thought that even when they qualified they had little idea of what was ahead of them or what their options were. Many eventually made their career choices by exclusion.

Many doctors thought that it was important to do pre-registration jobs in teaching hospitals: "If you pursue a hospital specialty in your own teaching hospital you cultivate friends in high places and that matters if you want to get on." Such personal patronage was thought to carry more weight than written references. A woman consultant from the 1966 cohort said: "The phone call is tremendously important. Written references are absolutely useless and always standard . . .," and a man from the 1981 group summarised the views of many: "It's hardly surprising that the chap who's got an influential friend gets the job when there are dozens of applicants with very similar qualifications and experiences. . . ." It was widely agreed that the "old boy" network did not exist for women and that any woman who was not able to cultivate an influential patron was unlikely to advance far up the ladder.

There were surprisingly few differences between men and women in the study. Although the women graduating in 1966 had taken longer than the men to reach the grades of registrar, senior registrar, and consultant the average time to do so for graduates in 1976 was more similar, and so far the 1981 men and women have progressed through the training grades at fairly equal rates. There was no evidence that women doctors were taking much time off work to have families. The biggest difference between the sexes was in the amount of part time work they did. Women from the 1966 group had spent about half as long as men in full time jobs, although both sexes emphasised that part time work in medicine was often as much of a commitment as a full time job in any other career.

Marriage and children were seen as obstacles to career plans by doctors of both sexes. Many mentioned the difficulties of moving from job to job if a spouse also had to find work. This was especially so when doctors were married to other doctors. Although 81% of women with children saw them as restraining their careers compared with only 30% of men with children, men too resented the way that a medical career may diminish family life. The statement: "I preferred to be at home playing with the baby than looking after somebody else's" was made by a man.

There was little evidence of obvious discrimination against women but a general feeling that so much of the appointments procedure was secret that it would be hard to prove anything. Nearly a quarter of the women graduating in 1976 thought that they had been discriminated against on sexual grounds compared with 7% of those graduating in 1981. Both sexes were asked questions about family life at interviews, but women reported more detailed questioning and often found it offensive: "I was asked who wore the pants in our family." One woman consultant had even been asked if all her children were by the same father.

The most disconcerting finding of this study is the tremendous amount of disillusionment and regret among doctors of both sexes and all ages. Commonly expressed frustrations included lack of resources, fewer suitable career posts, long hours for comparatively poor pay, conflicts with personal interests, absence of job security, and the paucity of opportunities to deviate from the "straight and narrow" career path. Sixteen per cent of the 1966 group, 28% of the 1976 group, and 46% of the 1981 group had felt regret about their career at some stage. Many unhappy doctors wished they had not entered medicine.

This study should be the basis for introducing changes in the medical career structure, and it ends with some recommendations. Realistic career advice must be given at school so that pupils have some idea of what a career in medicine will mean. Personal assessment and career advice should be offered throughout medical school and beyond. The formal training requirements are too rigid and must be relaxed with no discrimination against doctors who have taken longer than average to reach a given stage or have arrived at it by an unconventional route. Whether personal patronage is compatible with equal opportunities should be examined. Questions asked at interviews should conform to the guidelines of the Equal Opportunities Commission, and no question should be asked of women that would not be asked of men. Part time training should be encouraged, and part time career posts should be extended. Job sharing should be reviewed. Women doctors who have had a break in their careers should have retraining, and an assessment should be made of those specialties in which women are underrepresented. Mr Tony Newton, Minister of Health, has welcomed the study, and the DHSS is sponsoring two conferences on it later this year.

Some people are irritated by suggestions that women should have special provisions made for them. Many of the women doctors graduating in 1966 were resentful of women who wanted to "have their cake and eat it." The great achievement of this study is that it has shown that the problems that restrict women in medicine affect men too. We can now campaign to have things improved for the good of the whole workforce. "Men doctors should also be able to be more involved with their families. . . . Whatever would help women would equally help men."

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Surgery for cardiac arrhythmias

"Direct operations for cardiac arrhythmias represent the last frontier in surgical cardiology," said Sealy in 1980, and now surgeons are streaming across the frontier.¹ It is 20 years since the first report of successful surgical intervention in a patient with the Wolff-Parkinson-White syndrome,² and now operations for patients with cardiac arrhythmias are routine.

The first indication for such an operation is that patients have arrhythmias that persist despite drug treatment. An operation is also indicated if the patient is young and will require drug treatment for many years. An operation may be necessary if the arrhythmia is life threatening—for example, when it is accompanied by ventricular fibrillation or a low output state. Finally, surgery may be the best treatment when the patient has an arrhythmia associated with a cardiac lesion that itself needs an operation.

Re-entrant arrhythmias that are normally amenable to operation are usually caused by congenital accessory electrical pathways connecting the atrium and the ventricle and bypassing the rate limiting behaviour of the tissue in the atrioventricular node. Conduction through the accessory path may be anterograde (resulting in the classic short PR interval and Δ wave of Wolff-Parkinson-White syndrome) or

retrograde (in which case the standard electrocardiograph record may be normal). The object of surgery is to destroy these abnormal pathways, thus allowing conduction along normal routes. Preoperative electrical mapping should provide precise evidence of the position of the pathway(s) and confirm its participation in the tachycardia. Some cases are familial, inherited by an autosomal dominant gene, and these patients are more likely to have multiple accessory pathways.³

Two main surgical approaches have developed for these arrhythmias. The epicardial approach necessitates dissecting the atrioventricular groove and using a combination of sharp dissection and cryotherapy to destroy the microscopic abnormal pathways.⁴ The procedure is often performed on a beating heart (allowing its rhythm to be monitored) and sometimes does not require cardiopulmonary bypass. Guiraudon in Ontario has developed this technique and reported operating on 174 patients with Wolff-Parkinson-White syndrome with no deaths and no permanent complications; nine patients, however, needed more than one operation.⁵ This technique is not suitable for all pathways, and breaches in the left atrium or coronary sinus may be awkward to close. Late atheromatous changes caused by freezing of the coronary arteries have been reported.⁶

In the endocardial approach the atrium is opened as for a valve replacement and the atrial wall is incised in the area of the aberrant pathway as assessed by operative electrophysiological testing. All atrioventricular connections in this area, including nerve tissue, are cleared from the ventricular muscle. The endocardium is sutured and the heart closed. This technique requires cardiopulmonary bypass, and the dissection is usually performed using cardioplegic arrest. With this technique Cox has reported a rate of success of 99% without any need to reoperate and an incidence of heart block of 0.8%.⁷ This approach is familiar to cardiac surgeons, and other cardiac procedures—for example, valve repair or repair of a congenital defect—can be performed at the same time.⁸ Immediate loss of Δ waves and failure to provoke tachycardia with programmed stimulation can provide good evidence of success at the time of operation.

Focal atrial tachycardias may be caused by automaticity of an ectopic focus in the right or left atrium. These can be dealt with by excision, often without bypass, with or without cryotherapy.⁹ If the left atrium is affected more radical measures of left atrial isolation may be necessary.¹⁰

In atrioventricular junctional tachycardia the re-entrant pathway passes through or close to the atrioventricular node, and the usual management is to create heart block and insert a pacemaker. In 1982 Holman *et al* described elaborate animal experiments in which they modified conduction by making discrete cryolesions around the atrioventricular node.¹¹ They suggested that perinodal tissues may be important in the re-entry process and that the techniques could be useful in man.¹¹ Recently they have reported excellent results in seven patients with this technique.¹² Ross *et al* described in 10 patients two anatomical variants of atrioventricular junctional tachycardia with different sites of the re-entry pathway; they operatively cleared the relevant perinodal tissues with excellent results.¹³ These operations close to the atrioventricular node suggest that future developments may allow direct surgical intervention in atrial flutter and fibrillation.

Tachycardias originating in the ventricles are predisposed to deteriorate to ventricular fibrillation, causing sudden death. The commonest cause is an electrically active pathway resulting from myocardial infarction, but arrhythmias

originating in the ventricles may be associated with cardiomyopathies, sarcoid disease, cardiac tumours, or scars from cardiac operation. After myocardial infarction the pathway is usually in the subendocardial layer at the margin of the infarct. Surgical techniques may be based on precisely localising the pathway with electrophysiological testing or may have to be done in a non-directed way if localisation is impossible because either equipment is not available or the tachycardia cannot be provoked at operation.

Three main techniques have been employed to treat these ventricular tachycardias. Encircling myocardial ventriculotomy necessitates a deep incision through the endocardium to the outer myocardial layers and extending around the infarcted area of the heart. This excludes the infarct and therefore its potential to generate ectopic rhythms. The mortality is high, and the tachycardias may recur.¹⁴ Resection of the fibrous infarcted endocardial layer with the adjacent inner layers of myocardium may be effective depending on the size and position of the affected tissue. Limited resection at the border of the infarct yields acceptable results, but some surgeons advocate radical resection, which means an extensive operation and increased mortality.¹⁵

I believe that directed cryosurgical ablation is the best method if it is possible. Electrophysiological mapping is performed to define the origin of the tachycardia, and this area is then ablated by cooling to -60°C for two minutes with a cryoprobe. This technique can be used safely even in the least accessible areas of endocardium. There may, however, be multiple pathways, and if large areas of the heart are affected cure may be difficult. Electrical provocation studies must be performed before the patient is discharged from hospital, and if tachycardia cannot be provoked anti-arrhythmic drugs may be safely withdrawn.

Close and confident cooperation between the electrophysiologist and the surgeon is vital for operations to correct cardiac arrhythmias. Accurate localisation of aberrant pathways must be followed by a precise operation. The results are then excellent, and patients, many of whom are young, may return to normal lives.

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