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Main Article

Time trend analysis of otological procedures performed in England, 1989 to 2005

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Abstract

Objective: To observe trends in the number of major otological procedures performed in England, in the context of advances in the understanding of disease.

Methods: The data used were obtained from the Hospital Episode Statistics statistical database, published by the UK Department of Health, for England, 1989 to 2005. Specific otological procedures were identified using the Classification of Surgical Operations and Procedures system (fourth revision) of the Office of Population, Censuses and Surveys. Trend analysis of different procedures was performed using exponential smoothing (using the Statistical Package for the Social Sciences version 13 software).

Results: Our study did not confirm any reduction in the number of surgical procedures performed for cholesteatoma or otosclerosis. We noted a sharp decline in the number of endolymphatic sac surgical procedures performed, probably attributable to the increased use of intratympanic therapy.

Conclusion: The number of major otological procedures (other than endolymphatic sac surgery) was consistent over the period examined. The generally perceived reduction in the number of procedures performed by individual surgeons may be due to a dilutional effect. This can only support the need for subspecialisation, particularly regarding the training of junior surgeons.

Key words: Otologic Surgical Procedures; Tympanoplasty; Stapes Surgery; Cholesteatoma; Education; England

Introduction

There is a general perception among ENT surgeons that surgery for cholesteatoma and otosclerosis is declining in the developed countries. This is based mainly on anecdotal reports. One report from Finland showed a reduction in the number of surgical procedures performed for cholesteatoma.[1] In the United States, Vrabec and Coker reported a decline in the number of stapedectomy cases being undertaken over the last 30 years.[2] They postulated widespread immunisation for measles as a possible explanation for a decline in the incidence of otosclerosis.

In order to investigate trends in major otological procedures performed in England, we examined National Health Service (NHS) hospital episode statistics published by the Department of Health. The Hospital Episode Statistics statistical database surveys care provided by English NHS hospitals, and also care received by NHS hospital patients treated elsewhere. Hospital episode statistics are compiled from data submitted by over 300 NHS trusts in England, for the years 1989–90 to 2004–2005.

Methods

Hospital Episode Statistics data

The data for this paper were obtained from the Hospital Episode Statistics database of procedures performed in over 300 NHS trusts across England. These data were based on financial years (i.e. 1 April to 31 March). Operative procedures were coded using the Classification of Surgical Operations and Procedures system (fourth revision) of the Office of Population, Censuses and Surveys. We searched the Hospital Episode Statistics data (four character tables) using specific Office of Population, Censuses and Surveys codes for different otological procedures.

Different procedures studied

We aimed to document trends in the number of common otological procedures performed in England from 1989 to 2005. The following procedures were studied: those performed in the mastoid process, including revision procedures; stapedectomy and revision stapedectomy;

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ossiculoplasty; endolymphatic sac surgery; and tympanoplasty.

Codes used

The coding system for operative procedures within the NHS can be confusing. For example, there are at least 15 codes for procedures performed on the mastoid bone alone (see Table I). We used the four-character operation codes of the Classification of Surgical Operations and Procedures system (fourth revision) (Office of Population, Censuses and Surveys) for identifying cases of different otological procedures. The codes used for identifying mastoid operations were D10.1, D10.2, D10.3, D10.4, D10.6, D12.2 and D12.4. The codes used for identifying ossiculoplasty were D161, D162, D168 and D169. Stapes surgery was coded as D17.1 (stapedectomy) or D17.2 (revision stapedectomy). The tympanoplasty codes used were D14.1, D14.2, D14.3, D14.8 and D14.9. The codes used for identifying surgery on the vestibular apparatus were D26.1, D26.2, D26.3, D26.4, D26.8 and D26.9.

Data analysis

Statistical analysis of trends was performed using exponential smoothing, performed with the Statistical Package for the Social Sciences version 13 software (SPSS Inc, Chicago, Illinois, USA). Exponential smoothing[3] aids observation of alterations in the number of cases per year, based on the smoothed curve.

Results

The results from the survey of Hospital Episode Statistics data are presented in Figures 1 to 6.

TABLE I

CODES FOR PROCEDURES PERFORMED ON THE MASTOID PROCESS

Code	Procedure
D10.1	Exenteration of mastoid air cells, radical mastoidectomy nec (not elsewhere classified)
D10.2	Exenteration of mastoid air cells, modified radical mastoidectomy
D10.3	Exenteration of mastoid air cells, cortical mastoidectomy
D10.4	Exenteration of mastoid air cells, simple mastoidectomy
D10.5	Exenteration of mastoid air cells, excision of lesion of mastoid
D10.6	Exenteration of mastoid air cells, revision of mastoidectomy
D10.8	Exenteration of mastoid air cells, other specified
D10.9	Exenteration of mastoid air cells, unspecified
D12.1	Other operations on mastoid, obliteration of mastoid
D12.2	Other operations on mastoid, atticotomy
D12.3	Other operations on mastoid, biopsy of mastoid
D12.4	Other operations on mastoid, exploration of mastoid
D12.5	Other operations on mastoid, removal of pack from mastoid
D12.8	Other operations on mastoid, other specified
D12.9	Other operations on mastoid, unspecified

The number of modified radical mastoidectomies (code D10.2) performed in England showed no major decline in the 16 years from 1989 to 2005 (Figure 1). There was a sharp drop in the number of radical mastoidectomies (D10.1). An increase of 10 cases per year was noted for atticotomies (D12.2) (Figure 2). An increase of 17 cases per year was seen for revision mastoidectomies (Figure 3).

The number of stapedectomies (D17.1) performed across England showed an overall reduction of three cases per year. Between 1989 and 2001, there was a reduction of 18 cases per year. However, we then observed a sharp increase in the number of stapedectomies per year, amounting to 200 cases in three years (an increase of 67 cases per year) (Figure 5). Analysis of tympanoplasty numbers (i.e. myringoplasty using graft; code D14.1) showed an upward trend of 114 cases per year. Analysis of cases of ossiculoplasty using a prosthesis (D16.1) showed an upward trend of 13.35 cases per year.

The number of ossiculoplasties using a prosthesis showed a steady increase from 1989 to 2005 (Figure 4). The number of endolymphatic sac surgical procedures showed a sharp decline over the last 10 years studied (Figure 6). Other procedures performed within the vestibular system showed a stable number of cases during the 16 years studied.

Discussion

Hospital Episode Statistics data for England, published by the UK Department of Health, constitute a comprehensive, national database for hospital activities. However, Hospital Episode Statistics data also have shortcomings. These data represent all the in-patient care records reported by the care provider, but activity is sometimes under-reported (duplication also occurs). The resulting shortfall can be corrected by using a grossing factor that adjusts the selected measures according to known coverage discrepancies, usually at the level of specialty and hospital trust. This is termed 'grossing for coverage'. In addition, when cases are reported without any clinical data, grossing for coverage and missing or invalid clinical data can provide a more complete estimate of activity at a national or regional level. Grossing for coverage and clinical data added less than 1 per cent to overall measures in the most

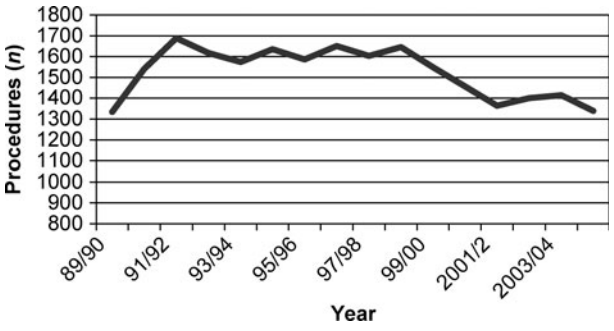

FIG. 1

Modified radical mastoidectomies performed in England, 1989–90 to 2004–2005.

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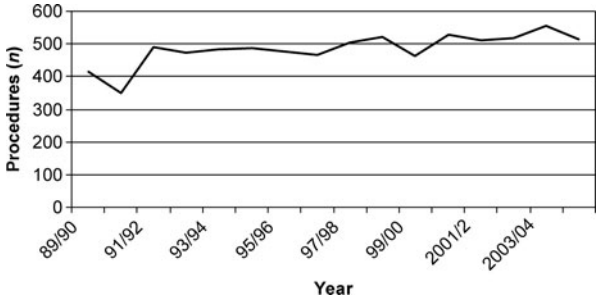

FIG. 2

Mastoid atticotomies performed in England, 1989–90 to 2004–2005.

recent year to which it was applied (i.e. 2001–02), but up to 2 per cent overall for some earlier years, and more for certain localities and specialties.[4] The Hospital Episode Statistics database is the only hospital statistics database available for England.

Is cholesteatoma a vanishing disease?

Cholesteatoma is essentially a surgical disease. We found that the commonest surgical procedure performed for cholesteatoma was modified radical mastoidectomy (code D10.2). Alho *et al.*[1] reported a sharp decline in the number of new surgical cases of cholesteatoma, after a peak in 1971–1974, from a population-based survey. Their data, gathered in northern Finland over a 30-year period, clearly suggested that the number of cholesteatoma cases in Western society was dwindling.

However, the trend we observed in England does not follow the same pattern. During 1989–1990, the number of modified mastoidectomies performed was 1334, and in 2003–2004 this figure was 1313. Trend analysis of these data showed an increase of 5.7 cases per year for this procedure. Over the 16 year period from 1989–1990 to 2004–2005, there was no substantial difference in the number of mastoidectomies performed in NHS hospitals in England (Figure 1). The number of atticotomies (D12.2) performed increased at a rate of 10 cases per year (Figure 2). These data appear to suggest a trend towards more conservative (i.e. small cavity) surgery.

There was an increase in the number of revision mastoidectomies (17 cases per year) (Figure 3); this

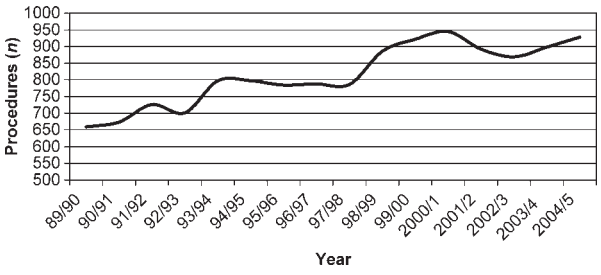

FIG. 3

Revision mastoidectomies performed in England, 1989–90 to 2004–2005.

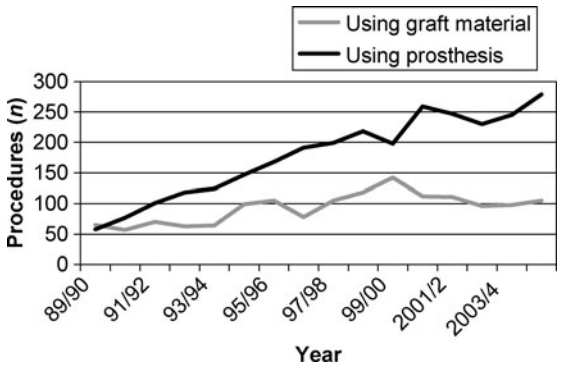

FIG. 4

Ossiculoplasties performed in England, using different techniques, 1989–90 to 2004–2005.

may reflect a tendency for the initial surgery to be more conservative. There was an increase in the number of revision surgery cases may suggest that the results of primary surgery are less successful than in previous years. However, we feel that this trend is more likely to suggest that otologists have developed a lower threshold for offering revision surgery to treat a problematic cavity.

There have been significant demographic changes in England during the 16 years between 1989 and 2005. The population of England grew quickly during this period, due to an extended life expectancy of the resident population (who may become less prone to ear problems as they age) and a large influx of immigrants (usually younger and from poorer countries, possibly making them more prone to ear problems). This demographic change could have influenced the data.

Ossiculoplasty

The number of ossicular reconstruction procedures using a prosthesis performed in England showed a steady increase (13.35 cases per year) from 1989 to 2005. A less marked increase (2.35 cases per year) was seen for ossiculoplasties using graft material (Figure 4). Was this trend due to altered otological practice, with radical mastoidectomies being abandoned in favour of staged, intact canal wall procedures? This would appear unlikely, as the number of modified radical mastoidectomies remained

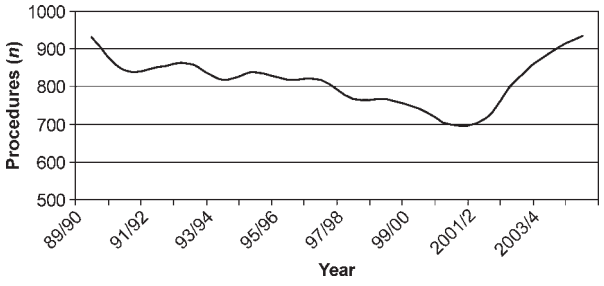

FIG. 5

Stapedectomies performed in England, 1989–90 to 2004–2005.

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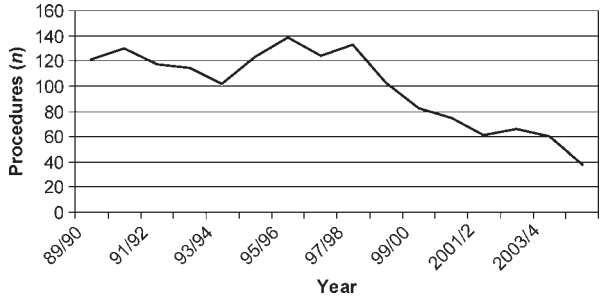

FIG. 6
Endolymphatic sac surgical procedures performed in England, 1989–90 to 2004–2005.

unchanged. However, as there is no specific code for intact canal wall procedures, we cannot comment further. Nevertheless, we find this altered incidence interesting, as no major improvements in prostheses had been widely adopted over the relevant time period.[5] One would expect that, with advances in hearing aid technology and the introduction of bone-anchored hearing aids, the option of ossiculoplasty would be less appealing to patients.

We recommend further investigation of this increase in the number of ossicular reconstruction procedures using a prosthesis, possibly via a national, prospective audit.

- **There is a general conception among ENT surgeons that surgery for cholesteatoma and otosclerosis is declining in the developed countries. This notion is based mainly on anecdotal reports**
- **This study examined data obtained from the Hospital Episode Statistics database, published by the UK Department of Health, for the period 1989–2005**
- **The findings did not confirm any reduction in the number of surgical procedures performed for cholesteatoma or otosclerosis**
- **The generally perceived reduction in the number of procedures undertaken by individual surgeons may be due to a dilutional effect. This can only support the need for subspecialisation, particularly regarding the training of junior surgeons**

Stapes surgery

The number of stapes surgical procedures performed in England did not show a great change over the 16-year period studied. Trend analysis showed an overall reduction of three stapedectomy cases per year. However, these data did not show a smooth trend. In the initial 12 years from 1989, there was a decline of 18 cases per year, followed by a sharp increase (67 cases per year) for three years (Figure 5). A study from the United States showed a decline in the number of stapedectomies performed. Vrabec and Coker[2] indicated that this reduction was due to a decline in the number of surgical otosclerosis cases. Although the true cause of this decline is uncertain, widespread immunisation for measles was thought to be a plausible hypothesis. The association of measles virus with otosclerosis was based on identification of the virus in otosclerotic lesions, using immunohistochemistry and polymerase chain reaction based techniques.[6,7]

Vestibular surgery

Many surgical procedures have been used to control the symptoms of Ménière's disease. When medical treatment fails, various surgical treatment methods have been used, including: grommet insertion, intratympanic gentamycin infusion, saccus decompression, osseous labyrinthectomy, membranous labyrinthectomy and vestibular neurectomy. Since the introduction of intratympanic gentamycin infusion to the UK in 1990, there has been a steady increase in the number of surgeons employing this method. A 2005 national survey of UK otolaryngologists showed that 63 per cent of respondents either used this technique themselves or advocated its use.[8]

We observed a sharp decline in the number of endolymphatic sac procedures performed in England since 1990 (Figure 6). This trend could be due to the popularity of intratympanic gentamycin infusion among English ENT surgeons. If this trend continues, saccus surgery may vanish from the UK surgical repertoire within the next five to 10 years. Some surgeons believe that intratympanic gentamycin may replace surgical options for the treatment of medically refractory Ménière's disease.[9] Although endolymphatic sac surgery is controversial, disappearance of the technique could potentially disadvantage patients who, because of allergy or genetic sensitivity to aminoglycosides, may not be candidates for intratympanic therapy. It certainly would affect training; the number of future surgeons trained to perform this procedure would be few.

Procedures such as labyrinthectomy and vestibular neurectomy continued to be specialised techniques performed only in certain centres, and their numbers remained stable over the 16-year study period.

Conclusion

From the data studied, we cannot confirm a decline in the number of surgical procedures performed for cholesteatoma and otosclerosis. Otosclerosis will continue to be managed in surgical and non-surgical ways, and our data do suggest a slight trend towards a reduction in the number of stapes procedures. This was not dramatic, and there are still significant numbers of these procedures being currently undertaken in England. Awareness of this fact will hopefully encourage the provision of training in these demanding techniques.

Few procedures were observed to have declined in number, including radical mastoidectomy and endolymphatic sac surgery. Interestingly, the number of

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revision mastoidectomy and ossiculoplasty cases showed an upward trend.

There has been a substantial increase in the provision of ENT services during the 16-year study period, with an increasing number of ENT doctors of all grades. The general trend we observed could in fact be a true reduction, masked by greater access to otological services, resulting in a dilutional effect as regards the practitioners concerned.

It would appear that training in major otological procedures is safe at present. However, it is possible that both the providers and recipients of such training may need to be better targetted and supported. Ongoing observation of trends will be important in this process.

This study also highlights the usefulness of the Hospital Episode Statistics database in the observation of epidemiological trends, and also its potential to assist work force planning.

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