coordinated campaign might be a factor in helping to reduce fetal wastage and morbidity in this particularly vulnerable group of women.

SUMMARY

A retrospective survey of 195 consecutive diabetic pregnancies in the Royal Maternity Hospital, Belfast, between 1963 to 1978 revealed 184 pregnancies which exceeded 28 weeks. Of these, 19 congenitally malformed babies were born (10.3 per cent). The total malformation rate was 13.0 per cent (24 malformations in the 19 babies). Seven, or just over one-third of the congenital malformations proved fatal in the perinatal period. In all, congenital malformations contributed to just under one-third of the perinatal deaths.

Cardiovascular lesions were most frequent and were found in over one-third of infants affected. They accounted for six of the major malformations and for four of the seven deaths. Infants of diabetic mothers have a six-fold greater risk of a cardiovascular malformation than the general population.

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KNEE REPLACEMENT: A CLINICAL REVIEW

by

J. H. LOWRY, N. W. McLEOD and R. A. B. MOLLAN

from

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THE first successful knee arthroplasty was reported in 1861, but from then until the 1940s arthroplasty of the knee was of the interposition type using either autogenous tissue or a foreign non-metallic material between the joint surfaces. Results of this operation were at best poor and unpredictable when compared to arthrodesis, the alternative procedure for degenerative arthritis. Arthrodesis sacrificed movement in order to achieve a predictable clinical result which was very acceptable to both patient and surgeon. Arthrodesis achieved complete pain relief, a stable limb, opportunity to correct deformity and a low complication rate. Metallic interposition arthroplasty began in the 1940s, but again results remained poor. Infection both immediate and delayed was a frequent and devastating complication. Prostheses loosened due to poor bone to metal fixation, high friction forces in the metal on metal joint, and the inherent constraints designed to prevent excessive movement. All these complications hampered early attempts to develop a successful alternative to the stiffening procedure.

Relief of pain, stability and a low operative morbidity still makes arthrodesis of the knee a valuable treatment for degenerative arthritis. A stiffened knee, however, is a severe handicap in modern transport and it is impossible for patients to get in and out of small cars or ride on buses without great difficulty. In the last decade new skills and knowledge have been acquired from the highly successful total hip replacement. We now have a better understanding of the biomechanics of the knee joint both natural and prosthetic, and the factors which will allow successful fixation of the metal and plastic polymers to living bone. Metal and plastic interposition arthroplasty of the knee thus promises to become a viable alternative to arthrodesis in terms of pain relief, stability and low complication rate, but with the important bonus of movement. As a result of these advances, knee arthroplasty using metal on plastic joints cemented to bone were commenced on a trial basis at the Withers Orthopaedic Centre in 1974. A trial of this type of operation was essential to test the proposition that with modern technology the arthroplasty had become a safe and feasible alternative to arthrodesis. The high rate of complication, especially infection, recorded in the American literature was worrying and some reviews even quoted an amputation rate as the final sequela to infection. It was mandatory that the operation was closely monitored and restricted in the first few years in this province in order that an unacceptable number of disasters did not occur. This paper reports the results of the first four years of total knee replacements of this type. Two types of arthroplasty were used and they will be discussed separately.

THE MARMOUR KNEE

Material and Method

The Marmour knee was used as a unicompartmental tibio-femoral resurfacing arthroplasty in those cases of arthritis where the damage was predominantly in only one compartment of the joint. All those patients with unicompartmental destruction who were being considered for arthrodesis between 1974 and 1978, were offered the operation described by Marmour (1977).

Nineteen replacements were carried out in eighteen patients, one patient had a bilateral replacement. The average age was 64 years (range 42 to 78 years). Fifteen patients had osteoarthritis, two had rheumatoid arthritis and one patient had post-traumatic arthritis. There were nine male and nine female patients.

Results

The patients were assessed retrospectively using the British Orthopaedic Association Knee Function Assessment Chart. The average follow-up was 36 months (range 12 months to 50 months). All patients were available for review. Fifteen patients were enthusiastic when asked about their assessment of the operation, one patient was satisfied and two were disappointed. One of the two disapppointed patients had a very obvious loose femoral component which was causing severe pain on weight bearing and he was awaiting revision, the other patient was disappointed because of the very poor range of movement after the operation (30° to 80°). Twelve patients had no pain whatsoever, five had mild pain not interfering with activity or sleep and one had severe pain—the patient with the loose component. One patient was unable to walk at review due to bilateral fractured femurs and one patient had to use two crutches—again the patient with the loose component. Twelve patients had some limitation in walking outdoors, however, eight of these did not use a walking aid. The results of the movements recorded are shown in Tables 1 and 2. No patients were found to have extensor lag and only one patient had more than five degrees of varus angulation. No patients showed any sign of wear of articular surfaces on follow-up X-rays and there was no evidence of any synovial reactions. Only one patient had a delay in wound healing and there were no infections. Two patients required manipulation of the knee under general anaesthetic post-operatively. Two patients developed clinical deep venous thrombosis, but neither had evidence of pulmonary embolism. One patient had an early loosening of the femoral component and is awaiting revision, while another fell 12 feet onto concrete and fractured the tibia beneath the tibial component, this replecement has been successfully revised.

TABLE 1

Flexion Contracture following Marmour Knee

Flexion Contracture	*No. of Arthroplasties*
none	15
<10°	3
30°	1

TABLE 2

Maximum Flexion after Marmour Knee

Maximum Flexion	*No. of Arthroplasties*
>100°	13
81-100°	2
61-80°	1
<60°	3

Conclusion

This preliminary report is encouraging when it is realised that only the worst cases were considered for operation. However the indications for the unicompartmental operation have still to be decided and this is a matter of great debate in the literature (Laskin, 1978). Our initial results indicate that we should continue the trial but realise that a long term review is essential to evaluate late loosening, wear and reactive synovitis to particles of plastic polymer. Degeneration in the other compartment must be carefully assessed in the light of encouraging results in bi- and tricompartmental replacement arthroplasties.

THE GEOMEDIC KNEE

Material and Method

The geomedic knee replacement replaces both femoral condyles with a vitallium metal component and the tibial plateau with high density polyethylene. Both components are cemented in place and there is opportunity to correct varus and valgus angulation (Coventry *et al,* 1972 and Riley, 1973). All patients with degenerative arthritis who were being considered for arthrodesis between 1974 and 1978 were offered this operation if both compartments were degenerated.

Sixty eight replacements were carried out in sixty two patients, six were bilateral. The average age was 62.5 years (range 41 to 78 years). There were thirteen male and forty-nine females. Forty-four patients had rheumatoid arthritis and eighteen patients had osteoarthritis.

Results

Nine patients were not reviewed. Four patients had died of unrelated causes. Two patients were lost to review, one believed dead. The remaining three patients had infected prosthesis which had to be removed. Two had successful arthrodesis, the other had a fibrous union which causes mild pain but is stable. The remaining fifty-three patients have a mean follow-up of three years (range 1 to 4½ years).

When asked for their assessment of the knee forty-seven patients were enthusiastic, three were satisfied and the three failures were, of course, disappointed. In forty-two of the knees there was no pain, sixteen knees had mild pain not interfering with activities or sleep. Ability to walk was assessed but due to the great number of patients who had other weight bearing joints involved there was not significant improvement in walking distance after the operation. Thirteen patients were still

using crutches to get about. The flexion deformity and maximum flexion are summarised in Tables 3 and 4. No patient had extensor lag and there were no patients who had a residual varus or valgus angulation of more than ten degrees. Review radiographs did not reveal any evidence of wear and no patients had synovial thickening. Three patients did notice that the replacement did give way on them when walking. This was a rare occurence but enough to warrant a walking aid for confidence. In these cases the knee was clinically unstable in the anterior drawer test.

TABLE 3

Flexion Contracture following Geomedic Knee

Flexion Contracture	*No. of Arthroplasties*
none	31
<10°	16
11-20°	3
21-30°	5
>30°	3

TABLE 4

Maximum Flexion after Geomedic Knee

Maximum Flexion	*No. of Arthroplasties*
>100°	27
81-100°	19
61-80°	7
<60°	5

Eleven patients had a delay in wound healing and five patients developed clinical deep venous thrombosis. There were no cases of pulmonary embolism. Four patients required manipulation under anaesthetic and in one of them the tibial component became loose. This patient had a successful revision.

Conclusion

The geomedic replacement was under trial in the worst possible knees. There were three failures due to infection, but two of these were successfully salvaged by arthrodesis, another by fibrous union. There was an understandably greater incidence of delay in wound healing and deep venous thrombosis due to the great number of patients with rheumatoid arthritis. The goals of the operation were fully met and the great majority of patients had relief of disabling pain, stiffness and deformity. It is interesting that despite the ligamentous destruction found in the rheumatoid knees only three were clinically unstable. Again the trial was a success but a long term follow-up is essential to assess wear, late loosening and plastic

synovitis. The trial compares very favourably with those reported so far (Skolnick *et al,* 1976; Ilstrup *et al,* 1976).

SUMMARY

The initial results of nineteen Marmour and sixty-eight Geomedic knee replacements are reported. In view of the low complication rate in both groups and the high degree of patient satisfaction it is concluded that modern knee replacement should be considered in those patients with advanced degenerative arthritis.

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THE DEVELOPMENT OF NEUROLOGY IN BELFAST

by

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BEFORE the middle of the nineteenth century no special facilities existed in the United Kingdom for the care and treatment of sufferers from diseases of the nervous system. It was the policy of general hospitals not to admit any patient suffering from an incurable disease, and patients with epilepsy were generally refused admission, not because treatment was unavailable, but because of the effect of the fits on other patients.

Hospitals and institutions for the treatment of "nervous diseases" existed before the nineteenth century, but these did not cater for diseases of the nervous system as we understand them in the context of neurology. One such example is the institution founded by Dean Swift in Dublin in 1745. Its title was St. Patrick's Hospital for the Treatment of Nervous and Mental Diseases. It was in fact, in the parlance of the time, a madhouse. In the satiric poem written by Swift in 1731 which he entitled "On the Death of Dean Swift" there is a verse:-

> He gave the little wealth he had
> To build a house for fools and mad
> And shewed by one satiric touch
> No nation wanted it so much.

In these lines Swift made it clear that he was extending his bounty to the insane, not the paralysed.

If we look at the teaching of a famous physician in Edinburgh in the eighteenth century we find that Professor William Cullen in his *First Lines on the Practice of Physic* (1777) included a section entitled "Of Neuroses or Nervous Diseases". He wrote—"It seems improper to limit the term, in the loose and inaccurate manner in which it has hitherto applied to hysteria and hypochondriacal disorders". He therefore proposed to use the term "neuroses" to comprehend "all those preternatural affections of sense or motion, which are without pyrexia as a part of the primary disease; and all those which do not depend upon a topical affection of the organs, but upon a more general affection of the nervous system . . . . " His broad classification embraced many of the conditions which a neurologist of the present day would recognise as belonging to his speciality.

Even if we are puzzled by some of the terms used by Cullen we may be certain that he and those trained by him were no strangers to neurology. Among them were the founders of the Belfast Medical School, of whom the premier figure is James McDonnell. He and his fellow students in Edinburgh would doubtless have used Cullen's textbook and been familiar with his teaching on the diagnosis and treatment of diseases of the nervous system. Included in the Archives of the Royal Victoria Hospital is a complete handwritten set of Cullen's lectures on medicine which must have belonged to one of the original members of its medical staff.

The first special hospital for the treatment of diseases of the nervous system to be established in the United Kingdom was the National Hospital for Paralysis and Epilepsy in Queen Square, London. It was opened in 1860 and grew into the greatest neurological centre in the United Kingdom and gained a worldwide reputation for being in the forefront of progress in the study and treatment of diseases of the nervous system.

THE BELFAST GENERAL HOSPITAL

When the Belfast Fever Hospital in Frederick Street was relieved of the burden of caring for patients suffering from contagious fevers by the opening of the Fever Hospital on Lisburn Road in 1844 it became possible gradually to admit more and more patients with general medical and surgical diseases, and by the end of the 1840s its official title had been changed to "Belfast General Hospital". In the year ending 31 March 1849, 106 patients were admitted to the medical wards for conditions which included delirium tremens (6), neuralgia (1), and paralysis (9). The hospital's neurological practice had begun.

The number of in-patients increased rapidly but it was not until 1874 that the medical report presented a classified return of diseases treated in the wards. This report shews how far differentiation of diseases of the nervous system had gone a century ago and how they were divided between the physician and the surgeon. The physicians treated both organic and functional diseases. Two cases of eclampsia were included, and one-third of the 103 patients were suffering from delirium tremens. The surgeons treated 39 patients with nervous diseases including tetanus, apoplexy, compression of brain, concussion and syphilophobia.

How patients were being used in teaching may be discovered by perusing some of the printed material that has survived. In 1852 one of the attending physicians, A. G. Malcolm, conducted a course of clinical lectures with the title "The Interpretation of Derangements of the Nervous System", and in 1855 he provided a pamphlet for his students entitled "Memoranda useful as an Introduction to the Diagnosis of Lesions of the Nervous Centres". He expanded this teaching in a book which was almost ready for publication when he died in 1856 and which his colleagues brought out after his death. The second section of the book dealt with the nervous system. It begins with a brief account of the relevant anatomy and physiology and goes on to present a comprehensive account of the signs and symptoms of various diseases of the nervous system under the heads of altered intelligence, the special senses, sensation and motor power. Most of his teaching would still pass muster but in many respects it reflects long outmoded and discarded theories.

THE BELFAST INSTITUTION FOR NERVOUS DISEASES, PARALYSIS AND EPILEPSY

In 1860 John McGee MacCormac of Banbridge, Co. Down entered the Royal Belfast Academical Institution and after two years went on to the Queen's College, Belfast as a medical student. He qualified L.R.C.P. and S. Edinburgh in 1867 and proceeded M.D. Durham in 1885. He spent some time in London studying neurology and attended the practice of the National Hospital, Queen Square as a

post-graduate student. He was one of the original members of the Neurological Society of London.

His involvement in the intellectual life of Belfast is reflected in his contributions to the proceedings of the Natural History and Philosophical Society which he had joined on his return to Belfast in 1888. He read papers on the influence of language and environment upon the individual through the nervous system, on education and innervation, on abnormal ideas and nervous superexcitability and on heredity in its relation to the nervous system. He also read neurological papers at meetings of the Northern Ireland Branch of the British Medical Association on such subjects as "The Nervous Troubles of Articulation and their Treatment", expressing the belief that a study of the chemical pathology of the nervous system would reveal the cause of many cases of dysarthria. He recognised the value of electricity in treatment.

The effective date for the announcement of Roentgen's discovery of X-rays is considered to have been January 1896. In the session 1896-97 MacCormac demonstrated an X-ray apparatus and gave a detailed account of the physics of the production of the rays and described their use in examining bones, liver, kidneys, lungs and heart. He added that up to that time the results were not sufficiently defined to be of use except for examining bones and detecting foreign bodies such as a needle or bullet. This demonstration in itself is evidence of how up to date he was.

Perhaps the most unusual of his writings is a slim volume, published in 1890, entitled "The Physical Causes of Christ's Death". He examined several alleged causes and concluded that the immediate cause of death was rupture of the heart. "His agony and sympathy communicated their effects to His heart through the medium of His brain centres, nerves and sympathetic system, causing His heart to palpitate, to beat so forcibly that it was torn in sunder".

After returning to Belfast in 1888 MacCormac practised at 29 Great Victoria Street where his near neighbours included future eminent physicians such as J. A. Lindsay and H. L. McKisack; a long established surgeon, T. K. Wheeler; a future paediatrician, Sydney Brice Smyth and a gynaecologist, J. St. C. Boyd. By 1889 MacCormac's house had become "The Belfast Institution for Nervous Diseases, Paralysis and Epilepsy". The street directory for that year described it as "designed for the treatment of all diseases of the brain, spinal cord and nerves, and fitted up with all kinds of electro-medical apparatus. Patients have every home comfort. Dr. J. MacCormac, physician".

The venture must have flourished for in 1893 MacCormac moved into the house next door leaving no. 29 to the patients, and in 1897 he and the institution moved to nos. 73 and 71 respectively where they remained until his sudden death in 1913. The Belfast Institution for Nervous Diseases is now quite forgotten but it was once of sufficient importance to be included among the benevolent establishments of the city. We fittingly remember it here as the first special hospital for the treatment of nervous diseases in Belfast.

CLAREMONT STREET HOSPITAL

Another step forward was taken in 1896 when the Victoria Hospital for Diseases of the Nervous System, Paralysis and Epilepsy was opened at No. 14 Claremont

Street. It was endowed and sponsored by a Miss Farrell, the daughter of a former rector of Dundonald, Co. Down, and its first physician was MacCormac. The founder's words when she launched the project are on record:

> In February 1895 the great need of a public Hospital for diseases of the brain, nerves and spinal cord began to press upon my mind . . . that, owing to my long personal experience of nerve sufferings, I was the person to make the start . . . .

We do not know the nature of Miss Farrell's illness but we may fairly assume that she was a patient of MacCormac. When he died in 1913 he was described as founder of the hospital, but he himself gave the credit for its foundation to Miss Farrell. We should perhaps regard them as co-founders, the lady supplying the means and the doctor achieving the ends.

Miss Farrell's part was recalled at the annual meeting in 1926 when the chairman, Mr. H. Stephens Richardson, spoke of the hospital's early days:

> She took the building . . . and made herself responsible for the rent and the purchase of instruments and medicine up to £200, so that our city might have the very best skilled physicians and experts relating to the brain, nerves and spinal cord. Remember, in those days nerve patients were placed in the workhouse lunatic ward.

One would gather from these remarks that the main work of the hospital was in psychiatry rather than neurology as the term is understood to-day. Mr. Richardson went on to explain why "nerve diseases" were spreading. It was because the problems of industry had become so exacting as to put a great strain on the nerves of those carrying great responsibilities. He added that there was "an inordinate love of pleasure and excitement connected with the cinema and the liquor trade which produces a constant desire for shorter working hours". He looked on strikes as a "nerve eruption and an effect of some disturbing cause in the body politic". This is hardly the language of neurology.

The new hospital was given its own place among the benevolent institutions of Belfast for the first time in the street directory for 1901. It was described thus:

> "THE VICTORIA HOSPITAL FOR DISEASES OF THE NERVOUS SYSTEM
>
> This Hospital is situated in Claremont Street, and though only in existence since November, 1896, has by the work already done given full proof of its right to claim a very generous support from all classes of the community. It has the honour of being the first public institution established in Ireland for the exclusive treatment of paralysis, epilepsy, and all the other diseases of the nerves. To Miss Farrell, daughter of the late Rector of Dundonald, is due the credit of having first realised the imperative necessity for an Hospital of the kind in Belfast. In the face of a good deal of opposition and discouragement, she has succeeded in opening an institution free to the necessitous poor from all part of Ireland, without religious distinction. All the medical appliances needed in the diagnosis and treatment of nervous diseases have been provided at considerable cost. There is on the premises a well-equipped surgery, where patients can have their prescriptions filled before leaving. The number of those in attendance for treatment—an ever-increasing one—and the reports they give of the benefits received, are the very best proof of the skill and attention of the Honorary Physician, Dr. J. M. MacCormac, and the other members of the staff. Thanks to the

> efforts of Lieutenant-General Geary, who presided over the Committee of Management during the year 1899, and of Sir James Henderson, D.L., who, since the departure of General Geary, has directed the energies of the Committee of Management, the financial condition of the Hospital is thoroughly satisfactory. Mrs. J. D. Crawford, is the Honorary Treasurer, and Mr. J. K. Blackwood, B.A., the Honorary Secretary. The Hospital is open daily (Sundays excepted) for the admission of patients at 10 a.m. It may be added that a well-equipped intern department will be opened during 1901, as the Hospital has now been purchased by the Committee and it has recently been renovated and enlarged".

In his report for 1905-06 MacCormac referred to remarks made by the hospital's first President (General Sir Henry le Guay Geary, K.C.B.). The poor could not, from their surroundings, receive the treatment adequate to their needs in reference to nervous diseases, and there was nothing for them, apart from a Hospital, but to gravitate to the Union, where they would become chargeable to the public in some form or other; whereas by a little well-spent money in the direction of keeping up a Hospital of this kind, they [the subscribers] were not only doing what they were called upon to do from a philanthropic point of view, but were really satisfying the conditions of true economy". One wonders what the committee and medical staff of the Royal Hospital in Frederick Street thought of the charge that they were not meeting the needs of the poor of Belfast suffering from nervous diseases. According to the report of that hospital for the year 1895-96, 115 patients were admitted to the wards with diseases of the nervous system, representing six per cent of the total number admitted.

The new hospital had a male and a female ward containing in all 15 beds, a treatment room with apparatus for faradism and galvanism, a consulting room for the physician to see out-patients, a matron's sitting room and accommodation for her and a nurse upstairs. Patients were expected to contribute small sums, and in 1904 these amounted to £256 which, with other contributions and legacies, amounted to £556. Total expenditure was approximately £499 of which the largest amount (£136) was spent on drugs followed by £131 on provisions, £73 on salaries and £27 on coal and electricity.

The first extant annual report covers the period for the year ended 3 November 1904. 35 in-patients had been admitted of whom, according to MacCormac, 31 were cured, 18 much benefited and 2 were unchanged. Adult and child out-patients numbered 552. Some of MacCormac's observations on the work of the hospital may be quoted:

> The inroads of nervous diseases . . . do not so promptly awaken the liberality of the uninitiated . . . . The nature of the diseases treated here is such that the longer the mischief is allowed to play unchecked the less the chance there is of a radical cure.

The high rate of cure continued but we are given no information about the diseases being treated. During the hospital's first six years the rate of cure of in-patients was 67 per cent which is remarkably high and calls for further information which does not now exist.

We have to wait for the 1909 report before obtaining information about the actual conditions treated. MacCormac's report for that year stated that "cases of paralysis,

melancholia, hypochondriasis, rheumatic neuritis, sciatica and chorea (which had not reached the chronic state) were treated with complete success and . . . epileptics have been so greatly benefited that for years they have not suffered from any recurrence of attacks".

Following MacCormac's death in 1913 John Thompson, M.D. (R.U.I.), L.R.C.P. Lond., originally of Lisburn, Co. Antrim, was appointed to succeed him. Thompson had been a student in Queen's College, Belfast and also in Dublin, London and Vienna. His interest was more in functional disorders than in organic nervous diseases. His reports are as little informative as his predecessor's. In 1914 he mentioned many children with chorea and with infantile paralysis, which conditions, he reported, were treated with invariably good results. The commonest diseases seen were neurasthenia, epilepsy and disseminated sclerosis (here mentioned for the first time). The use of the term "neurasthenia" suggests that the hospital was dealing largely with what would now be described as psychoneuroses, but Thompson was postulating organic causes for the condition. In the 1915 report he wrote: "Neurasthenia is on the increase because of modern living, associated in nearly all instances with circulatory disturbances due very often to a slight defect in the mechanism of the heart . . . and errors of metabolism associated with defective teeth . . . and injudicious dieting . . . . " He added that he attributed his good results to ionic medication. Further information about the conditions being treated are found in the report for 1916: "Chronic cases cause disappointment but ailments taken in time and carefully treated yield most gratifying results, particularly such cases as sciatica, neuritis, tic douleureux, facial paralysis and insomnia".

A further development took place in 1927 when the hospital was amalgamated with the Killowen Colony for Epileptics in Lisburn. The title of the combined institutions was now "Nervous Diseases Hospital and Epileptic Colony". Thompson reported good results in treating epilepsy and most functional diseases and that many organic diseases were much improved by electrical treatment and the use of ultra-violet rays. He deplored the "unscientific attitude" of the Medical Research Council in a recent report which cast doubt on the value of treatment by ultra-violet light. He wrote that the report "would have a tendency to disturb the mind of a large number of patients receiving the treatment, and even if there were a psychological or faith healing element in the treatment, as hinted by the Council, they have no right to criticise so mercilessly one of the most recent advances in medical science and shake the confidence of the public. It is astonishing that the Council should state that a mustard plaster might have as good result as these rays". We do not know for what conditions Thompson was using ultra-violet light but he mentioned that the rays improved the sensitiveness of the nervous system and that several mental specialists had reported beneficial results from their use.

The medical staff of the hospital was augmented in 1926 when Thomas Howard Crozier was appointed assistant physician. He remained for only two years. He recalls that when he was being interviewed by Thompson for the appointment the conversation concerned religious and theological belief rather than medicine.

In 1932 Howard Hilton Stewart was appointed assistant physician. He had been a registrar in the Hospital for Paralysis and Epilepsy, Maida Vale, London where he had undergone training in neurology under such distinguished men as Douglas

McAlpine and Russell Brain. Although essentially a neurologist he did not exclude psychoneuroses from his practice. When he returned to Belfast there were no physicians engaged solely in neurology. Stewart followed his bent towards that speciality in Claremont Street but he was at the same time a general physician in the Ulster Hospital for Children and Women and in Ards District Hospital.

He soon made his voice heard in the affairs of Claremont Street Hospital. At the annual meeting of subscribers in 1933 he added a post-script to Thompson's annual report: "To a large number of people a Nerve Hospital indicates a home of rest for people with imaginary ailments, but the numbers of cases of paralysis, neuritis, epilepsy, etc. . . . dealt with serve to show that this Institution is in no sense confined to the treatment of functional disorders". He argued that the hospital must be enlarged and added that plans existed for building a hospital "the only one of its kind in Ireland". The report for 1933 shows continuing increase in the work being done and lists the diseases treated but not the number of patients suffering from each. It is clear that much of the practice would now be defined as psychiatric.

Thompson resigned in 1939 and was succeeded by Stewart, who at once invited the late Richard Sydney Allison to join him on an equal footing as full physician. Allison recalled the changes that were made by Stewart. He altered the hospital's former empiric and evangelical pattern into one which was more scientific and in greater conformity with the notable advances that had been made in neurology and neurosurgery in the preceding ten years. Outwardly these changes were apparent in the disappearance of the numerous texts of Scripture which had adorned the walls, both in Claremont Street and Killowen, and their substitution by good pictures.

In spite of the changes that Stewart introduced in the hospital's ethos and practice he shared his predecessor's belief that one of its principal tasks was to provide treatment for functional disorders, in particular, anxiety and depressive states, hysteria and "borderland mental illness" (a term used in the medical reports of the time). Allison recalled that he did not share Stewart's views, believing that the hospital should concentrate on organic nervous diseases and cease to be regarded as primarily for the treatment of psychoneuroses and depression.

Plans for extension came to fruition in 1939 when a new building was opened, adding 18 beds to the existing 15, which had been the hospital's sole accommodation for in-patients since its earliest days. The staff was depleted during the 1939-45 war when Allison was absent on naval service, but in spite of war-time stringency progress continued, and in 1944 apparatus for electroconvulsive therapy was installed which Stewart used for treating depression both in out-patients and in-patients. The pattern which Thompson had imprinted on the hospital remained litle changed in the immediate post-war years. In 1947 30-40 per cent of the patients were suffering from psychoneuroses or some other functional disorder.

Family doctors were now encouraged to refer patients to the extern department which was becoming more truly consultative than previously. At one time patients had found their own way there without being sent by the family doctor. Clinical neurological demonstrations for students were conducted weekly, and, on Allison's representation to the Faculty of Medicine in the Queen's University, the hospital was given recognition by the university as a teaching centre of neurology both for undergraduate and post-graduate students.

The first neurological surgeon to be appointed was Cecil Armstrong Calvert who joined the staff in 1946, and the long awaited electro-encephalograph was installed in the following year. The hospital's independent life came to an end with the advent of the National Health Service in 1948 when its administration passed to the new Belfast Hospitals Management Committee, which also administered the three Royal Hospitals. The Claremont Street Hospital was thus brought into the main stream of Belfast medicine after 50 years of cramped and penurious independence.

NEUROLOGY IN THE ROYAL VICTORIA HOSPITAL

It is now time to look back at neurology in its clinical setting in the Royal Victoria Hospital. I have already described the systematic teaching on diseases of the nervous system in the 1850s. There is no reason to doubt that it continued. James Cuming, who succeeded John Creery Ferguson as Professor of Medicine in the Queen's College in 1865, is known to have been an accomplished neurologist. His obituary notice in the *Lancet* (1899) records that during a period of study in Paris he became a pupil of the celebrated Charçot and thus became interested in diseases of the nervous system. On his appointment to the staff of the General Hospital he gave lecture-demonstrations on nervous diseases, and his old house physicians and pupils are said to have recalled with what clarity and enthusiasm he lectured on tabes dorsalis or disseminated sclerosis. He was interested also in epilepsy and mental diseases.

In the 1906 report of the hospital we find the term "multiple" being used instead of "disseminated" sclerosis for the first time. The list of diseases of the nervous system treated in the wards includes all the common neurological conditions. Brain tumours were diagnosed in seven patients. By 1916 diagnosis had become more exact. Intracranial tumours were being given their anatomical location, cerebral thrombosis was listed separately but cerebral haemorrhage and embolism were listed together. Syringomyelia and muscular dystrophy were mentioned.

The emphasis on "functional" as opposed to "organic" diseases in Claremont Street Hospital followed from the predilection of its founder and of Dr. John Thompson, but this cannot explain the surprising fact that in the 1920s patients with neuroses were being admitted to the medical wards of the Royal Victoria Hospital. The report of the medical staff for 1926 has a section headed "Nervous and Mental Disorders". There were 117 in-patients in this category of whom eight had neurasthenia, six hysteria, seven debility, one melancholia and six functional neurosis. The diagnosis in seven was "insanity". Ten years later not a single patient was admitted whose condition was diagnosed as "functional". Instead, cerebral haemorrhage, thrombosis and tumour were predominant, and epilepsy, which had once been a common cause for admission, did not appear at all in the 1936 report.

The general physicians in the Royal in the first quarter of the century had considerable interest in neurology. William Calwell, who was the first to hold the office of registrar, accompanied the hospital when it moved from Frederick Street to the Grosvenor Road in 1903. He was especially interested in two branches of medicine—dermatology and neurology (including medical psychology). Allison recalled that it was Calwell who urged him to specialise in neurology in Belfast, and T. H. Crozier, sometime assistant physician in Claremont Street Hospital and later

a consultant physician in the Royal, has told me that he learned more neurology from Calwell than from Professor W. W. D. Thomson. The latter's interest in neurology was such that, as the story went, he spent a whole term lecturing on tabes dorsalis. During his army service in the 1914-18 war Thomson had come under the influence of leading English neurologists, and after the war he had spent some time at the National Hospital, Queen Square. Allison remembered Thomson's teaching of neurology as being of a high quality.

Calwell no doubt had been indoctrinated by James Cuming. Another of Cuming's pupils was James Alexander Lindsay, his successor in the Chair of Medicine. The hospital alphabet of the 1890s described Lindsay as "boss auscultator" but he did not confine his interest to the heart and lungs. It is worthy of note that the number of pages he devoted to the nervous system in his *Clinical Memoranda* (1923) was exceeded only by the number devoted to the respiratory system. He had after all been at one time house physician under the great Hughlings Jackson, the pioneer of British neurology.

Neurology was, therefore, by no means neglected in the Royal Victoria Hospital. All of the visiting physicians and assistant physicians diagnosed, treated and lectured on diseases of the nervous system, and in 1920 Foster Coates, then an honorary assistant physician, was given leave of absence for four months in order to study neurology in London. From 1931 Allison, also an honorary assistant physician, conducted clinical demonstrations in neurology for students attending the hospital. There was, however, no specialist appointment in neurology.

By 1946 Allison, who was now one of the physicians in charge of out-patients and honorary secretary of the medical staff, raised the question of neurosurgery in the hospital. He mentioned that the Nufield Hospital Trust had expressed the opinion that Northern Ireland should have a neurosurgical centre and that the Royal Victoria Hospital would be the natural site for its development. He suggested that C. A. Calvert would be the right choice for the directorship of such a unit. Calvert was at the time visiting surgeon in charge of out-patients.

Allison's proposals were received favourably by his colleagues, and, after consultation, a scheme was drawn up by which Calvert would be relieved of his general surgical duties and given charge of a new department of neurosurgery. He was to have a salary of £1,500 per year and would be permitted to engage in private practice in the speciality. The Board of Management received the proposals enthusiastically (as W. W. D. Thomson reported), and Calvert was appointed the first specialist neurosurgeon in Northern Ireland.

In 1948 there was a further development when the decision was taken to establish a department of neurology with Allison as physician in charge, the appointment being on the same conditions as Calvert's. He was relieved of his general medical duties towards the end of the year to become the first specialist neurologist.

At the opening of the winter teaching session in the Royal in 1946 the address was given by Calvert. His subject was the history of neurosurgery but there was no reference to the speciality in Belfast, for the appointment of a neurosurgeon had not yet been made. This does not mean, however, that neurosurgery had not been practised in the hospital.

Perusal of the reports of the surgical work done in the early years of the present century shows that, for example, in 1904 two patients with brain tumours were operated on; both died. In 1910 there were three similar operations and one laminectomy. In 1919 decompression was carried out to relieve intracranial pressure caused by a glioma of the brain; the patient died. A similar operation with the same outcome was performed in 1920 when also two patients underwent decompression for epilepsy. One patient had the spinal accessory nerve removed with resulting 'improvement', but what the reason for the operation was is not recorded. By 1928 trigeminal neuralgia was being treated by injecting alcohol into the Gasserian ganglion.

Which of the surgeons was venturing into this little explored field cannot be ascertained without examination of surviving case records of individual patients, which would be a daunting task. No doubt any of them would have trephined a skull at need, but one name stands out from the rest, namely that of Andrew Fullerton, Professor of Surgery in Queen's, 1923-1933., and visiting surgeon in the Royal Victoria Hospital, 1902-33. Allison recalled that in the period 1918-25 it was to Fullerton that most patients who required craniotomy were referred.

Fullerton is remembered as the leading genito-urinary surgeon of his time, but during his military service in France he had worked in contact with Harvey Cushing (the pioneer of neurosurgery in the United States) and George Riddoch, the distinguished neurologist, who was an authority on the nervous mechanism controlling bladder function. Allison remembered Fullerton as one of the first to make extensive use of Cushing's "postage stamp" method of controlling haemorrhage, whereby a small piece of tissue was teased out and placed over the site of the bleeding.

Following the appointment of George Raphael Buick Purce as visiting assistant surgeon in 1929, there was an expansion of neurosurgery in the Royal. Purce was a general surgeon with a special interest in thoracic and neurosurgery. He was a pioneer in Belfast in both specialties but gradually abandoned the latter. He operated successfully on tumours of the spinal cord and became skilled in exposing intracranial tumours. Purce's impact can be seen from the list of neurosurgical operations performed in the hospital in 1930: removal of brain tumours, 2 (died 2); removal of cerebral cyst, 1; cerebral abscess, 1 (died 1); laminectomy, 1 (died 1); neurectomy, 2; injection for trigeminal neuralgia, 10; division of sciatic nerve, 2.

Calvert was by this time turning to neurosurgery and spending many of the night hours on lengthy operations. Allison, who invariably assisted him, recalled those nights:

> '. . . if it was a question of doing a laminectomy at a certain level in the cord he would refresh his knowledge of anatomy (already profound) by carrying out the procedure first on the cadaver. At brain operations between 1930 and 1939 he was meticulous in controlling haemorrhage (this was before the days of routine blood transfusion), made use of modern instruments such as de Martel's cutting electric saw, diathermy to control haemorrhage (with the assistance of the late Mr. Ralph Leman, senior radiographer). Operations, because of their length, could only take place in the evenings or at night and only if a theatre happened to be free for the purpose. One of the housemen

was recruited to give the anaesthetic when the regular anaesthetist, Dr. James Heaney, was not available. Sister Dynes (the night superintendent) did her best to deter us . . . but reluctantly congratulated us when the results were not disastrous . . . . Beginning at 8.30 or 9.30 p.m. the operations usually went on into the small hours . . . . '

It should be remembered that at the time Calvert was undertaking this taxing and discouraging work he was also, as a surgical registrar, taking his turn on 'take in' dealing with acute abdomens, strangulated hernias, fractures and any other surgical emergencies that arose, and conducting out-patient clinics two mornings a week.

The reference above to 'disastrous' results was not an over-statement. For example, in 1931 excision of cerebral tumours was done in 3 patients, of whom 2 died; cerebral tumours were explored in 5, of whom 3 died. In 1932 2 patients were operated on for cerebral abscess and 1 died; 1 for a cerebellar abscess who died, and a cerebral tumour was explored in 1 patient who died.

The results appear in a different light if we recollect that Purce and Calvert had no recourse to any of the modern methods of investigation such as radioisotope scanning, complex radiological techniques or electro-encephalography, which enable to-day's neurosurgeons to assess the state of their patients with greater accuracy than ever before and to select those who are likely to benefit by surgical interference.

However, no matter how they are viewed, the results of operation were certainly such as to discourage entirely a less dedicated man than Calvert, but he was fully dedicated to neurosurgery. He had been attracted to it, Allison recalled, largely through his friendship with Geoffrey Jefferson of Manchester who was later to become Professor of Neurosurgery there. The writer remembers Jefferson as extern examiner in surgery in Queen's in 1929. He was still a general surgeon who, the story went, practised neurosurgery in Manchester Royal Infirmary whilst earning his living repairing hernias in Salford. So it was with Calvert. He practised neurosurgery in the Royal Victoria Hospital when he had the opportunity and earned his living by general surgery in various nursing homes where alone, before the advent of private hospital beds, a surgeon could earn fees. As a house surgeon in the Royal in 1930 I marvelled at his courage and pertinacity in following his neurosurgical star.

When Calvert was appointed an honorary assistant surgeon in 1935, being at the time a general surgical registrar, he submitted at least two testimonials which acknowledged the high esteem in which the physicians held him for his neurosurgical work. Sir Thomas Houston wrote that Calvert had made a special study of the diagnosis of lesions of the nervous system and of the surgical treatment of brain tumours and that the medical and surgical staff had long recognised his pre-eminence in that branch of surgery. Professor W. W. D. Thomson wrote of his deep interest in the surgery of the brain and spinal cord, of his wide knowledge of the literature of the specialty, and his frequent visits to the clinics of the leading neurological surgeons both in the United Kingdom and Europe. He concluded—"Again and again I have availed myself of his assistance in dealing with tumours of the brain and spinal cord and have admired the infinite pains, the tireless patience, the profound knowledge and the perfect technique he has exhibited in the examination and treatment of such cases". One would think Houston and Thomson

were writing of an established neurosurgeon and not of a registrar who was a candidate for his first post on the honorary staff of the hospital.

The work grew in scope and volume. Ventriculography was first mentioned in 1937, and injection of alcohol into the Gasserian ganglion for trigeminal neuralgia was becoming so readily resorted to that in 1938 no fewer than 17 patients were treated by this method. The result was described as "good" in 11.

In 1940 Calvert joined the Royal Army Medical Corps, and his standing as a neurosurgeon was recognised by his posting to the Military Hospital for Head Injuries at St. Hugh's College, Oxford. Sir Hugh Cairns, the leading neurosurgeon of the time, was head of the hospital, and it was he who had arranged that Calvert should be posted there. He profited greatly from his contact with Cairns. The older man had much to teach the younger, but the traffic was not all one-way. When Calvert died in 1956 Jefferson wrote of him that during the Oxford period he was "the staff on which Cairns leaned". In the same appreciation Jefferson recorded that Calvert had been elected one of the original members of the Society of British Neurosurgeons in 1927. The previous year he had read a paper on referred pain in cases of brain tumour at the Manchester meeting of the society. It is thus seen how deeply he had been concerned with neurology and neurosurgery for nearly 20 years before the creation of a specialist post in Belfast.

During Calvert's absence on military service neurosurgery seems to have been in abeyance. The reports for the years 1940-45 do not mention a single neurosurgical operation. The establishment of the neurosurgical unit as described above led to a rapid development of the specialty as its first report shews. This is a historic report and is therefore reproduced in full:

NEURO-SURGICAL UNIT

Director ..... Mr. C. A. Calvert, F.R.C.S.
Anaesthetist ..... Dr. J. F. Bereen, M.B.

The Neuro-surgical Unit began its work on November 1st, 1946. This report covers the five months from this date up to April 1st, 1947.

No attempt is made in this report to assess the results of our cases, as in nearly all instances the period which had elapsed since their treatment is too short to form any useful opinion of their progress.

We have had 53 admissions as follows:

Brain tumours	23
Head Injuries	11
Investigations of epilepsy	5
Spinal cases—tumours, discs	5
Brain abscesses	3
Miscellaneous	2
Trigeminal neuralgia	4
	53

There have been 8 deaths, 2 of these on the day of admission. We have operated on 51 of these cases. Nearly all of these operations have been procedures which were not usually carried out in this Hospital before the advent of this unit.

Ventriculography	15
Brain tumour	13
Encephalogram	4
Brain abscess	2
Spinal abscess	2
Head injuries	
— ruptured middle meningeal	
— sub-dural haematoma	
— depressed skull fracture	6
Spinal tumours and discs	5
Trigeminal injection	4
	51

The report goes on to mention the need for the unit in such a large area as Northern Ireland and that twenty-five beds had been set aside temporarily for its use until such time as further building might be contemplated.

How the work developed is shewn in the report for the year 1947-48. The number of admissions was 118; 17 patients died on the day of admission. The number of operations was 109. Two new methods of investigations are mentioned for the first time, namely myelography and arteriography. In addition, some one hundred new out-patients were examined and investigated. A neurosurgical operating theatre was ready for use at the end of 1947, and Calvert was no longer dependent on the favour of some other surgeon for the loan of his operating theatre.

Departments of neurology and neurosurgery were now in existence and dealing with patients, but only a few beds were made available for their use in general medical wards. Allison and Calvert brought their needs before the Hospital Management Committee, the chairman of which was Senator Herbert Quin. The result was that money was provided from the free funds of the hospital for the conversion of existing wards into a neurosurgical unit. On the ground floor were 35 beds, a theatre suite, and an X-ray department of neurosurgery. A room was also provided for electro-encephalography. On the second floor were 16 beds for neurology. Quin House—named after Senator Quin who had played such a large part in the creation of the new unit—was opened formally in October 1953.

The speedy growth of the neurosurgical department is shown by the appointment of an additional neurosurgeon in 1948, Rainier Campbell Connolly of St. Bartholomew's Hospital and in 1951 of William Henry Thompson Shepherd as radiologist. In 1952 Hilton Stewart and John Harold Dundee Millar were appointed consultant neurologists in the hospital.

The specialty of neurology was extended further when Allison and Stewart were appointed visiting neurologists in the Belfast City Hospital in charge of a unit of 15 beds for patients requiring rehabilitation by means of physiotherapy or speech or

occupational therapy. At the same time members of the staff of the neurological department of the Royal Victoria Hospital paid regular visits to clinics established in various hospitals throughout Northern Ireland so that patients with diseases of the nervous system could receive specialist attention in their own neighbourhood.

It has been possible to write this short account of the history and development of neurology in Belfast only because both Claremont Street and the Royal Victoria Hospitals produced annual printed reports which provide primary material for the historian. In addition to these reports the personal recollections of R. S. Allison and T. H. Crozier have proved invaluable. The former played a large part in establishing neurology as a specialty within the wide field of medicine and without his assistance the story would have been much less detailed than it is.

As already related, both Claremont Street and the Royal Victoria Hospitals ceased to be independent on the inception of the National Health Service in 1948 and both ceased to publish their customary reports. The historian of the years after 1948 will be all the poorer because of this, as the late Robert Marshall discovered when he was writing the history of the Royal Victoria Hospital down to the year 1953. He wrote:

> "After 1947 the Hospital ceased to publish its Annual Reports in the manner which had become traditional for more than a hundred years, the bound volumes of which have been so valuable to those interested in its history. Since 1948 the Northern Ireland Hospitals Authority has printed Annual Reports giving a wealth of administrative details and some interesting statistics . . . . The Belfast Hospitals Group Management Committee of which the Royal Victoria Hospital is a not unimportant constituent has issued a typewritten Annual report giving lists of the members of the various committees . . . . "

However, the specialty of neurology, both in its medical and its surgical aspects, was well established and documented by 1947. The historian of its next phase must be left to grapple with his own difficulties.

ACKNOWLEDGEMENTS

This brief account of the development of neurology in Belfast was written at the request of the late Dr. Sydney Allison who, shortly before his death, handed over to the writer some notes on the subject. Thanks are due to the medical staff of Claremont Street Hospital for access to records of that hospital. I thank Mrs. E. O. Russell of the Office of Archives, Royal Victoria Hospital, for secretarial assistance.

THE ESTABLISHMENT OF AN AID CLINIC IN NORTHERN IRELAND

by

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INTRODUCTION

ALTHOUGH major advances have been made in the management of female infertility during the last 15 years, particularly with regard to ovulation induction, tubal microsurgery and embryo transfer, the treatment available for the infertile male remains very limited.

In the past, childless couples could be certain of obtaining a child by adoption within two years of being placed on the waiting list. However, over the last 12 years despite the increasing numbers of illegitimate births the numbers of babies available for adoption has decreased—this is a result of the increasing number of abortions being carried out since the 1967 Abortion Act and, the larger number of unmarried mothers who now prefer to keep their child. The number of placements by adoption agencies in Northern Ireland has fallen from 415 in 1966 to 358 in 1977, and this can partly be accounted for by the rise in the number of Ulster women having their pregnancies terminated in England to over 1200 per year. For many couples the waiting list is unacceptably long, and, provided there is no female barrier to conception, donor insemination may provide an alternative solution to their problem.

In 1973 the "Report of Panel on Human Insemination" recommended that recognised centres for artificial insemination by donor (AID) should be set up within the NHS, and, three years later, in an atmosphere of changing social outlook, widespread publicity and increasing demand, facilities for donor insemination were made available at the Royal Victoria Hospital, Belfast. The system operating at present was finally established during 1977 and in the following 12 months over 60 patients were treated.

HISTORY OF AID

John Hunter in the late eighteenth century was the original practitioner of artificial insemination in humans as far as we know only with the husband's semen (Shields, 1950). Dickenson in 1890 in the USA was the first to use donor semen doing so only with the utmost secrecy (Kleegman, 1966), but not until 1945 were pregnancies recorded in Great Britain using donor semen (Barton). By 1960 the Feversham Committee estimated that artificial insemination was being carried out

in this country by some 20 practitioners and during the previous 20 years had resulted in approximately 1100 live births.

A major factor in establishing AID has been the development of techniques for the freezing and storing of donor semen. Mantegazza (1866) originally suggested a bank for frozen semen but the poor quality of the semen after thawing remained an insurmountable problem for many years. The introduction by Parkes in 1945, of ampoules rather than capillary tubes for freezing the semen, and the development by Polge (1949) of glycerol as a cryo-protective medium, greatly improved post-thaw semen quality. These developments immediately preceded the first recorded pregnancies using stored frozen semen (Bunge, 1953).

METHODS

Patients:

More than 50 per cent of our referrals for AID come from consultant gynaecologists and in general, all of these couples have been fully investigated and judged to be suitable for this treatment. The remaining couples, mostly from general practitioners, usually require further assessment particularly to confirm regular ovulation and patency of the Fallopian tubes: all patients need counselling.

At the first visit the couple are interviewed together and separately and the legal and moral aspects of AID are discussed. They are then advised to consider their decision over the next two months, and if at the end of that time a firm commitment is made to proceed with AID, consent forms are signed by both husband and wife.

Donors:

Donors are obtained by verbal canvassing and are interviewed and examined before being accepted. The family history is investigated for hereditary disorder or congenital abnormality and the legal implications of AID explained. Unusual features of physique or colouring are noted, and a fresh semen sample is obtained for analysis and bacteriological examination.

Semen bank:

Donor semen is obtained by masturbation and is examined for sperm count and motility before being frozen. The complex cryo-protective medium, which has been prepared using sodium nitrate, fructose, glucose, glycerol and egg yolk is diluted by an equal volume of semen at 37°C. After equilibration, 0.6 ml aliquots of the mixture are sealed in sterile ampoules, marked with code numbers, frozen and stored in a tank of liquid nitrogen at -196°C.

Insemination:

Once a couple is finally accepted the further necessary investigations are carried out. An attempt is made to ascertain the day of ovulation from a chart of the daily basal body temperature. When this is established the patient is instructed to attend the hospital on the appropriate day; the temperature chart is assessed and the cervical mucus examined. If these are suitable the insemination is carried out, if not, it is deferred for one or 2 days or until the next cycle.

The majority of inseminations are now carried out using a cervical cap (Semm, 1966) which has the advantage of ensuring close contact between the cervical mucus and the semen for the period of 4 hours until the patient removes it at home. A further insemination is carried out within 48 hours and an appointment is made for the following cycle.

RESULTS

During the period under review 62 patients with an average age of 31 years, received donor insemination. Thirteen of these patients had had a previous pregnancy, six of which had been the result of AID in other centres. The indications for donor insemination are shown in Table I. Twenty-one pregnancies have been recorded, the result of 407 inseminations carried out in 285 menstrual cycles. On average, conception occurred during the fifth treatment cycle and required 9 inseminations. The outcome of the pregnancies are shown in Table II. Of the patients who became pregnant eleven required ovulation induction therapy to assist in the synchronization of ovulation and three were treated with bromocryptine for mild hyperprolactinaemia.

TABLE 1

Indications for AID

Indication	*Number*	*Per Cent*
Azoospermia	37	60
Severe Oligospermia	20	32
Paraplegia	4	6
Rhesus Disease	1	2
TOTAL	62	

TABLE 2

Outcome of Pregnancy

Live Births	8
Spontaneous Abortion	4
Ectopic Pregnancy	1
Continuing Pregnancy	8
Number of Pregnancies	21

DISCUSSION

The demand for donor insemination in Northern Ireland has been steadily rising since the Clinic was established in 1977. This may be attributed to the increasing social acceptance of such treatment and also to the difficulty which couples experience in trying to obtain a child from the adoption agencies.

It is essential that each couple requesting AID is carefully assessed both physically and psychologically before embarking on treatment. Our policy is to arrange several interviews spread over two to three months to discuss with them the full implications of the undertaking and ensure that the marriage is stable. Whilst there may occasionally be some advantage in obtaining the assistance of a psychiatrist and a social worker to assess the suitability of the couple, in practice we have found this unnecessary and rely on the recommendations of the referring general practitioner who can provide details of the social and domestic background. The disadvantage of involving a large number of personnel in the initial assessment is the risk of a breakdown of confidentiality, and this is particularly relevant in a small community such as Northern Ireland. Similarly correspondence, even between professionals, is kept to a minimum, as this is often read by ancillary staff. The advice given to the couple is not to disclose to relatives or friends the nature of the treatment as this may lead to difficulties in acceptance of the child within the family circle.

At present there is inadequate legislation on AID particularly relating to the legal status of the child born following this treatment. By law such a child should be registered as 'father unknown' and legitimacy ensured by adoption some three and a half months later. Most couples, however, refuse to do this because the matter will then no longer be secret and they usually register the child in their own names. Law reform in this area is urgently needed to provide either a new status for the AID child or a single status to encompass legitimate, illegitimate and legitimated children (Dunstan, 1973; Cusine, 1976).

Other workers have reported higher pregnancy rates than that obtained in our series (Steinberger and Smith, 1973; Chang and Taymour, 1975). This can undoubtedly be attributed to our initial difficulty in obtaining an adequate number of donors and hence the use of semen samples of less than optimal quality in terms of sperm count and motility. Furthermore it is generally accepted that pregnancy rates are lower when banked frozen semen is used (Annsbacher, 1978) but this has several advantages. It allows maximum utilization of each ejaculate, which on average will yield 10 frozen samples for insemination; it provides a large number of samples to choose from for closer matching of the physical characteristics of the husband; and in the long term it will allow a couple to have a further pregnancy from the same donor.

A significant problem in clinical practice is the high incidence of menstrual irregularity which develops after the start of treatment and results in difficulty in establishing the day of ovulation. This phenomonen is also encountered among patients having AIH and has been attributed to the stress of attending for insemination. The use of an ovulation induction agent such as Clomid will usually regulate the cycle and in this series over 50 per cent of patients required such therapy.

SUMMARY

The demand for AID in Northern Ireland has steadily increased since a clinic was established for this purpose in 1976. During 1978 62 patients were treated resulting in 21 pregnancies.

On average the patients conceived during the fifth menstrual cycle and required nine inseminations. The overall pregnancy rate was 32 per cent and it is anticipated

that this will improve markedly with a larger selection of donors and the development of improved freezing techniques.

ACKNOWLEDGEMENTS

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RECONSTRUCTION OF THE THUMB BY MICROVASCULAR TRANSFER OF THE GREAT TOE

A Case Report

by

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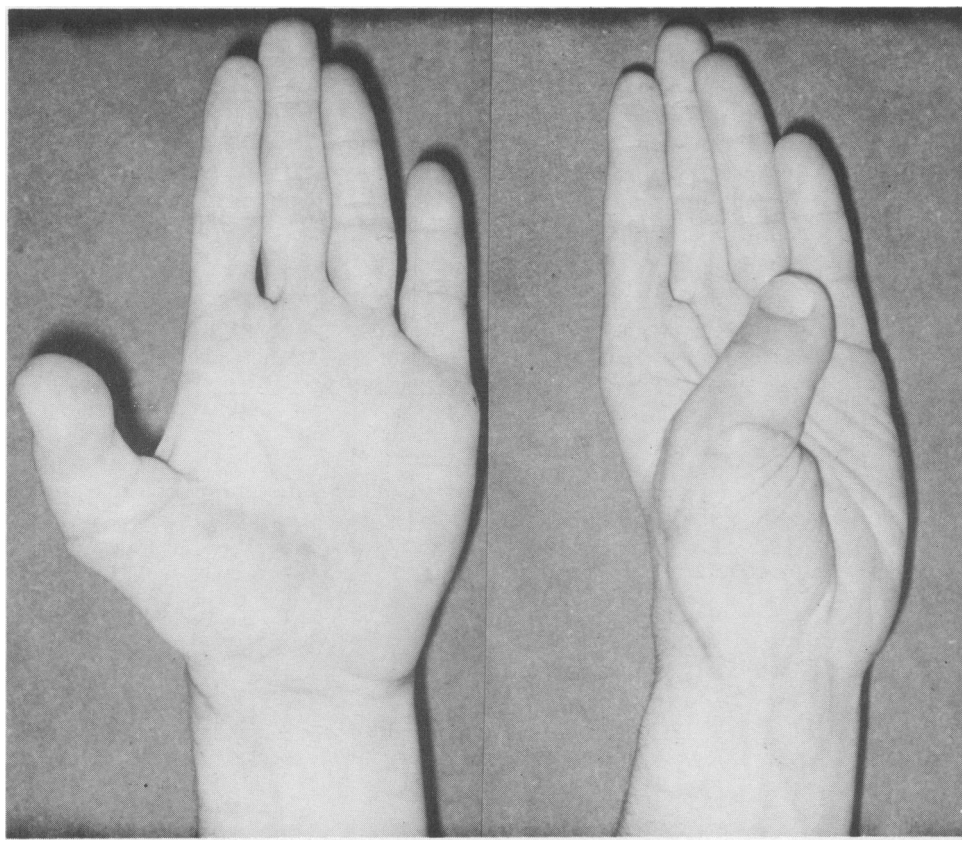
INTRODUCTION

TRAUMATIC amputation of the thumb is a particularly severe hand injury, because of the unique functional role of the thumb, and several methods exist for reconstruction of the thumb, all of which have disadvantages. Microvascular technique allows the transfer of a block of tissue from one site to another, by anastomosis of vessels with a known vascular territory to the vessels in the recipient area. Reconstruction of the thumb by microvascular transfer of the great toe was first described by Cobbett in 1969 and an improved technique was described by O'Brien in 1975. The purpose of this paper is to report the first such case carried out in Northern Ireland.

CASE REPORT

The patient, a 19 year old joiner, sustained a severe circular saw injury to his left hand on the 17th May, 1976. The thumb was amputated through the base of the proximal phalanx, and there were lacerations of the ulnar aspects of the index and middle fingers. In addition to the emergency surgery for suturing of the stump and lacerations, he had successful nerve grafts to the ulnar digital nerves in these fingers. At operation on the 3rd June, 1977, exploration of the thumb stump allowed identification of both digital nerves, the long flexor and extensor tendons, and the radial artery and cephalic vein. Exploration of the dorsum of the left foot allowed dissection of the first dorsal metatarsal branch of the dorsalis pedis artery, supplying the great toe, and the dorsal veins draining from the toe into the origin of the long saphenous vein. The flexor hallucis and extensor hallucis longus tendons and the digital nerves were isolated and divided, and the great toe resected at the metatarso-phalangeal joint, leaving it attached only by artery and vein, which were seen to provide an adequate circulation. The vessels were then divided and the hallux transferred to the hand, where it was implanted after trimming its proximal phalanx to the required length. Bone fixation was achieved by means of crossed Kirschner wires and one interosseous wire. The dorsalis pedis artery was anastomosed to the radial artery and the long saphenous vein to the cephalic vein, using 10/0 nylon suture and the operating microscope. Satisfactory circulation was restored, with an ischaemic time of under two hours. The extensor hallucis longus tendon was connected to the extensor pollicis longus, and the flexor hallucis to the flexor pollicis longus, and the digital nerves sutured. Finally, the skin was sutured, and the foot defect closed by means of a transposition flap and a skin graft. The procedure took a total of 12 hours and the transferred digit never gave any cause for concern. He was discharged on the 29th June, the delay being due to delayed healing of his foot,

and had further brief admissions for skin grafting to his foot, and for removal of the pins which were retained for two months after the transfer. After four months he had 40° of active flexion at the interphalangeal joint, and could flex and oppose to the base of the little finger. He returned to work at this stage. Reinnervation of the reconstructed thumb has progressed to provide sensation comparable with the other great toe, and the current range of movement is 60° at the interphalangeal joint. He admits to no significant disability in his foot.



This shows the reconstructed thumb in positions of abduction and opposition.

DISCUSSION

Several ingenious techniques exist for thumb reconstruction, all of which have disadvantages. The classical plastic surgical technique of an abdominal tube pedicle with a central bone graft, and sensory skin provided by transfer of a neurovascular island of skin from the ring finger, has the disadvantage of four or five operations and a total stay in hospital of at least eight weeks. It results in a 'digit' of abnormal appearance, with an island of sensory skin in the pulp area and is little more than a

rigid bony pillar covered by skin and subcutaneous tissue poorly adapted for its new role.

The more recent technique of pollicisation of the index finger where an appropriate length of index finger is transposed to the thumb stump, provides a reasonable alternative but at the expense of one finger and reduced hand width, and results in a 'thumb' of rather spindly appearance.

Microvascular transfer of the great toe allows the closest functional and cosmetic approach to the original digit, providing as it does a 'thumb' which has a stable sensory pulp, active flexion and extension, and a normal nail. The period of hospitalisation is short compared to the classical technique and the present expectation of 6 to 8 hours surgery for the whole procedure is considerably less than the cumulative operating time of the older staged reconstructions. In contrast to pollicisation, the rest of the hand is unscathed. The functional deficit in the foot is minimised by preservation of the head of the first metatarsal. In short, reconstruction of the thumb by microvascular transfer of the toe represents a major advance in reconstructive surgery of the hand.

SUMMARY

The patient, a 19 year old joiner, sustained a circular saw amputation of the left thumb. The reconstruction of a thumb by microvascular transfer of a toe is described, and the advantages of the technique discussed.

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PEPTIC ULCER AND CHRONIC RENAL FAILURE

by

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PROBABLY the first real attempt to ascertain if any casual relationship existed between peptic ulcer and renal disease was contained in a survey of post mortem records by Perry and Shaw (1893). They found that some form of kidney disease was present in seven per cent of deaths and as their cases of duodenal ulcer numbered 70, they reasoned that seven per cent, or five cases, might have been expected to have coincident Bright's disease. In fact, 12 cases showed this association and they concluded that "there appears to be some reason for including Bright's disease as one of the predisposing causes of duodenal ulcer". Moynihan in his classical textbook on duodenal ulcer (1910) described 27 autopsy cases where ulceration affecting the duodenum was associated with an advanced pathological condition of the kidneys, and he hinted at an association between the two diseases. Thereafter the subject received little further attention until the early 1960s when attempts were made to prolong the lives of uraemic patients by regular dialysis and transplantation. Subsequently, peptic ulcer was recognised as a serious complication in uraemic patients receiving regular dialysis (Sokol, 1964), and in those undergoing kidney transplantation (Moore and Hume, 1969). In some centres, the incidence of upper gastrointestinal haemorhage and perforation following transplantation was so high it was even suggested that all uraemic patients should have vagotomy carried out prior to transplantation (Penn et al., 1968).

In the present study, gastric function has been examined in 186 patients undergoing treatment for chronic renal failure, including patients on dialysis and following renal transplantation. The study attempted to answer several questions. Is peptic ulcer commoner in chronic renal failure? Is gastric acid secretion affected by chronic uraemia, dialysis and transplantation? And do gastrointestinal hormones have a role to play? Finally it was hoped the study might provide guidelines for management of peptic ulcer disease in these patients.

PATIENTS AND METHODS

Of the patients studied 131 had a barium meal, and 106 had a pentagastrin test under standard conditions carried out by the same experienced personnel. Endoscopy usually including fundal biopsy, was carried out on 26 patients who had either gastro-intestinal bleeding or x-ray negative dyspepsia. Radioimmunoassay of the following gastrointestinal hormones was carried out in the fasting state and after a standard meal: gastrin, glucagon, (measured as total glucagon or N-terminal glucagon-like immunoreactivity (N-GLI) and pancreatic glucagon or C-terminal glucagon-like immunoreactivity (C-GLI)) vasoactive intestinal peptide (VIP), secretin and insulin. The techniques involved in these hormone assays have been described in full elsewhere (Buchanan 1973).

Patients studied included 100 patients with advanced renal failure (Creatinine clearance less than 10 ml/min); 31 patients undergoing regular haemodialysis therapy, most with negligible renal function (creatinine clearance less that 3 ml/min); 55 patients with functioning cadaver kidney grafts, studied three to 140 months after transplantation, all of whom were receiving azathioprine and prednisolone.

Statistical methods used were the Student t test for analysis of radioimmunoassay data, the non-parametric Mann-Whitney 'U' test for acid secretory data which was not normally distributed, and linear regression analysis with calculation of partial correlation coefficients.

RESULTS

Peptic Ulcer

Table 1 shows the results of gastric assessment in 131 uraemic patients. Of 100 patients with advanced chronic renal failure (CRF) examined by barium meal, 18 of 70 males had an ulcer crater or scar (26 per cent) and 1 of 30 females (3 per cent), a total frequency of 19 per cent. Of 31 patients receiving regular dialysis therapy (RD) and examined by both barium meal and endoscopy, 12 of 20 males had an ulcer crater or scar (60 per cent) and 3 of 11 females (27 per cent), a total frequency of 48 per cent. Thus 34 (26 per cent) of 131 CRF and RD patients had peptic ulcer disease. Of these 34 only one patient had a gastric ulcer, all the rest suffered duodenal ulceration (13 had ulcer craters, 20 had chronic scarring).

TABLE 1

Upper gastrointestinal tract findings in 131 patients with advanced uraemia. (CRF—chronic renal failure; RD—regular dialysis)

Group	*No. of Patients*	*Method of Investigation*	*No. with Ulcer Disease (%)*
CRF	100 (70 Male (30 Female	Radiology	19 Male and Female (19%)
			18 Male (26%)
			1 Female (3%)
RD	31 (20 Male (11 Female	Radiology/Endoscopy	15 Male and Female (48%)
			12 Male (60%)
			3 Female (27%)

Gastric Acid Secretion

Table 2 shows the results of basal and peak acid output (PAO) in 106 patients undergoing treatment for chronic renal failure and in 24 normal subjects. There was no significant difference in mean age (Student t test) or sex distribution (chi-squared

test) between controls and any of the three groups studied. The table shows the results for acid secretion in males and females combined, but the results were similar when the sexes were examined separately.

TABLE 2

*Basal and peak acid output in patients with chronic renal failure (CRF), undergoing regular dialysis (RD) and following renal transplantation (RT). (*compared with controls)*

		Basal Acid Output mmol/hr.			*Peak Acid Output mmol/hr.*		
Group	*No. of Subjects*	*Median*	*Range*	*P**	*Median*	*Range*	*P**
Controls	24	1.2	0—5.5		19.8	0.8—44.8	
C.R.F.	32	2.2	0—9.3	<0.1	22.0	0—51.0	<0.1
R.D.	36	3.6	0—12.1	<0.01	33.1	0—78.0	<0.02
R.T.	38	2.4	0.1—11.4	<0.05	31.9	6.2—69.0	<0.01

Table 3 shows the percentage of hyposecretors (PAO$<$10 mmol/hr) and hypersecretors (PAO$<$30 mmol/hr in females, $<$45 mmol/hr in males) in each group; Figure 1 illustrates individual values for PAO in the four groups, and Figure 2 shows the relationship between PAO and time elapsed post-transplant in the group of 38 renal transplant (RT) patients. Calculation of partial correlation coefficients showed that the negative correlation between PAO and time elapsed post-transplant remained significant ($P<0.02$) after controlling for the influence of age, and that there was no independent relationship between PAO and prednisolone dosage.

TABLE 3

Percentage of hypo—and hypersecretors

Group (Male and Female)	*Hyposecretion*	*Hypersecretion*
Chronic Renal Failure (32)	22%	3%
Regular Dialysis (36)	22%	42%
Renal Transplant (38)	8%	29%

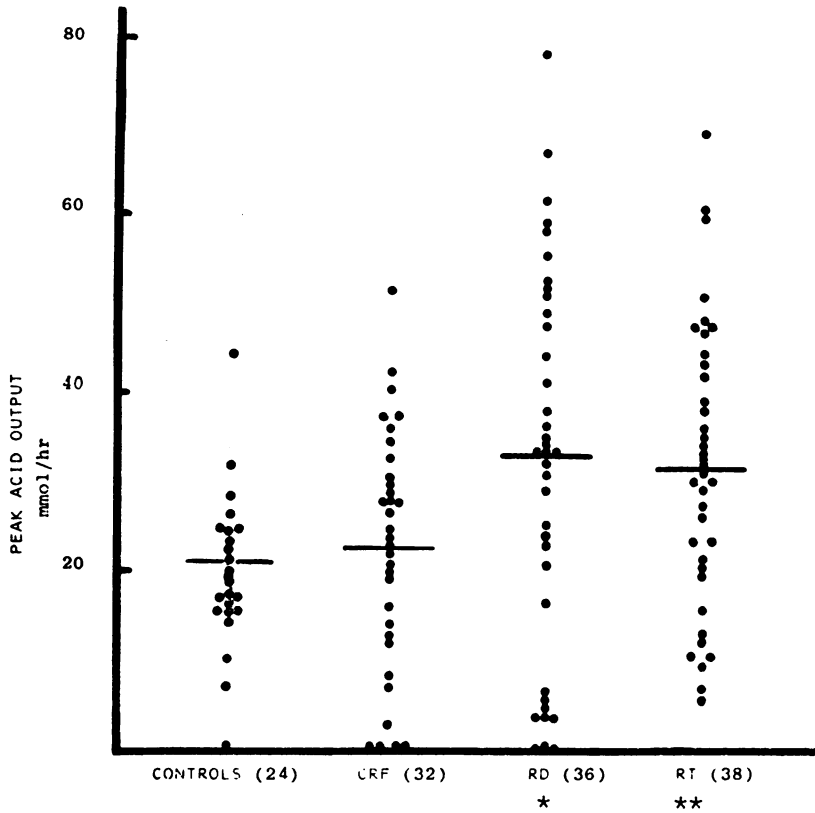


FIGURE 1

*Peak acid output (PAO) in CRF, RD and RT patients compared with normal subjects (*P<0.02, **P<0.01)*

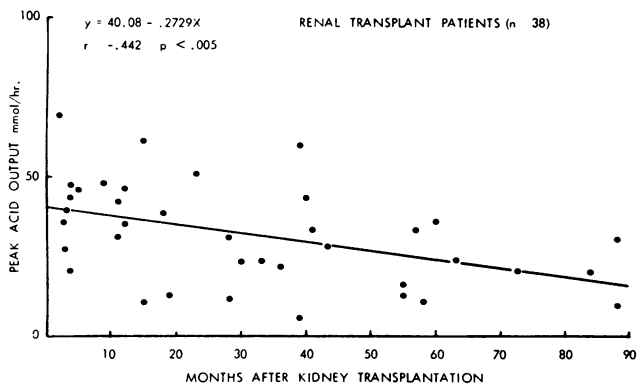


FIGURE 2

Relationship of peak acid output (PAO) and time post-transplant in 38 RT patients

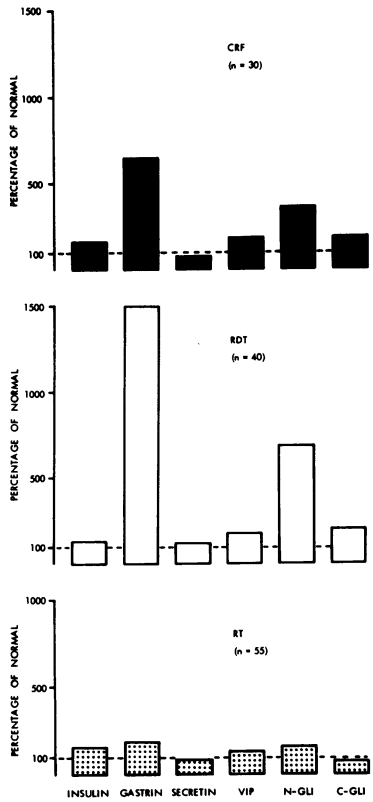


FIGURE 3
Fasting plasma levels of gastrointestinal hormones

Gastrointestinal (GI) Hormones

Figure 3 shows fasting plasma levels of several GI hormones in uraemic patients undergoing dialysis and transplantation, and Figure 4 the effect of a standard mixed meal on plasma gastrin levels in these patients compared with normal subjects. Figure 5 illustrates the influence of hypochlorhydria on fasting plasma gastrin in uraemic patients, and Figure 6 the relationship between plasma gastrin and PAO in RD patients when those with hypochlorhydria are excluded.

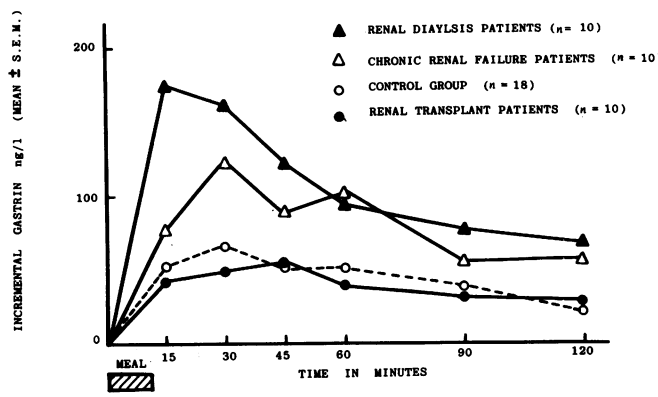


FIGURE 4
Food-stimulated plasma gastrin response

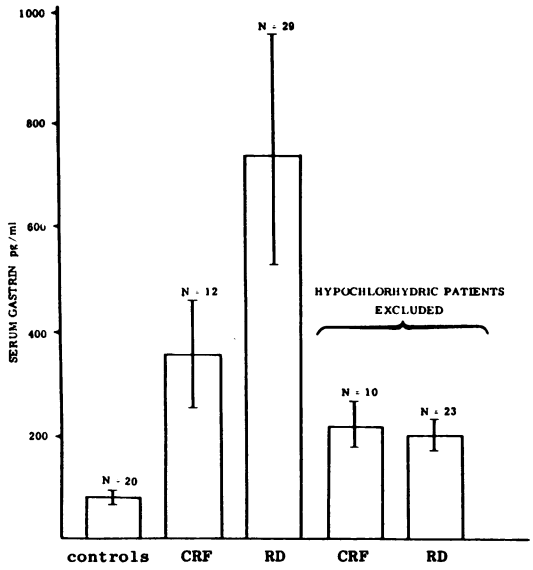
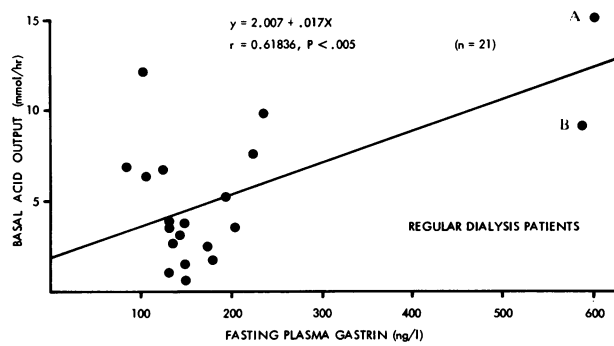


FIGURE 5
The mechanism of hypergastrinaemia in uraemia: role of hypochlorhydria

FIGURE 6
Relationship between fasting plasma gastrin and peak acid output in RD patients (excluding those with hypochlorhydria). Patients A and B had particularly severe ulcer disease (see text).



DISCUSSION

It appears that peptic ulcer is unusually frequent in patients undergoing treatment for chronic renal failure, 34 (26 per cent) of 131 such patients in this study showing either an ulcer crater or scar. Figures were highest (48 per cent) in those undergoing regular dialysis and assessed by radiology and endoscopy, and there was a marked predominance of duodenal ulceration. Other authors have studied the occurrence of peptic ulcer in advanced uraemia but in a review of 19 series comprising a total of 910 uraemic patients (Doherty, 1978) only 97 patients (11 per cent) had peptic ulcer proven by surgery, autopsy or barium meal. However only 145 of these 910 patients were receiving regular dialysis, and 45 (31 per cent) of this group had peptic ulceration. Coarsening of mucosal pattern on the barium meal was remarked upon in several of the studies reviewed, and noted to be a very common feature (65 per

cent in one series). Explanations put forward included mucosal oedema due to hypoproteinaemia (Weiner, Vertez and Shapiro, 1969) and hypertonicity of the muscularis mucosae due to irritation from uraemic gastritis. Connell (1973), in discussing the significance of coarse mucosal folds, states that they are associated with gastric acid hypersecretion and are seen in a high proportion of cases with duodenal ulceration. Patients with x-ray negative dyspepsia who have coarse gastric folds are more likely to have surgery subsequently than patients with normal folds (Krag, 1965). In practice, enlarged mucosal folds can produce deep clefts which may make it difficult to exclude an ulcer niche, and the high frequency of ulcer in the present study may perhaps be due to use of combined radiology and endoscopy.

It is difficult to find reliable figures for the prevalence of ulceration in a non-uraemic population for the purpose of comparison with the patients in this study. Doll and Jones (1951) surveyed a healthy population of 6,047 subjects drawn from the London area and reported the occurrence of ulcer to be 6.4 per cent in men and 1.7 per cent in women. However, they carried out barium meals only on patients giving a history of dyspepsia, whereas all patients in the present study had a barium meal examination. A post-mortem study by Watkinson (1958) estimated that one in six men over the age of 35 had suffered from ulcer at some time, as did one in eight women. Patients in the present study were younger than the subjects of these surveys, and as the prevalence of ulcer increases with age it seems highly probable that there is a real increase in frequency of peptic ulceration in chronic renal failure, especially in patients undergoing regular dialysis.

It is logical therefore to assume that some underlying mechanism connects the two diseases. Explanations suggested have included the psychological stress associated with haemodialysis (Sokol, 1964), secondary hyperparathyroidism (Gingell, 1968) and Chisholm, 1968) and impairment of pancreatic exocrine function (Bartos, Melichar and Erben, 1970). Table 2 shows the results of acid output measured by pentagastrin stimulation in patients with chronic renal failure (CRF), undergoing regular dialysis (RD) and following renal transplantation (RT). While the results are in keeping with the traditional concept of uraemic hypoacidity (22 per cent in the group studied here) they showed that in uraemic patients treated by regular dialysis, gastric acid secretion is in fact greater than in normal subjects (Figure 1) suggesting that acid hypersecretion plays an important role in the association of the two diseases. Why is hypersecretion only apparent in uraemic patients who receive regular dialysis treatment? This is perhaps because dialysis lowers blood urea levels and improves uraemic gastritis, both factors known to influence gastric pH (Von Korff, 1951, Cheli and Dodero, 1958).

What then is the cause of the acid hypersecretion? A possible explanation is found in the effect of renal transplantation on gastric acid output. It is possible that the decline in acid output following renal transplantation (Figure 2) reflects gradual reduction in prednisolone dosage. However, the effect of coricosteroids on gastric secretion is very small (Cooke, 1967) and furthermore, no independent relationship existed between PAO and prednisolone dosage in the patients studied here. Alternatively, as PAO may be considered a measure of parietal cell mass (Card and Marks, 1960), it is reasonable to assume that many patients with advanced uraemia have gastric hyperplasia which subsequently regresses following transplantation.

This phenomenon could represent the effect of associated changes in plasma gastrin, a polypeptide hormone with a trophic effect on gastric mucosa (Johnston, 1974) and dependent in large part on the kidney for removal from the circulation (Clendinnen et al, 1971). Figure 3 illustrates that gastrin levels are significantly elevated in uraemic patients and return towards normal after renal transplantation.

A large number of other gastro-intestinal hormones are known to affect acid secretion and although the physiological role of many awaits clarification, recent studies indicated secretin may be involved in peptic ulceration (Bloom and Ward, 1975) and also that glucagon and insulin merit further consideration (Hansky and Korman, 1973). Figure 3 shows the levels of these hormones in uraemic patients compared to normal subjects. A deficiency of hormones with acid inhibitory activity (such as secretin) could conceivably lead to acid hypersecretion but such a deficiency is not apparent from the data here. It would appear, therefore, that elevated gastrin levels are the most important hormonal factor in the high acid output of these patients.

In Figure 4 the food stimulated gastrin response in uraemic patients is compared with that of normal subjects. It shows that the rise in circulating gastrin after a meal is greater and more prolonged in CRF and in RD patients, while patients with transplants behave similarly to the normal control group.

It is difficult, however, to relate plasma gastrin levels in uraemic patients to measurements of gastric acid secretion. Figure 5 illustrates that hypochlorhydria contributes to elevation of plasma gastrin levels in uraemic patients, and that the elevation is of lesser degree among patients with normal or increased acid secretion. Although there was a relationship between plasma gastrin and acid output in the RD group from which hypochlorhydric patients were excluded (Figure 6), it is obvious that the correlation is unduly biased by patients A and B. However, it is interesting that both these patients had a form of ulcer disease resembling the Zollinger-Ellison syndrome in severity. It is possible, therefore, that circulating gastrin influences resting acid output in RD patients, but study of greater numbers of patients is necessary to clarify this point.

Upper gastrointestinal complications account for 7.5 per cent of deaths following renal transplantation (Gurland, 1973), and the frequency of ulcer in this study emphasises the importance of pre-operative gastric assessment. The decline in acid output following transplantation suggests that prophylactic vagotomy is unnecessary for uncomplicated ulcer, while favourable preliminary results with cimetidine in patients undergoing dialysis (Doherty et al, 1977) and following transplantation (Doherty et al, 1979) suggest it may prove a suitable alternative.

SUMMARY

Duodenal ulcer is commoner in patients with chronic renal failure especially in those receiving regular dialysis and gastric acid hypersecretion appears to have an important role which may be (in part at least) hormonally mediated. There are abnormal levels of several circulating hormones of the gastro-intestinal tract, of which gastrin appears to be the most important. This hormone may directly influence resting acid secretion and may indirectly affect stimulated acid secretion by a trophic effect on gastric mucosa. Successful renal transplantation tends to

return abnormal gastric function in these patients towards normal. These findings are relevant to the treatment of peptic ulcer in uraemic patients and the prevention of upper gastrointestinal complications after renal transplantation.

ACKNOWLEDGEMENTS

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PROGRESS OF THE ROYAL COLLEGE OF GENERAL PRACTITIONERS ESPECIALLY IN NORTHERN IRELAND

by

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Course Organiser

Northern Ireland Vocational Training Scheme for General Practice

ON 19th November, 1977 the Royal College of General Practitioners celebrated its Silver Jubilee. In 1952 morale in general practice was low. Most general practitioners worked in isolation from inadequate premises, dealing with an increasing volume of minor illnesses and caring for many seriously ill patients in their own homes. As hospital facilities and staffing improved in the late 1940s, the status of family doctors decreased. The College was founded to "Encourage, foster and maintain the highest possible standards in general medical practice".

AIMS

This paper outlines what the College has achieved particularly in Northern Ireland, the reasons our members joined the College, their worries about the future and their active participation in the local faculty.

METHOD

The achievements of the Royal College of General Practitioners have been reviewed. The Northern Ireland list of general practitioners was assessed from the aspects of College membership, area of practice and year of graduation. A questionnaire was posted in 1978 to all College members residing in Northern Ireland. Four weeks later a reminder was sent to those practitioners who did not reply. One hundred and fifty-nine (70 per cent) replies were obtained.

RESULTS

The achievements of the Royal College of General Practitioners may be summarised as—

1. *Research*

Morbidity studies have established that about 90 per cent of illness episodes are dealt with entirely by general practitioners and that the pattern of illness is significantly different from that observed in hospital. These studies have been facilitated by College research units, which have been set up in Birmingham, Manchester, Dundee and Swansea, to collect and process data from general practices. The value of this was later seen when the Royal Commission on Medical Education (1968) accepted the College evidence (Royal College of General Practitioners, 1966) that general practice was a subject in its own right, that there was a need for departments of general practice in the universities and that there was a need for a programme of vocational training for general practice.

2. *Undergraduate Teaching*

Of the twenty-nine clinical medical schools in the United Kingdom, all now include general practice teaching as a formal part of the curriculum. The first chair in this subject was established in Edinburgh in 1963. There are now 11 professors, 2 readers and some 30 senior lecturers in the United Kingdom. The Chair of General Practice in the Queen's University of Belfast was established in 1971. The Staff of the Department now consists of 1 professor, 2 senior lecturers, 2 senior tutors and 8 part-time lecturers; all are College Members. The Department is supported by 99 teachers in practices. Sixty per cent of these are College Members. The teaching commitment is 92 hours for each student. As well a 2 week period is spent in practice attachment in each of the last two years of the undergraduate curriculum.

3. *Vocational Training*

In 1972 the College published "The Future General Practitioner, Learning and Teaching". This major work outlined the content of general practice and the educational aims of vocational training. A training scheme started in Northern Ireland in 1968. Following registration the trainee now begins a three year course of study. The first two years are spent in approved hospital posts and the third year is spent with a general practitioner teacher. In 1978 there were 65 general practitioners in Northern Ireland, who were approved teachers. Of these 46 (70 per cent) are College Members. On one day each week the trainee attends a day-release course in either Belfast or Londonderry. There is an associate advisor of general practice and four course-organisers who plan and run the study days with assistance from the Regional Advisor and the Department of General Practice, Queen's University of Belfast. There are now 107 doctors in the three year scheme and of these 52 are female.

4. *Membership Examination*

Since 1968 entrance to the College has been by examination. 788 candidates sat this examination in 1978 and 70.2 per cent passed, including 18 doctors from Northern Ireland.

There are 227 Fellows, Members and Associates of the College in Northern Ireland out of a total of 717 general practitioners. The distribution in each of the four area boards is as in Table 1.

TABLE 1

Area	*All General Practitioners*	*College Members*	*Per cent*
Eastern	309	126	40
Northern	167	57	34
Southern	127	27	21
Western	114	17	15
TOTAL	717	227	32

The age structure can be obtained by looking at the number of years since graduation. Table 2 gives the numbers in groups of 10 years.

TABLE 2

The Number of Years Since Graduation

Years Qualified	*General Practitioners in Practice*	*College Members*	*Per cent*
0—10	150	43	29
11—20	154	42	27
21—30	193	55	28
31—40	197	68	34
41—50	19	12	—
51—60	4	7	—

All College members were asked by questionnaire "Why did you join the College?—be candid" one hundred and seventy-six reasons were given by the respondents (Table 3).

TABLE 3

Candid reasons for joining the College

			Per cent
(a)	Educational Benefit	45	26
(b)	Approval of basic philosophy	30	17
(c)	To help improve image of general practice	27	15
(d)	Automatic on completion of training	23	13
(e)	For qualifications and self prestige	22	13
(f)	Other	25	14
	Blank	4	2

Between May, 1977 and April, 1978 the College held ten academic meetings and the Faculty Board met five times. Table 4 gives the number of meetings that individual members attended out of a possible 15 during this period.

TABLE 4

Number of Meetings	1—3	4—6	7—9	10—12	13—15
Number of Members who attended the above number	37	9	12	5	2

College Members were asked on the questionnaire to tick reasons for non-attendance at meetings. One hundred and thirty-nine members gave 297 reasons (Table 5).

TABLE 5

Reasons for non-attendance at meetings

			Per cent
1.	Too busy	78	26
2.	Family commitments	68	23
3.	Venue unsuitable	43	15
4.	Lack of interest	30	10
5.	More interested in non-medical meetings	18	6
6.	More interested in other medical meetings	15	5
7.	Other reasons	45	15

Another question was "What anxieties have you about general practice in the 1980s?". One hundred and forty-three reasons were obtained from 117 members (Table 6).

TABLE 6

Anxieties about General Practice in the 1980s

			Per cent
(a)	A decline in image/status of general practice due to inadequate facilities, e.g. x-rays	55	38
(b)	Increasing bureaucracy/loss of personal service	47	33
(c)	Deterioration of patient care, e.g. due to greater demand	41	29

DISCUSSION

The great strength of the College is that it is too young to have become institutionalised and complacent. Among possible future areas of development of General Practice in which the College should be involved are—

1. *Undergraduate Education*

Pathology and disease orientated medicine represents a narrow view of illness and patient centred medicine should play a greater part in the training of future doctors.

2. *Vocational Training*

At present a doctor is at least four years qualified when he completes training. Only one year is spent in general practice. Many hospital rotations are unsatisfactory: for example, only half the trainees in Northern Ireland have held senior house officer posts in paediatrics. As teaching facilities in general practice improve more training should take place in teaching practices and less emphasis will be placed on the service role of the trainee.

3. *Accreditation*

At the end of training some form of assessment will become mandatory before a doctor can become a principle in general practice. With its experience of the membership examination the College will be in a strong position to assist with this assessment.

4. *Peer Group Review*

As a result of training and in response to public pressure, doctors will begin to look more critically at their work and learn to accept criticism from colleagues. This process is already well established in North America.

5. *Research*

Project work forms part of the present general practice training programme. This entails developing expertise in collecting and processing data. The logical development is to use this skill to increase the volume of general practice research. Again the College is ideally suited to foster, encourage and co-ordinate this work.

One-third of the general practitioners in Northern Ireland are members of the Royal College of General Practitioners and three-quarters of these members work in the Eastern and Northern Area Boards. The ratio of College members to the total number of general practitioners is remarkably constant in each decade of working life. Although 58 per cent of the reasons given for joining the College were of an academic nature, 162 (71 per cent) of the members did not attend an academic College activity during the year of review. The reasons given for non-attendance indicate the tremendous challenge that organisers of medical meetings have to cope with if they are to increase the numbers going to their meetings.

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DRINKING PATTERNS OF YOUNG PEOPLE IN NORTHERN IRELAND

by

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RECENT surveys of drinking habits in both Great Britain (Stacey and Davies, 1970; Ritson, 1975; Kinder, 1977) and Ireland (Fitzpatrick, 1972; Irish Council of Churches, 1974) have indicated that, whereas the majority of teenagers drink in moderation and responsibly, the minority who drink heavily experience problems and are a major cause of concern. The work of Blaney and McKenzie (1979) on adults in Northern Ireland has recently drawn further attention to the problem of excessive use of alcohol.

MATERIAL REVIEWED

The findings reported in this paper arise from a general investigation of the association between the knowledge and the stated behaviour over a wide range of health matters of fifth-formers in Northern Ireland conducted in 1976-77 (McGuffin, 1979). A coded-answer knowledge test, which included four items on alcohol, and a behaviour questionnaire, which included a section on the use of alcohol, were administered to a sample of 2439 fifth-formers (average age 15.95 years). These were the fifth-formers in a random sample, drawn from the rolls of all the grammar and secondary schools in the province prepared to take part in the inquiry, who were present on the day the papers were administered. Of the 247 schools invited, 167 (67.6 per cent) participated and of the drawn sample of 3150, 711 (22.6 per cent) were absent. Although every effort was made to obtain a sample statistically representative of the fifth formers in the province, this proved impossible for two reasons. A number of principals declined to participate, most because of lack of time or administrative difficulties and some because they objected to certain aspects of the questions. In particular, the questions on use of alcohol were unacceptable to a few principals who take a definite anti-drink approach and considered it was not appropriate to ask such questions of their pupils. Other principals considered that the questions on the drinking habits of parents and siblings would unduly invade family privacy. Absence on the day the papers were administered accounted for 22.6 per cent of the drawn sample not participating. In some cases, this was due to illness or travel difficulties but there was evidence that, especially in secondary schools, some of the absentees were regular truants. The major consequence of these factors is that the data obtained from the analyses cannot be extra-polated to give statistically reliable figures for 16 year olds generally in the province. Nevertheless, several important trends and patterns are indicated.

RESULTS

The first question in the section on alcohol in the questionnaire asked whether or not the subject used alcoholic beverages. Those who drank were then asked about the age of taking the first drink, the frequency of drinking, the type of beverage taken, and where drink is usually consumed. The results are summarised in Tables I-IV, comparisons between the sexes, and between pupils in different types of school being given where these are of interest.

TABLE I

Incidence of drinking

Total number in survey			2439
Drinkers			1364 (55.9%)
Boys	62.5%	Girls	50.0%
Grammar	58.2%	Secondary	54.9%
Urban	59.5%	Rural	53.7%
Protestant	68.5%	Catholic	41.3%
Abstainers			1003 (41.2%)
Past users			26 (1.1%)
No reply			46 (1.8%)

TABLE II

Drinking patterns (Figures in percentages)

Age of starting	Before 10 years	1.8
	10-11	3.8
	12-13	21.5
	14	30.9
	15	53.7
	over 15	8.1
	Mean age	13.96 years
Frequency in previous year	Once	14.4
	Twice	14.0
	3-6 times	21.9
	6-12 times	15.6
	2-3 times/month	14.4
	at least once a week	19.7

More than 6 times

Boys	56.8%	Girls	41.0%
Grammar	53.3%	Secondary	48.2%
Urban	52.8%	Rural	47.5%
Protestant	52.3%	Catholic	43.3%

Type of beverage

Total		Boys		Girls	
Beer	31.3	Beer	47.5	Vodka	39.3
Vodka	27.4	Vodka	16.8	Cider	13.6
Cider	14.0	Cider	14.3	Beer	13.5

Source of first drink	Friend	30.4	Off licence	11.8
	Parent	27.9	Licenced premises	10.5
	Adult relative	13.0	Taken at home	6.4

TABLE III

Usual place of drinking (Figures in percentages)

	Total	Friend's house	23.3	Hotels	17.8	
		Home	21.9	Clubs	16.6	
		Elsewhere*	20.3			
Boys	Friend's house	25.5	Elsewhere	24.6	Home	19.8
Girls	Home	24.3	Hotels	22.7	Friend's house	20.9
Grammar	Home	28.3	Hotels	19.6	Elsewhere	18.3
Secondary	Friend's house	25.7	Elsewhere	21.2	Home	19.0
Urban	Friend's house	26.5	Home	21.6	Elsewhere	18.4
Rural	Home	22.1	Elsewhere	21.8	Friend's house	21.0
Protestant	Home	23.4	Friend's house	23.0	Elsewhere	19.4
Catholic	Friend's house	24.2	Elsewhere	22.6	Hotels	19.3

*'Elsewhere' was described as the open-air by the majority of subjects who selected this answer.

TABLE IV

Relationship between drinking habits of subjects and those of parents, siblings and peers.

		Subject		
		Drinks	Does not drink	Yule's Coefficient Q
Father	Drinks	43.2	23.5	0.54
	Does not drink	11.8	21.4	
Mother	Drinks	34.0	12.1	0.63
	Does not drink	20.9	33.0	
Older brothers	None drink	48.3	38.9	0.24
	Some drink	4.6	8.2	
Older sisters	None drink	48.2	33.8	0.42
	Some drink	6.6	11.4	
Peers	Few drink	13.6	34.6	0.84
	Half or more drink	42.5	9.3	

Those who used alcohol were asked which of eight listed reasons applied to them. Only two of the reasons applied to more subjects than they did not apply to. While 854 (62.5 per cent) liked the taste, 261 said this was not a reason for their drinking and 606 (44.4 per cent) drank because most of their friends did, while for 437 this did not apply. The other most frequently quoted reasons were that drinking relieves tension and anxiety (29.9 per cent), and it makes one feel adult (20.7 per cent). Equal numbers (14.9 per cent) claimed that they drank because they had nothing else to do and because drinking helped them to talk better. Eighty four subjects (6.1 per cent) stated that they drank because they had plenty of money. The only marked

difference in the reasons given by subjects, classified by sex or type of school, as indicated by rank order of frequency was that girls ranked 'it helps me to talk better' fourth and for boys it ranked seventh.

Those who did not use alcoholic beverages were asked to indicate which of the listed reasons applied to them. Of the six reasons, five applied to more subjects than they did not apply to. The most frequently given reason was the parents would not approve (733, 71.0 per cent). The number who never felt any inclination was 696 (67.4 per cent) and for 580 (56.2 per cent) drinking would be too expensive. Very few of the friends of 517 (50.1 per cent) drank; while 467 (45.3 per cent) indicated that they did not like the taste of alcoholic beverages. While 271 of the total abstainers (26.3 per cent) disapproved of drinking on religious grounds, 421 did not abstain for this reason. The rank order of reasons as given by subjects of different sex and in different types of school were almost identical.

In the knowledge test, the items were scored one mark for each correct answer, the average score on the four items on alcohol being 1.38. Table V sets out the results and the answers given to the questions. The only conspicuous difference in the answering of these questions by subjects in different categories was that in every case pupils in grammar schools scored significantly better ($p<0.01$) than those in secondary schools.

TABLE V

The knowledge on alcohol (Figures in percentages)

Score obtained (out of 4)			**Item 1**	
	0	6.6	The highest percentage of alcohol is	
	1	56.0	contained in A beers	4.5
	2	30.6	B shandies	0.9
	3	6.2	C spirits	**88.5**
	4	0.6	D wines	5.0
			No answer given	1.1

Item 2
In terms of alcohol content how much beer is roughly equivalent to a 'half-un' of whiskey?

A	one bottle	**12.5**
B	3 bottles	46.6
C	5 bottles	25.2
D	7 bottles	10.0
No answer given		5.7

Item 3
After half a dozen drinks the body system most adversely affected is

A	blood circulation	38.2
B	respiratory	7.9
C	nervous	**19.9**
D	genito-urinary	29.3
No answer given		4.7

Item 4
In this item subject has to indicate whether each statement was true or false.
A person's behaviour is likely to be affected more quickly by drinking alcoholic beverages if

1	drinks are mixed	false	27.7
2	drinks are taken in an empty stomach	true	71.8
3	the drink is sipped over a long period	false	93.1
4	the person is not used to alcoholic drinks	true	86.3

An investigation to find if any association existed between the level of knowledge and the drinking behaviour of the subjects was conducted. The items on the knowledge test were weighted according to difficulty and the subjects then divided into five groups, as nearly equal in size as possible. On the basis of the answer to the question about frequency of drinking, subjects were divided into three categories, those who never drank, those who drank only once or twice in the preceding year and those who drank more often than this. A cross tabulation was prepared and an association between knowledge and positive drinking behaviour, significant at the one per cent level ($X^2 = 48.4$; $ndf = 8$, $p < 0.01$) was established. A similar result was obtained for boys, girls, grammar school pupils, secondary school pupils, those who attended rural schools and those who attended mainly Protestant schools separately. Only those in urban schools and those in mainly Catholic schools did not show an association significant at this level.

DISCUSSION

The number of subjects taking alcoholic beverages (55.9 per cent) was very much lower than figures quoted in some recent reports. In Somerset, Kinder (1977) found that 75 per cent of 15 year olds drank alcohol and in a town in North West Ireland, 80 per cent of the 14-17 age group were reported as 'drinkers' (Irish Council of Churches, 1974). In a major investigation recently published, Hawker (1978) found that 98 per cent of her sample of 13-18 year olds in English schools had tasted alcoholic drink, and only 7 per cent had not continued beyond an initial taste. A higher percentage of boys than girls were drinkers (62.5 and 50.0 per cent, respectively), as has been generally found. The conspicuous differences in the percentage of Protestants and Catholics who were drinkers (65.8 and 41.3 per cent, respectively) may be explained by the custom of Catholic bishops, in their address at Confirmation Service, to emphasise the desirability of total abstinence, at least until adulthood. Although some of the Protestant denominations, such as Methodist and Baptist, lay great emphasis on total abstinence, these include in their membership only a small percentage of all Protestants.

The use of alcoholic drink begins about the age of 9 and the percentage beginning to drink increases with each year of age. About one half (50.3 per cent) of those in the sample who were drinkers had taken alcohol on 6 or fewer occasions in the year preceding the inquiry. It would appear that these had probably taken alcohol only on special occasions. A parent or relative was the source of the first drink in the case of 40.9 per cent of the subjects. This compares with 50 per cent being given their first drink by parents at home in Hawker's study. Whereas in this study the largest group (23.3 per cent) generally drank in a friend's house, 21.9 per cent at home and 20.3 per cent 'elsewhere', about half of Hawker's sample drank at home and almost always with the family, 42 per cent in a pub, disco or party and only 5 per cent in the open air. The patterns shown by the two studies are distinctly different, and point to less parental supervision in Northern Ireland and much greater apparently unsupervised drinking in the open air. The fact that 34.4 per cent claimed to generally drink in hotels or clubs would indicate considerable violation of the licencing laws. The most usual reasons for drinking were quoted as liking the taste (62.5 per cent) and because most of their friends drank (44.4 per cent).

These figures are a cause of considerable concern, in terms of the consequences of the use of alcohol. While alcoholism is a long term possibility, more immediate consequences, such as road traffic accidents and violent behaviour are often reported. Evans (1978) in commenting on Hawker's work and Rice (1978) draw attention to the need for further research into the situations involving alcohol which young people face and the development of educational programmes to give young people the skills necessary to deal constructively with them.

Parental disapproval was the reason most frequently quoted for not drinking alcohol (71.0 per cent of non drinkers). Almost as many (67.4 per cent) claimed they never felt any inclination and the least frequently quoted reason (26.3 per cent) was disapproval on religious grounds. It appears from the answers generally that parents have a considerable influence on the drinking habits of their offspring. In some cases, this takes the form of introducing the young people to drink in the home under supervision and only on special occasions, while in others disapproval and probably example, leads to total abstinence (at least until the age of 16). However, the evidence shows a greater association between the behaviour of subjects and that of their peers than between subjects and members of their family. This is a general finding, but raises the question, as to whether the peer group is chosen because its general mode of behaviour matches that of the subject or the behaviour of the individual is influenced by that of the peer group.

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HLA ANTIGENS IN ASYMPTOMATIC DIABETES. A 10-YEAR FOLLOW-UP STUDY OF POTENTIAL DIABETES IN PREGNANCY AND GESTATIONAL DIABETES

by

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INTRODUCTION

BOTH genetic and environmental factors have been implicated in the pathogenesis of diabetes mellitus. Juvenile-onset diabetes mellitus has been shown to be associated with increased frequencies of HLA-B8 and HLA-B15 (Nerup et al, 1974; Cudworth and Woodrow, 1975) and it is believed that a major genetic factor in this type of diabetes is the presence of a diabetogenic gene or genes linked to the major histocompatibility complex. While twin studies have suggested that genetic factors are also important in maturity-onset diabetes (Tattersall and Pyke, 1972) a definite association between antigens of the major histocompatibility complex and maturity-onset diabetes has not been demonstrated (Nerup et al, 1974; Cudworth and Woodrow, 1976).

Studies of genetic factors in diabetes mellitus have hitherto been confined mainly to symptomatic diabetes rather than asymptomatic diabetes, such as that which may occur in pregnancy. The relationship between this form of asymptomatic diabetes and symptomatic diabetes mellitus in later life is poorly understood. In particular, although some women with transiently abnormal glucose tolerance in pregnancy eventually develop symptomatic maturity-onset diabetes, it is uncertain whether they are at greater risk of doing so than the normal population (O'Sullivan, 1975; Hadden, 1979). Genetic factors may have a role in either the pathogenesis of asymptomatic diabetes in pregnancy or its subsequent progression to symptomatic maturity-onset diabetes.

As part of a long-term follow-up study (Hadden, 1979) we have examined the frequencies of HLA-B8 and HLA-B15 in women who had transiently abnormal glucose tolerance in an index pregnancy i.e. "gestational diabetics" and women regarded as having "potential diabetes in pregnancy" on the basis of selection criteria during the index pregnancy (previous big baby, family history of diabetes, etc) and have correlated our findings with the results of oral glucose tolerance tests 10 years later.

PATIENTS AND METHODS

Two groups of patients were studied. Group 1 consisted of 32 patients who had been classified during an index pregnancy as having "potential diabetes in pregnancy" and who were found to have an abnormal glucose tolerance test (GTT) at 10 year follow-up. This group was obtained from 625 patients attending the Antenatal Clinic of the Royal Maternity Hospital, Belfast between 1963 and 1965 who fulfilled one or more of the criteria for the diagnosis of potential diabetes in pregnancy in previous pregnancies or in the index pregnancy (Hadden and Harley, 1967). Of these, 234 attended for a 50g oral GTT 10 years later as part of a long term follow-up study and 32 were found to have abnormal glucose tolerance (2 hour plasma glucose greater than 7.2 mmol/1) (Hadden, 1979). Tissue typing was carried out in all of these 32 patients.

Group 2 consisted of 83 patients who had been classified during an index pregnancy as having "gestational diabetes". Between 1966 and 1968 over 1000 mothers attending the Antenatal Clinic of the Royal Maternity Hospital, Belfast fulfilled the selection criteria for the diagnosis of potential diabetes in pregnancy and had either an intravenous GTT or a cortisone-stressed oral GTT (Hadden et al, 1971). Of these 216 were shown to have an abnormal GTT in the index pregnancy. Frankly diabetic patients were excluded from the study. Ninety-three of these patients attended for a 50g oral GTT 10 years later. Tissue typing was carried out in 83 of these patients, 15 of whom had an abnormal GTT at follow-up.

At follow-up 10 years after the index pregnancy the patients were classified according to the results of a 50g oral GTT as "normal" (2 hour plasma glucose less than 7.2 mmol/1), "borderline" (2 hour plasma glucose 7.2—8.29 mmol/1) or "diabetic" (2 hour plasma glucose greater than 8.3 mmol/1). All patients with 2 hour plasma glucose greater than 7.2 mmol/1 were considered to be "abnormal".

Two hundred normal blood donors resident in the same geographical area and tissue-typed concurrently with the patients were used as controls. Typing for HLA-B8 and HLA-B15 was carried out by a standard microlymphocytoxicity test. In each instance not less than 3 different antisera of each specificity were used. Antisera against HLA-B15 were obtained from the National Tissue Typing Reference Laboratory, Bristol. Antisera against HLA-B8 were obtained locally and their specificity was checked in two other laboratories. Statistical analysis was carried out using the exact probability test.

RESULTS

Of the 32 patients (group 1) with potential diabetes in pregnancy who had abnormal GTT's 10 years later, 9 were classified as diabetic and 23 as borderline. The frequencies of HLA-B8 and HLA-B15 in this group compared with the 200 control subjects are shown in Table I. A significantly increased frequency of HLA-B15 but not HLA-B8 was found in this group compared with control subjects. This difference was due solely to the frequency of HLA-B15 in those patients classified as borderline.

TABLE I

Frequencies of HLA-B8 and HLA-B15 in 32 patients with potential diabetes in pregnancy who had abnormal glucose tolerance tests at follow-up compared with 200 control subjects.

		HLA-B8			HLA-B15		
	Number studied	*Number positive*	*Per cent positive*	*Probability*	*Number positive*	*Per cent positive*	*Probability*
Blood donors	200	69	34.5	—	9	4.5	—
Abnormal at follow-up	32	9	28.1	0.4277	6	18.8	0.0087
(i) Diabetic at follow-up	9	3	33.3	0.9999	0	0	0.9998
(ii) Borderline at follow-up	23	6	26.1	0.3666	6	26.1	0.0017

Of the 83 patients (group 2) with gestational daibetes, 7 were classified as diabetic, 8 as borderline and 68 as normal on the basis of their follow-up GTT's. The frequencies of HLA-B8 and HLA-B15 in this group compared with the 200 normal control subjects are shown in Table II. In the group as a whole and in those who were classified as normal at follow-up, but not in those who were abnormal at follow-up, the frequency of HLA-B8 was significantly decreased. The frequency of HLA-B15 in this group was nearly twice that of the control population, but this increase was not statistically significant.

TABLE II

Frequencies of HLA-B8 and HLA-B15 in 83 gestational diabetics compared with 200 control subjects.

		HLA-B8			HLA-B15		
	Number studied	*Number positive*	*Per cent positive*	*Probability*	*Number positive*	*Per cent positive*	*Probability*
Blood donors	200	69	34.5	—	9	4.5	—
Gestational diabetics	83	17	20.5	0.0106	7	8.4	0.2561
(a) Normal at follow-up	68	13	19.1	0.0097	6	8.8	0.2203
(b) Abnormal at follow-up	15	4	26.7	0.5806	1	6.7	0.5226
(i) Diabetic at follow-up	7	1	14.3	0.4249	0	0	0.9999
(ii) Borderline at follow-up	8	3	37.5	0.9998	1	12.5	0.3304

Of the 115 patients (groups 1 and 2) studied, 47 had an abnormal GTT at follow-up i.e. they had asymptomatic diabetes 10 years after an index pregnancy in which they had potential diabetes in pregnancy or gestational diabetes. The relative

frequencies of HLA-B8 and HLA-B15 in these asymptomatic diabetics are shown in Table III. Once again there was a significant increase in the frequency of HLA-B15 compared with control subjects and this increase was due solely to those patients classified as borderline at follow-up. There was however, no statistically significant difference between the frequency of HLA-B15 in the borderline group compared with the diabetic group ($p = 0.0782$) or with the group who were normal at follow-up ($p = 0.1044$).

TABLE III

Frequencies of HLA-B8 and HLA-B15 in 47 patients with either potential diabetes in pregnancy or gestational diabetes who had abnormal glucose tolerance tests at follow-up compared with 200 control subjects.

		HLA-B8			*HLA-B15*		
	Number studied	*Number positive*	*Per cent positive*	*Probability*	*Number positive*	*Per cent positive*	*Probability*
Blood donors	200	69	34.5	—	9	4.5	—
Abnormal at follow-up	47	13	27.7	0.3062	7	14.9	0.0170
(i) Diabetic at follow-up	16	4	25.0	0.4269	0	0	1.0000
(ii) Borderline at follow-up	31	9	29.0	0.5443	7	22.6	0.0019

DISCUSSION

In this study HLA-B15 appears to be associated with abnormal glucose tolerance 10 years after an index pregnancy in which a woman was considered to have either gestational diabetes or potential diabetes in pregnancy. The frequency of HLA-B15 in these patients was comparable with that found in juvenile-onset diabetes in several series (Nerup et al, 1974; Cudworth and Woodrow, 1975) and in addition the frequency of HLA-B15 in our Northern Ireland control population was almost identical to that found in a large series in the Bristol area (Middleton and Martin, 1978). In contrast the frequency of HLA-B15 was only slightly increased in an unselected series of gestational diabetics. Although an unselected series of patients with potential diabetes in pregnancy was not examined in this study a similar absence of any significant HLA association might be expected especially since potential diabetes in pregnancy comprises a very heterogeneous group of patients. In this study therefore the increased frequency of HLA-B15 is associated with asymptomatic diabetes in middle life rather than with the original criteria for inclusion in the follow-up study. This study does not, however, suggest a correlation between HLA-B15 and progression from gestational diabetes or potential diabetes in pregnancy to symptomatic maturity-onset diabetes. In our series of patients who have now been followed from 10 to 15 years the incidence of symptomatic diabetes is very low and may be no greater than would be expected in a comparable group of the female population (Hadden et al, 1979). We cannot predict whether our patients who now have abnormal oral GTT's will eventually become symptomatic maturity-onset diabetics but prolonged follow-up is obviously required.

There have been several studies of the frequency of HLA antigens in maturity-onset diabetes but, in contrast to juvenile-onset diabetes no definite association with any HLA antigen has been found (Nerup et al, 1974; Cudworth and Woodrow, 1976). The association of asymptomatic diabetes with an increased frequency of HLA-B15 in this study therefore favours the suggestion that asymptomatic glucose intolerance does not necessarily progress to symptomatic maturity-onset diabetes. In this respect it is of interest that the increased frequency of HLA-B15 occurs predominantly in those women whose glucose tolerance tests were classified as "borderline" rather than "diabetic". It is thus possible that this study has revealed two subgroups of asymptomatic diabetes; (a) those with diabetic glucose tolerance tests in whom there is no HLA association and who may eventually become symptomatic maturity-onset diabetics and (b) those with mildly abnormal glucose tolerance tests associated with an increased frequency of HLA-B15 and in whom the outcome is uncertain.

A rather unexpected finding in this study was the decreased frequency of HLA-B8 in those patients with gestational diabetes compared with the control population, the difference being due mainly to the decreased frequency of HLA-B8 in those patients with gestational diabetes who had normal glucose tolerance at follow-up. This appears to be a true decrease in the frequency of HLA-B8 in the gestational diabetics rather than a falsely high frequency of HLA-B8 in the control population since the frequency of HLA-B8 has recently been shown to be higher in Northern Ireland, in common with other parts of Ireland, compared with other areas in the British Isles (Middleton and Martin, 1978). No obvious explanation exists for the decreased frequency of HLA-B8 in the gestational diabetics but it is perhaps relevant that patients who were already frankly diabetic during the index pregnancy and who might be expected to have an increased frequency of HLA-B8 were excluded from the study.

In most instances in which an increased frequency of HLA-B15 has been associated with symptomatic diabetes there has been a concomitant increase in the incidence of HLA-B8 (Nerup et al, 1974; Cudworth and Woodrow, 1975). Cudworth and Woodrow (1976) found that in juvenile-onset diabetics the relative risk was additive when both HLA-B8 and HLA-B15 were present. They suggested that this finding was in favour of there being more than one HLA-linked gene, possibly operating by different mechanisms, involved in the pathogenesis of juvenile-onset diabetes. It may therefore be that our patients in whom HLA-B15 is associated with asymptomatic impaired glucose tolerance have lacked an additional genetic or environmental factor which would have favoured the development of juvenile-onset diabetes. In favour of this suggestion is the finding of Nelson et al (1975) that there is an increased frequency of HLA-B15 but not HLA-B8 in identical twins discordant for juvenile-onset diabetes. This suggests that an HLA-B15 linked diabetogenic gene may not necessarily be phenotypically expressed.

The mechanisms by which HLA-linked disease susceptibility genes result in expression of the disease concerned are uncertain but one possibility is that such genes determine susceptibility to virus infection. There is good evidence that virus infection can result in diabetes in experimental animals (Craighead, 1975) but in human diabetes the evidence in favour of initiating virus infection e.g. by Coxsackie

B4 virus, is much weaker (Gamble, Taylor and Cumming, 1973; Hadden et al, 1972). Cudworth et al (1977) have produced evidence that HLA-B15 positive juvenile-onset diabetics have higher neutralising antibody titres to Coxsackie virus types B1—B4 at the time of diagnosis. Antibody titres to Coxsackie virus were not determined in this study. Further work is required to determine the mechanism by which the presence of HLA-B15 or an HLA-B15 linked gene may lead to the development of asymptomatic diabetes mellitus.

SUMMARY

In a 10-year follow-up study the frequencies of HLA-B8 and HLA-B15 were examined in women classified in an index pregnancy as having potential diabetes in pregnancy or gestational diabetes. In 32 patients who had been considered as having potential diabetes in pregnancy and who had an abnormal GTT ten years later, the frequency of HLA-B15 (18.8 per cent) was significantly increased compared with 200 control subjects (4.5 per cent; $p = 0.0087$). In 83 patients originally classified as having gestational diabetes, 15 of whom had an abnormal GTT ten years later, the frequency of HLA-B15 (8.4 per cent) showed a small increase compared with controls (4.5 per cent; $p = 0.2561$) while the frequency of HLA-B8 (20.5 per cent) was significantly lower than controls (34.5 per cent; $p = 0.0106$).

Of a total of 115 patients studied 47 had an abnormal GTT at follow-up and in these 47 patients the frequency of HLA-B15 was also significantly increased compared with controls (14.9 per cent; $p = 0.017$). This increase was most marked in those women with borderline GTT (22.6 per cent; $p = 0.0019$).

ACKNOWLEDGEMENTS

We gratefully acknowledge the invaluable assistance of Mrs. Irene Trotter. We wish to thank Dr. Charles McAteer, Dr. Violet Reilly, Sister Murphy and her staff and the district nurses of the North and West Belfast District for help in obtaining blood samples and Dr. S. D. Nelson, the technical staff of the Tissue Typing Laboratory, Belfast City Hospital and the Northern Ireland Kidney Research Fund. We also wish to thank Mr. J. R. McDonald for the statistical analysis and Mrs. Paula Trimble who typed the manuscript.

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THE ULSTER SOCIETY OF INTERNAL MEDICINE

10th ANNIVERSARY MEETING HELD AT THE MATER INFIRMORUM HOSPITAL, BELFAST ON FRIDAY, 17th NOVEMBER, 1978

Chairman: Dr. J. H. BRUCE, Consultant Physician, Craigavon Area Hospital

The Ulster Society of Internal Medicine was founded ten years ago, under the aegis of The Ulster Medical Society, as a representative body of Consultant Physicians in Northern Ireland. Its founder was Dr. J. S. Logan, Consultant Physician, Royal Victoria Hospital.

The Society meets biannually, in the Spring and Autumn of each year, alternating between city and country venues. The first meeting was held in The Ulster Hospital, Dundonald, Belfast, on Friday, 4th October 1968 and the first Chairman was Dr. G. A. Scott.

The following papers were read at the 10th Anniversary Meeting.

Tumour Markers—Dr. A. R. Lyons.
Improvement of Diagnostic Precision of Treadmill Exercise Testing by Analysis of Blood Pressure Changes During Recovery—Drs. P. Morton, G. Murtagh, M. E. Scott, and Dr. K. Balnave by invitation.
Animalcules—Dr. D. A. Canavan.
Cushing's Syndrome—Professor D. A. D. Montgomery.
A P. P. oma Syndrome—Professor K. D. Buchanan.
Emergency Geriatric Medical Admissions—Professor R. W. Stout.
Beta Blockade in Thyrotoxicosis; Is the Cardioselective Drug Atenolol as Satisfactory as Propranolol?—Dr. J. K. Nelson and Professor D. G. McDevitt.

The First Guest Lecture of the Ulster Society of Internal Medicine
Hepatitis—Dr. P. W. Brunt, M.D., F.R.C.P., Consultant Physician and Gastroenterologist, Aberdeen Royal Infirmary; Clinical Senior Lecturer in Medicine, The University of Aberdeen.

BOOK REVIEWS

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THIS, the second edition of this book now has a very useful section in history taking in rheumatology and it is hard to see why this was not included in the first edition, since it plays such an important part in the diagnosis of these disorders.

Emanating from the Division of Rheumatology of the Mayo Clinic, Rochester, Minnesota I can do no better than quote from the preface to the second edition "It is intended for physicians and students seeking an elementary yet comprehensive guide for the clinical examination and evaluation of patients with various rheumatic diseases. The details of this subject are still overlooked or slighted in the medical school and graduate training of most physicians". With this I would entirely concur.

The objectives are fully accomplished in this excellent book. The material is covered systematically commencing with a full evaluation of the significance in points of history; (here reference is made to the systemic effects), followed by a discussion on the implications of the main symptom in the rheumatic patient e.g. pain, joint swelling, limitation of motion, stiffness, weakness and fatigue, and the physical aspects are not forgotten.

Then follows a discussion on assessment of joint involvement with coverage of the essential anatomy. Each chapter is preceded by a summarising outlay of the essential examinations to follow. In the course of this, a good deal of "clinical rheumatology" is presented.

Throughout, the book is well illustrated by line drawings and clear photographs, some in colour. There are full references and suggested additional reading. The index is accurate and detailed. The book is beautifully printed and bound and should stand up to hard use.

This is an important work which should be in all medical libraries and clinicians' book shelves.

M.W.J.B.

INTRODUCTION TO GENERAL PRACTICE: By Michael Drury and Robin Hull (Pp vii + 232: Figs. 8. £3.50). London. Bailliere Tindall; 1979.

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ATLAS OF NUCLEAR MEDICINE. Volume 4; BONE. By Pablo E. Dibos and Henry N. Wagner. (Pp xii + 197; figs. 181. £24.50). Philadelphia, London, Toronto: Saunders and Eastbourne; Holt-Saunders, 1978.

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The format of the book is logical, with information regarding pharmaceuticals, anatomy and normal variants being presented initially, followed by a comprehensive outline of pathological lesions affecting the skeletal system. A considerable number of the cases presented show correlative X-rays and, although these illustrations could be larger, the quality is first class. The volume concludes with sections on soft tissue accumulation, and an intersting chapter on tomographic bone scanning. The references provided are adequate.

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RESPIRATORY FUNCTION OF THE LUNG AND ITS CONTROL. By D. F. S. Grodins and S. M. Yamashiro. (Pp 148; figs. 77. £6.50). New York, Macmillan Publishing Co. 1978.

THIS short text has evolved from a set of hand-out lecture notes given to medical, physiology, biology and bio-engineering students at the University of Southern California. As the introductory survey states "To understand this (respiratory) behaviour we must examine both the unit processes and their interactions". The authors tackle the problem by using the techniques and jargon of *systems analysis* making extensive use of control theory in developing their theme. The ventilatory apparatus is described in terms of its geometrics, kinematics, dynamics and elastive and resistive properties. People without a reasonable working knowledge of physics and mathematics will have to struggle a little to keep on top of the material. For example, when dealing with gas exchange in the tissues, the oxygen tension gradient across the capillary wall is defined by the equation:

$$P_{T(O_2)}(r_o) - P_{T(O_2)}(r) = \frac{\dot{V}_{O_2}}{2\alpha DV}\left[R^2 \ln \frac{r}{r_o} - \frac{(r^2 - r^2_o)}{2}\right]$$

However, for the serious student of respiratory function who is prepared to adopt a rigorous approach to the subject this is a clearly written precise book which illustrates how the complexities of lung function may be analysed and quantitated and how the interrelationships of the different aspects of function may be explained in terms of control theory.

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IMMUNOLOGY used to be the hobby of a sub-population of microbiologists and this book expresses such origins in terms more or less appropriate to the late 1970's. However, by missing the much wider ethos of modern immunology I feel that it does a disservice to the subject and therefore to any student who chooses to use it as an introductory text.

The book is divided into three "Units"—I, Basic Immunology (12 chapters), II—Clinical Immunology (13 chapters) and III—Applied Immunology (4 chapters).

Unit I has some good chapters—I liked the one on the complement system for example—but others are weak, such as those on cell-mediated cytotoxicity (where are the NK cells?) and phagocytosis (what about oxidative mechanisms in bacterial killing?). There are many other texts which give a better introduction to basic immunology than this.

Unit II although described as clinical deals mainly with the pathogenesis of infective and other disturbances of the immune system together with some information on diagnostic methods. The student would find little 'real' clinical material here such as the clinical features or management of patients with these disorders.

Unit III exhibits a curious choice of subjects. The chapter entitled Diagnostic and Therapeutic Applications of Immunology is concerned with serodiagnosis of infections and prophylactic immunizations, again emphasizing the microbiological bias of the book. However, even within the microbiological context it is not immediately clear why a whole chapter is devoted to immunoelectronmicroscopy in a book where the student would be hard pressed to find the principles of a complement fixation text or how to interpret it.

T.A.McN.

APLASTIC ANAEMIA. Edited by C. G. Geary. (Pp 249. £12.50). London: Balliere Tindall. 1978.

ALTHOUGH sometimes clearly due to a drug reaction, in many cases aplastic anaemia comes unheralded by any apparent cause. With correction of anaemia by transfusion, the patient again often feels well and considers himself restored to health. Meanwhile however, his peripheral blood count may signal the relentless destruction of a whole organ, the bone marrow, which will lead to death in a matter of weeks or months. Having no therapy effective in arresting this progressive marrow failure, the perplexed haematologist too often has had to attend his patient armed only with encouraging words and a hope that the disease would abate before the marrow was irreparably damaged.

This book is evidence that at last progress is being made in the understanding of the enigma of aplastic anaemia and that already the first steps have been taken in the development of effective treatment. Edited by Dr. Geary, there are eight other contributors who deal with various aspects of the disorder. In an excellent first chapter recent knowledge of haemopoietic stem cells is reviewed and there is a discussion on the mechanisms by which marrow hypoplasia may be brought about. Other sections deal with the diverse ways in which drug reactions may damage the marrow, the clinical and laboratory features of aplastic anaemia and the disease in childhood. Especially interesting is the chapter on treatment by bone marrow transplantation. Not only does this technique promise to be important in treatment of a number of bone marrow disorders in the years to come, but it was the early attempts at marrow transplantation which indicated the immunologic cause of some instances of marrow aplasia. Further evidence of the interaction of the immune system and the bone marrow is described in the section on red cell aplasia.

This book brings together present knowledge of aplastic anaemia and each chapter is well endowed with references. It is on a topic about which previously little was known, but which is now the subject of considerable interest and research activity. The newer concepts of marrow function and failure which are emerging are of such fundamental importance to haematology that this book is recommended reading for any haematologist whatever his special interest.

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DOUBLE CONTRAST GASTROINTESTINAL RADIOLOGY, WITH ENDOSCOPIC CORRELATION. Igor Laufer. (Pp xii + 723. Illustrated. £45.50). Philadelphia, London, Toronto: Saunders and Eastbourne; Holt-Saunders, 1979.

THIS manageable volume draws together the current information on double-contrast G.I. radiology in a very readable form. It describes and comments on the techniques necessary (and the re-orientation of the examiner) and provides beautiful and profuse illustrations of what can be achieved. Its description and illustration of normal and abnormal variants is particularly useful for those trying out the technique "de novo".

There are chapters by American, Japanese and European authors, all of high repute, on each section of the G.I. tract, with separate chapters on tumours of the oesophagus, early gastric cancer, the post-operative stomach, tumours of the colon, polyposis syndromes, diverticular disease, inflammatory bowel disease, and finally the rectum. Each chapter has a bibliography which is representative, and as up-to-date as can be expected—1978 publications are quoted. A chapter on endoscopic correlation contains 94 side-by-side arrowed illustrations of the photographs and radiographs of various lesions, again beautifully reproduced.

Dr. Laufer states his purpose in writing this book is to provide radiologists with the information they need to perform and interpret double contrast examinations of the gastrointestinal tract, with the emphasis on the detection of the lesion, and illustrations of the more everyday pathology with its numerous variations. This he has done excellently and comprehensively. This book should be mandatory reading for every radiologist who has to do G.I. examinations. A.D.G.

A SURVEY OF GENERAL PRACTICE IN NORTHERN IRELAND IN 1976. Department of Health and Social Services for Northern Ireland (Pp iii + 76: Figures and Tables. £2.50 net). Belfast. Her Majesty's Stationery Office, 1976.

THE present survey (1976) of general practice in Northern Ireland by the Department of Health and Social Services naturally updates the 1970 similar survey. It is a worthwhile study, which depicts the many changes taking place to-day in general practice. These are defined in terms of group-practice, primary care team and health centre development. It also provides useful information about other characteristics of general practice, for example—average list sizes, deputising arrangements and teaching involvement, and about the opinions of G.Ps in many areas of controversy. These include—the value of an age-sex register, the merit of having an attached social worker, the advantages and disadvantages of health centre practice and access to hospital beds by G.Ps. Fact usually dispels fiction. It will surprise some doctors to read that 'three fifths of G.Ps view the attachment of a social worker to their practice as a distinct advantage'. Controversial findings are brought to one's attention—'a majority of G.Ps thought health centres were advantageous to the doctor, but less so to the patient'. The information throughout is of immense value to those engaged in teaching about or planning health care services, and points the way to further operational research studies. It is timely, because most G.Ps have accepted in principle internal medical audit of their work and conditions of practice. The data are presented clearly and concisely in many tabulations and histograms. The contents deserve study by all interested in raising professional standards in primary care and the D.H.S.S. deserves congratulations for foresight in planning and obtaining the ready co-operation of virtually all the G.Ps in Northern Ireland. W.G.I.

MEDICAL MICROBIOLOGY by C. G. A. Thomas. Fourth Edition (Pp 406; Figs. 37. £4.25). London: Bailliere Tindall, 1979.

THE fact that any of the numerous short text books reaches a fourth edition is in itself proof that it has appeal. There are, however, several general criticisms of this volume and the most significant of these is that although the type-face is clear it is to the reviewers' eyes too small. A second important criticism is that the few figures portraying the microscopic appearance of organisms still appear in black and white and although colour reproduction is expensive the replacement of these figures with colour micrographs would enhance the volume.

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THIS manageable volume draws together the current information on double-contrast G.I. radiology in a very readable form. It describes and comments on the techniques necessary (and the re-orientation of the examiner) and provides beautiful and profuse illustrations of what can be achieved. Its description and illustration of normal and abnormal variants is particularly useful for those trying out the technique "de novo".

There are chapters by American, Japanese and European authors, all of high repute, on each section of the G.I. tract, with separate chapters on tumours of the oesophagus, early gastric cancer, the post-operative stomach, tumours of the colon, polyposis syndromes, diverticular disease, inflammatory bowel disease, and finally the rectum. Each chapter has a bibliography which is representative, and as up-to-date as can be expected—1978 publications are quoted. A chapter on endoscopic correlation contains 94 side-by-side arrowed illustrations of the photographs and radiographs of various lesions, again beautifully reproduced.

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THE present survey (1976) of general practice in Northern Ireland by the Department of Health and Social Services naturally updates the 1970 similar survey. It is a worthwhile study, which depicts the many changes taking place to-day in general practice. These are defined in terms of group-practice, primary care team and health centre development. It also provides useful information about other characteristics of general practice, for example—average list sizes, deputising arrangements and teaching involvement, and about the opinions of G.Ps in many areas of controversy. These include—the value of an age-sex register, the merit of having an attached social worker, the advantages and disadvantages of health centre practice and access to hospital beds by G.Ps. Fact usually dispels fiction. It will surprise some doctors to read that 'three fifths of G.Ps view the attachment of a social worker to their practice as a distinct advantage'. Controversial findings are brought to one's attention—'a majority of G.Ps thought health centres were advantageous to the doctor, but less so to the patient'. The information throughout is of immense value to those engaged in teaching about or planning health care services, and points the way to further operational research studies. It is timely, because most G.Ps have accepted in principle internal medical audit of their work and conditions of practice. The data are presented clearly and concisely in many tabulations and histograms. The contents deserve study by all interested in raising professional standards in primary care and the D.H.S.S. deserves congratulations for foresight in planning and obtaining the ready co-operation of virtually all the G.Ps in Northern Ireland. W.G.I.

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J.E.M.

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THIS book is a compliment to the research of the Department of Medicine at the Queen's University of Belfast and in particular to the initiative and enthusiasm of its Guest Editor. Perhaps a little wistfully he remarks in the introduction that gastrointestinal endocrinology has been "rather spurned by classical endocrinologists" and that some parts of his subject are "at the stage of clinical crystal-ball gazing". The quality of the review articles and the depth of already established knowledge which is referred to in these pages belie this approach. Gastrointestinal endocrinology has arrived; it has established its own field; this will be one of its major reference sources for some years to come.

Bayliss and Starling may have discovered secretin in 1902, but there are very few "classical" references in this book—it is entirely forward-looking in its approach and entirely frank in its discussion of areas of controversy. A useful review of radioimmunoassay techniques (always a complex thing to describe) by Joy Ardill and a detailed review of the chemical characterization of gut hormones by R. F. Murphy set the stage for a subsequent exponential increase in information. Basic knowledge of the intriguing brain/gut relationship is reviewed by D. Powell, and by Julia Polak and S. R. Bloom—the possibility that the Enkephalin fragments of the ACTH molecule may be related to the biochemical processes underlying psychotic behaviour broadens the field of this monograph well beyond its title. R. G. McFarland discusses the known associations of these hormones with disease states, particularly peptic ulceration and coeliac disease. Although the possibility of deficiency of G I hormones is unlikely due to their diffuse distribution, it is probable that many will prove non-essential and their relevance to disease will be seen only when they are produced in excess. J. R. Hayes and R. W. Henry review the evidence that gut hormones regulate gut metabolism—the precise contribution of each single hormone remains unclear. J. C. Brown (Vancouver) and J. C. Floyd (Ann Arbor) bring their individual expertise to update their work on GIP (Gastric Inhibitory Peptide) and PP (Pancreatic Polypeptide) respectively. The chapters by Holst, and Stadil, both from Copenhagen, which review the established—even "classical"—tumour syndromes will be most useful reference sources for the general endocrinologist and general physicians or surgeons. The Insulinomas; the Verner-Morrison syndrome (watery diarrhoea, hypokalemia and achlorhydria) and its nine possible diarrhoea-producing peptides; the glucagonomas and their curious skin rashes; the multiple peptic ulcers and hypergastrinemia of the Zollinger-Ellison syndrome: the pathophysiology and the clinical management of each of these states is well reviewed.

Throw away your crystal balls—just read this book! D.R.H.

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THIS volume is the successor to "The Treatment of Burns", the second edition of which was published ten years ago. It has been re-named to emphasise the importance of the team approach which is so vital to the care of the severely burnt patient.

The late Curtis Artz, his two co-editors and the other forty contributors are all present or former members of the staff of the U.S. Army Institute of Surgical Research at the Brooke Army Medical Center in Houston, and the book demonstrates the important part played by that Institute in advancing our understanding of burns and their treatment. Many of the authors are now running major burn centres throughout the United States so that the volume presents up-to-date American practice in burn care.

The book is comprehensive and covers most aspects of the subject in considerable detail with contributions by physicians, surgeons, pathologists, nurses, an anaesthetist, a physical therapist and an occupational therapist. It is organized in eight sections, the first of which covers the patho-physiological, metabolic and haematological changes following burning, with an excellent chapter on alterations in pulmonary function and inhalation injury. Succeeding sections deal with early care including replacement therapy, local care of the burn surface and operative care, followed by a section headed Specific Burns. In this a chapter on burns of the face is followed by a short chapter on burns of the upper extremity. No reference is made to the use of plastic bags for dressing hand burns. These, by permitting movement of the digits and use of the hand, are most valuable in maintaining function. The frequency and importance of hand burns would have justified more extensive coverage of the subject and inclusion of information on salvage procedures for the severely damaged hand. This section also includes contributions on Burns in Children, in Geriatric Patients and in Pregnancy, and also on Electrical Injury and on Chemical Burns. Sections on Nursing Care, General Management and on the Development of Burn Centers complete the book.

The multiplicity of contributors has lead to considerable overlap and repetition which makes the book somewhat annoying to read.

Little reference is made to such important aspects of treatment as re-integration of the burn victim into the community or of industrial rehabilitation.

"Burns—A Team Approach" would be a valuable reference book in any unit specializing in the treatment of burns. The fact that each chapter represents the writer's own individual practice and experience and not a 'school solution', makes it less suitable for general use in units caring for only the occasional burn victim.

The publishers are to be congratulated on the excellent lay-out and production of the book.

N.C.H.

ENDOMETRICAL CANCER. By M. G. Brush, R. J. B. King and R. W. Taylor. (Pp xvi + 459; figs. 197, tables 123. £16.50). London: Bailliere Tindall. 1979.

THIS book is the best to be published at present on the subject of endometrical cancer. The Editors are to be congratulated for their presentation of the book, results and opinions of a considerable number of authors, each with their own specialised interest, in such a manner that we can assimilate a considerable knowledge of the subject as we read through the book.

Some of the chapters are unnecessary because they are repetitive; different authors presenting their results and ending with no answers. This was inevitable because the answers to problems such as the advantages and disadvantages of long term oestrogen therapy are not known.

The argument concerning oestrogen as a cause of endometrical carcinoma continues, or has it been advanced to the view that oestrogen causes the histological *appearances* of endometrical carcinoma?

There seems to be general agreement that progestogen therapy is of value post-operatively and for secondaries, but there are no conclusions about how long therapy should be continued. I must agree with Kistner that therapy should *never* be discontinued.

This book will be of considerable benefit to all those who are associated with the problem of endometrical cancer and as a valuable addition to any medical library.

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The late Curtis Artz, his two co-editors and the other forty contributors are all present or former members of the staff of the U.S. Army Institute of Surgical Research at the Brooke Army Medical Center in Houston, and the book demonstrates the important part played by that Institute in advancing our understanding of burns and their treatment. Many of the authors are now running major burn centres throughout the United States so that the volume presents up-to-date American practice in burn care.

The book is comprehensive and covers most aspects of the subject in considerable detail with contributions by physicians, surgeons, pathologists, nurses, an anaesthetist, a physical therapist and an occupational therapist. It is organized in eight sections, the first of which covers the patho-physiological, metabolic and haematological changes following burning, with an excellent chapter on alterations in pulmonary function and inhalation injury. Succeeding sections deal with early care including replacement therapy, local care of the burn surface and operative care, followed by a section headed Specific Burns. In this a chapter on burns of the face is followed by a short chapter on burns of the upper extremity. No reference is made to the use of plastic bags for dressing hand burns. These, by permitting movement of the digits and use of the hand, are most valuable in maintaining function. The frequency and importance of hand burns would have justified more extensive coverage of the subject and inclusion of information on salvage procedures for the severely damaged hand. This section also includes contributions on Burns in Children, in Geriatric Patients and in Pregnancy, and also on Electrical Injury and on Chemical Burns. Sections on Nursing Care, General Management and on the Development of Burn Centers complete the book.

The multiplicity of contributors has lead to considerable overlap and repetition which makes the book somewhat annoying to read.

Little reference is made to such important aspects of treatment as re-integration of the burn victim into the community or of industrial rehabilitation.

"Burns—A Team Approach" would be a valuable reference book in any unit specializing in the treatment of burns. The fact that each chapter represents the writer's own individual practice and experience and not a 'school solution', makes it less suitable for general use in units caring for only the occasional burn victim.

The publishers are to be congratulated on the excellent lay-out and production of the book.

N.C.H.

ENDOMETRICAL CANCER. By M. G. Brush, R. J. B. King and R. W. Taylor. (Pp xvi + 459; figs. 197, tables 123. £16.50). London: Bailliere Tindall. 1979.

THIS book is the best to be published at present on the subject of endometrical cancer. The Editors are to be congratulated for their presentation of the book, results and opinions of a considerable number of authors, each with their own specialised interest, in such a manner that we can assimilate a considerable knowledge of the subject as we read through the book.

Some of the chapters are unnecessary because they are repetitive; different authors presenting their results and ending with no answers. This was inevitable because the answers to problems such as the advantages and disadvantages of long term oestrogen therapy are not known.

The argument concerning oestrogen as a cause of endometrical carcinoma continues, or has it been advanced to the view that oestrogen causes the histological *appearances* of endometrical carcinoma?

There seems to be general agreement that progestogen therapy is of value post-operatively and for secondaries, but there are no conclusions about how long therapy should be continued. I must agree with Kistner that therapy should *never* be discontinued.

This book will be of considerable benefit to all those who are associated with the problem of endometrical cancer and as a valuable addition to any medical library.

J.M.G.H.

MANUAL OF EMERGENCY MEDICAL THERAPEUTICS. By M. S. Eisenberg and M. K. Copass. (Pp xvi+311; Illustrated. £7.00). Eastbourne: Holt-Saunders. 1979.

I CAN find little merit in this book apart from its size. Its befuddled conception is at once obvious on reading the editor's statement of its purpose and is further confirmed by the list of contents which leaves a strong impression of random selection. More specifically, there are numerous instances of important information being omitted; e.g., there is no advice to deliver one or two solid blows to the patient's chest following cardiac arrest before attempting electrical defibrillation and in the section on upper gastro-intestinal bleeding the special measures required to stop bleeding from oesophageal varices are not detailed. In other parts of the book the advice given is positively dangerous, e.g., it is recommended that *normal* saline is infused intravenously in the initial treatment of suspected hyperglycaemic non-ketotic coma.

Because it is an American book it has two in-built disadvantages for potential European users, viz., S.I. units are not used and several drugs in common usage on this side of the Atlantic had not been approved by the F.D.A. at the time of writing, e.g., verapamil, salbutamol and mexiletine.

To give potential readers a flavour of the book, I quote the definition of alcoholism given on page 247:- "Various definitions exist, depending upon whether alcoholism is viewed in a cultural, medical or pharmacologic context". I trust that clarifies the matter!

The Americans have a name for "those quasi-scientific narcissistic glossies that arrive uninvited in the morning mail and hit the trash can with their addressographed jackets still snugly around them". (World Medicine, 11th August, 1979, p.50)—they are called "trash-can specials". Need I be more explicit?

P.G.N.

PATIENTS AND THEIR DOCTORS. By Glin Bennet. (Pp xiii+217. £3.75). London: Bailliere Tindall. 1979.

THIS book is written by a psychiatrist who also has qualifications in surgery and is intended to alert doctors to the effects of their actions in their day to day work.

It is divided into three parts. The first discusses the meaning of health and illness and discusses the sick role and how life events affects illness. The second and largest section is entitled "Patients and the Journey through Medical Care" and describes the effects on a patient of admission to hospital, the various procedures which are carried out in hospital including surgery and the effects of pain and unremediable illness. The last section discusses doctors, their ideas and their status.

This book is undoubtedly an attack on the medical profession and its attitudes to patients. It is well summarised by the first two sentences of the Preface: 'Illness provides doctors with their livelihood, identity and opportunities for distinction; illness inflicts on patients anxiety, suffering and upheavals to their daily lives. Doctors need patients just as patients need doctors'. It is clear that the author feels that there is a lack of empathy between doctors and patients and that doctors are not sufficiently aware of the fears and frustrations of their patients. The medical profession is portrayed as eletist and concerned chiefly with power and prestige. Doctors are also shown to have the same fallabilities and to have the same problems with their private lives as any other section of the community. Nevertheless the book is thoughtful and many of the points made by the author are valid. It is not easy for a doctor to put himself into the place of the patient and the descriptions of the effects of admission to hospital and the various procedures which may be carried out on the patient should be valuable for doctors and medical students. As so often happens in a book like this, the author has been tempted to go into too much detail and to cover all eventualities with the result that there is some repetitiveness in the matter covered. He also tends to mix descriptions of general principles with details of the management of specific complaints.

Although few would agree with all the opinions of the author of this book, most doctors would enjoy and perhaps benefit from exposure to the author's thought-provoking and sometimes provocative points of view.

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Although few would agree with all the opinions of the author of this book, most doctors would enjoy and perhaps benefit from exposure to the author's thought-provoking and sometimes provocative points of view.

R.W.S.

THE SURGEON PROBATIONERS. By R. S. Allison. (Pp xviii + 142: illustrated. £6.95). Belfast: Blackstaff Press. 1979.

OVER the years a fairly satisfactory system of base hospitals, forward hospitals, casualty clearing stations and field surgical units has gradually evolved so that the soldier fighting on land almost from the moment of wounding can be dealt with efficiently. A war at sea is a difficult and a different problem. This was particularly so in the 1914-1918 war. Firstly, compared with the Army medical man-power was greatly under strength; the Navy as a career was not popular—the doctor was not given many of the privileges that he got in the Army.

It was naturally impossible to man every sea-going vessel with a qualified doctor and so, on the principle that half a doctor is better than no doctor at all, a new body called "The Surgeon Probationer" came into being. This actually came into force in December 1913 when the possibility of a war was just appearing on the horizon. These young men must all have passed their second M.B. and if they had one or two years of clinical experience it was so much the better, but if they were far advanced in their medical training the Admiralty preferred that they should finish and join the Navy as fully fledged doctors.

These young men—they totalled 1200 men over the four years of war—came from all the home medical schools and many from other parts of the Commonwealth. They largely replaced the "sick bay attendants" of previous wars. They wore one thin wavy gold stripe (with later a curl on it) and were privileged to be looked on as officer class.

The 1914-1918 war was essentially a war of small vessels—destroyers, sloops, mine sweepers and light cruisers bore the brunt of the fighting and these were manned by the surgeon probationers, whilst the capital ships—dreadnoughts and battle cruisers which were fully equipped medically as it happened saw much less of the actual fighting.

The young surgeon probationers to start with had no clinical experience. They were given a crash course and all were supplied with a very useful small 80-page manual of "first-aid in naval warfare" by R. J. Willan—later Professor of Surgery in Newcastle-on-Tyne and successor to Professor Ernest Grey-Turner. R. S. Allison thought so well of this book that he reproduced it in toto as Part II of his own book.

Sydney Allison's book gives us a clear picture of the experience gained by these young men as well as the work that they might be expected to do.

Of the grand total of 1200—all of whom are given by name in this book—special and detailed mention is made of most of the 36 who came from the Belfast school, and it is interesting to see how many reached a position of great importance later on. They included the author himself, who had a distinguished career as a neurologist, as a sailor in two world wars and finally as an historian—with his main interest in the history of sea diseases as well as the origin of our own local hospitals. Another was Fred M. B. Allen—the first Nuffield Professor of Child Health at Queen's. Another was Arthur Eaton—surgeon to the Omagh Hospital. R. Leslie Dodds, although a Queen's man, moved to London to become one of the busiest gynaecologists there. The two Hall brothers—Robin and Hugo—were responsible with others for the formation of a permanent territorial unit of the R.N.V.R. which was based and still is in H.M.S. Caroline.

It was interesting to see in print the famous incident that happened to George McFadden—late Senior Surgeon in the Belfast City Hospital, who was washed over-board into a strong sea by a gigantic wave but by an exceptional piece of good luck was washed back on board again by a subsequent wave—something which must have happened to very few.

This delightfully written book is a valuable piece of naval history and gives details of a unique experiment. This will probably not be repeated and it was certainly not used in the 1939-1945 war. The real tragedy of this book is that the author lived long enough only to see it in its final state, but did not live long enough to hear from his friends how much thay had enjoyed it and to thank him for doing such a useful job for the Navy and for Belfast.

I.F.