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Stapes surgery: implications for training

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Abstract
The worldwide decline in surgery for otosclerosis had been reflected by a similar pattern here in Great Britain. Unless we are prepared to accept poorer results than have formerly been achieved, we will have to adopt measures to ensure that the skills of stapes surgery are transferred to the next generation of surgeons. Using the results of our experience, at the Queen Elizabeth Hospital, over the past 18 years, I have examined the implications for surgical training and for the management of future patients with otosclerosis.

Introduction

Surgery for otosclerosis has been performed with varying degrees of success for over a century. A good historical account of the development of stapedectomy is given by Mair (1989). The modern era of surgery for otosclerosis began with the introduction by Shea (1958) of his technique for stapedectomy. It is recognized that, following the ascent of this form of surgery in the 1960s, there is now a general decline, at least in patient numbers, if not also in the quality of surgery being performed (Hammond, 1976; Beales, 1979; Bellucci, 1979).

Worldwide, attention has focused on the problems caused by falling case numbers in the development and maintenance of stapedectomy skills (Chandler and Rodriguez-Torro, 1983; Vernick 1986). This general concern abroad, has not been reflected by the same interest in this part of the world.

In this paper I have examined how the decline in the number of patients with otosclerosis has changed our practice at the Queen Elizabeth Hospital in Birmingham; the catchment area of the Central Birmingham District which is served by the hospital is estimated to be of the order of 186,000. In particular, I have investigated how these changes in our practice have affected the training and acquisition of skills of our next generation of surgeons.

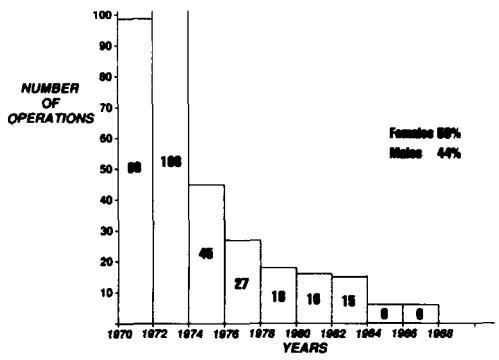


Fig. 1.
Stapedectomy operations at the Queen Elizabeth Hospital, Birmingham, 1970–1988.

Material and Methods

A retrospective study revealed all the patients who had an operation of stapedectomy for otosclerosis during the 18 year period from January 1971 until December 1988. The patients were classified by age and sex. They were also classified according to the grade of the operating surgeon, whether consultant or registrar.

The results of surgery were recorded as judged by the pre- and post-operative pure tone audiograms. A 'good' result was interpreted as one in which there was closure of the air bone gap to within 10 dB of the best recorded bone conduction. The results were analysed according to grade of surgeon.

Results

The number of stapedectomy operations performed over the study period is illustrated in Figure 1. This confirms the general decline in patient numbers as expected. The median age of the patients in our study was 43 years during the period 1971–1972, and 45 years over the period from 1981–1988.

More important than the overall decline in number of

	1971 - 72	1986 - 88
Consultant	12	1
Senior Registrar	7	<1

Fig. 2.
Average number of stapedectomy operations per year at Queen Elizabeth Hospital.

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stapedectomies is the reduced opportunity for learning the procedure by surgeons in training. This is illustrated in Figure 2, which classified the mean number of operations per year according to the grade of the surgeon over two different time 'windows'.

No uniform surgical technique was used by the various surgeons in our study and the materials used have been modified over the years. The results of surgery show that the consultants achieved a 'good' result in 88 per cent of 129 cases whereas the senior registrars achieved this in only 65 per cent of 70 cases. We had a 'dead' ear rate of 2 per cent which was all attributed to operations at which the consultant was at least partially involved.

Discussion

Globally, the decline in stapes surgery has been well documented (Hammond, 1976; Bellucci, 1979; Coker *et al.*, 1988). In this country, Beales (1979) collected data from ten centres which showed that, after a peak of operation numbers in 1963, there has been a gradual decline since then. Our figures confirm that this fall in operation numbers has continued during this decade.

A number of reasons are given for this decline in stapes surgery. First, there may be a true decrease in the incidence of otosclerosis. Morrison (1967) estimated the incidence to be less than 2 per cent in adults aged 30–59 years. Shambaugh (1949) quotes a 0.5 per cent—1 per cent prevalence in a white adult population. However, it is difficult to assess how these figures have changed with time.

Bellucci (1979) has suggested that there was a pool of patients in the population with unoperated otosclerosis and, as this reservoir decreased, the number of patients for surgery would fall. Historically, this may well have been the case. However it was not borne out over the period of our study. The median age of patients in the early years of our study was lower than that in the later years. This would seem to indicate that any pool of patients, which had accumulated in the past, had already been operated on during the 1960's.

Since the early 1970's we have, at least in this part of the world, restricted the operation of stapedectomy to one side, in cases of bilateral otosclerosis. In addition the increasing sophistication and acceptability of hearing amplification, and the recommendation of hearing aid use before considering surgery (Smyth 1982), these are all factors which have contributed to the decline in operation numbers. It is also interesting to speculate whether the introduction of water fluoridation, by Severn—Trent Water, to Birmingham in June 1964 has contributed to the decline in otosclerosis in this area. How should this fall in case numbers concern us regarding the training of the next generation of surgeons?

There has certainly been great concern outside of this country, particularly in North America regarding the efficacy of resident training in the discipline of stapedectomy (Vernick, 1986; Levenson *et al.*, 1987; Coker *et al.*, 1988). In this country the problem has not been widely investigated.

There is good evidence to suggest that inexperience in the art of stapedectomy leads to poor results (Smith and Hopp, 1986; Shah, 1981; Shapira *et al.*, 1985). This is certainly confirmed by our findings where we see that the more experienced consultant surgeons achieved a 'good' result in 88 per cent of cases, whereas the comparatively less experienced senior registrars achieved this in only 65 per cent of patients.

Morrison (1979) has shown a learning curve for a particular surgeon as he gains experience in performing stapedectomy. In a review of 1000 cases, he quotes a dead ear rate of 4 per cent for the first 50 cases, 2 per cent for the next 50 cases, no hearing loss in the next 500 cases, and 0.25 per cent in the remaining 600 cases. It is easy to conclude that our current senior registrars, doing less than one stapedectomy per year, will not progress very far along this learning curve under the present system. I have no reason to believe that we in Birmingham are alone in experiencing this problem.

Accepting poorer results than the experts can achieve is a disservice to the patient, the surgeon and the institution (Vernick, 1986). In the current medicolegal climate it may also lead to litigation. Rightly or wrongly, lawyers are beginning to ask 'How many of these operations have you done recently?' It is up to us to be able to defend ourselves against these criticisms by ensuring that all those undertaking stapes surgery are adequately trained. Once trained, surgeons should continue to perform enough operations to maintain their skills. An exact number of operations for each surgeon, and trainee person, is difficult to decide but a general consensus is that a minimum of eight operations per year is desirable (Levenson *et al.*, 1987; Chandler and Rodriguez-Torro, 1983; Vernick 1986). It is arguable whether these restrictions should apply rigorously to a surgeon who regularly performs other equally difficult microotological procedures.

In considering the teaching of surgery of otosclerosis, some thought must be given to factors other than the number of cases per surgeon. Smyth (1987) suggests that the morbidity of otosclerotic surgery in residency programmes would be greatly reduced by teaching stapedotomy instead of total stapedectomy. Other authors refute this and emphasize different techniques (Coker and Rodriguez-Torro, 1988). All authors agree that falling case numbers makes practice in a temporal bone laboratory even more essential than in the past. Shah (1981) suggests that all surgical trainees are advised to practice on at least 50 temporal bones.

It would appear advisable to avoid occasional stapes surgery and to restrict training in this form of surgery to fewer teaching centres (Mair, 1989). Some consideration should be given to the streaming of trainees within these centres as advocated by Coker and Rodriguez-Torro, (1988). Surgeons who do not have a specific otological interest should relinquish their cases to a surgeon who is specifically interested in managing these patients. Already at the Queen Elizabeth Hospital we have gone some way towards achieving this latter aim.

In view of the above considerations, we must ask ourselves whether we can, in future, expect surgical trainees to have performed many stapedectomies, or indeed to have performed any at all!

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References

Beales, P. H. (1979) Otosclerosis—past and present. *Journal of the Royal Society of Medicine*, **72:** 553–561.

Bellucci, R. J. (1979) Trends and profiles in stapes surgery. *Annals of Otology, Rhinology and Laryngology*, **88;** 708–713.

Chandler, J. R., Rodriguez-Torro, O. E. (1983) Changing patterns of otosclerosis surgery in teaching institutions. *Otolaryngology—Head and Neck Surgery*, **91:** 239–245.

Coker, N. J., Duncan, N. O., Wright, G. L., Jenkins, H. A., Alford, B. R. (1988) Stapedectomy trends for the resident. *Annals of Otology, Rhinology, Laryngology*, **97:** 109–113.

Hammond, V. (1976) The indications for stapedectomy. *Journal of Laryngology and Otology*, **90:** 23–29.

Levenson, M. J., Bellucci, R. J., Grimes, C., Ingerman, M., Parisier, S. C. (1987) Otosclerosis surgery in a resident training program. *Archives of Otolaryngology, Head and Neck Surgery*, **113:** 29–31.

Mair, I. W. S. (1989) Occasional stapes surgery—a Norwegian experience. *Journal of Laryngology and Otology*, **103:** 259–262.

Morrison, A. W. (1967) Genetic factors in otosclerosis. *Annals of the Royal College of Surgeons of England*, **41:** 202–237.

Morrison, A. W. (1979) Diseases of the otic capsule—Otosclerosis. In Scott Brown's Diseases of the Ear, Nose and Throat, 4th Edition (Ballantyne J. and Groves, J. Eds) Vol 2, pp. 405–464. Butterworths, London.

Shah, N. (1981) Stapedectomy . . . changing pattern: numbers, results and complications. *Revue de Laryngologie*, **102:** No. 5–6: 231–235.

Shambaugh, G. E. (1949) The fenestration operation for otosclerosis, experimental investigations and clinical observations over a period of ten years. *Acta Oto-Laryngologica Supplementum*, **79.**

Shapira, A., Ophir, D., Marshak, G. (1985) Success of stapedectomy performed by residents. *American Journal of Otolaryngology*, **6:** 388–391.

Shea, J. J. (1958) Fenestration of the oval window. *Annals of Otology, Rhinology, Laryngology*, **67:** 932–951.

Smith, M. F. W., Hopp, M. L. (1986) 1984 Santa Barbara state of the art symposium on otosclerosis. *Annals of Otology, Rhinology, Laryngology*, **95:** 1–4.

Smyth, G. D. L. (1982) Recent and future trends in the management of otosclerotic conductive hearing loss. *Clinical Otolaryngology*, **7:** 153–160.

Smyth, G. D. L. (1987) Letter to the Editor. *Annals of Otology, Rhinology, Laryngology*, **96 (2 Part 1):** 238.

Vernick, D. M.)1986) Stepedectomy results in a residency training program. *Annals of Otology, Rhinology, Laryngology*, **95:** 477–479.

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