The Journal of Laryngology and Otology
September 1999, Vol. **113,** pp. 803–810

Early complications of surgery for chronic otitis media

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Abstract
This audit report details early post-operative complications following surgery for chronic otitis media. One hundred and forty-five cases were assessed. There were no facial nerve palsies, a bone conduction threshold elevation occurred in 4.6 per cent of cases. A wound infection occurred in six per cent of cases as did BIPP allergy. Twenty-six per cent of patients reported symptoms consistent with chorda tympani trauma. Short-lived symptoms of jaw discomfort were reported by 46 per cent of patients and imbalance or vertigo by 10 per cent of patients. The findings are compared with other published reports of complications following ear surgery.

Key words: Ear, middle; Surgery, operative; Complications

Introduction

Audit is now an accepted part of clinical practice and surgeons are encouraged to audit their results both to examine the outcome of their practice and to consider how this may be improved. Additionally audit helps the individual surgeon discuss the expected result of proposed surgery when counselling patients pre-operatively. A prospective record of all procedures carried out as part of the management of chronic suppurative otitis media has been kept. This report concentrates upon the record made at the early post-operative visits, usually within six weeks. The pre- and post-operative audiograms have also been compared. Additional reference is made to other early complications that may follow such surgery but have not been encountered in this group of patients. The focus of this report is upon early post-operative complications and not surgical results.

Method

The audit proforma for recording surgical details and the early complications is shown in the appendix. Specific details relating to the surgery were taken from the audit records. Pre- and post-operative audiometry was taken from the audit records and a difference of more than 10 dB at any one frequency considered significant. Bone conduction thresholds have been used when assessing cochlear function at frequencies up to 4 kHz and air conduction thresholds at 8 kHz have been assumed to show a reduction in cochlear function at this frequency. Glasgow plots using threshold averages across ½, 1, 2 kHz and 1, 2, 4 kHz have been created to show the change in the air conduction thresholds of the operated ear compared to the non-operated ear for those who showed a threshold elevation as detailed above. Other than for five cases, detailed a-e in the results, widening of the air bone gap has not been examined; this should be considered as part of the surgical results and, particularly for the management of retraction pocket disease and cholesteatoma, may be the direct result of disease removal.

Results

One hundred and forty-five ear surgery and early complication records were completed in the period March 1993 to July 1996. The complications record was complete for 97 patients and incomplete for 48 patients. The incomplete records had not kept details of chorda tympani nerve symptoms, of jaw discomfort or dysfunction and of ear canal stenosis, although the latter was obvious from examination of the patient. The age range was 18 to 76 years and there were 77 females and 68 males. The findings are shown in Tables I to IV.

There were no dead ears as a result of surgery. The hearing results are detailed in Table V. A drop in bone conduction threshold occurred in six (4.6 per cent) cases, (only 144 ears were considered because one patient had a dead ear pre-operatively). Of these, two had a threshold elevation across frequencies 1, 2 and 4 kHz. Both patients had undergone modified radical mastoidectomy, one an uneventful procedure with no dissection in the oval window niche and the other had an inadvertent fistula created in the lateral semicircular canal which was immediately closed with bone wax, she suffered no further deterioration of bone conduction threshold on serial audiograms. One patient showed a 20 dB

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Accepted for publication: 17 May 1999.

TABLE I
SURGICAL PROCEDURES

	Complete record	Incomplete record	Total
Meatoplasty	2		2
Tympanotomy	2		2
Myringoplasty	20	12	32
Tympanoplasty	15	5	20
Cortical mastoidectomy plus other procedure	8	2	10
Revision tympanoplasty	2		2
Ossiculoplasty	4	1	5
Atticotomy/tympanoplasty	5	2	7
Open cavity procedure	34	22	56
Open cavity with mastoid tip removal	5	3	8
Mastoid obliteration		1	1

TABLE II
SURGEON PERFORMING SURGERY AND COMPLETENESS OF EARLY POST-OPERATIVE RECORD

	Complete record	Incomplete record	Total
Consultant	59	20	79
Senior Registrar	32	21	53
Registrar	6	5	11
Unspecified	0	2	2
Total	97	48	145

TABLE III
INCISIONS USED

	Complete record	Incomplete record	Total
Permeatal	9	0	9
Endaural	72	42	114
Heerman	2	1	3
Postaural	14	5	19
Total	97	48	145

TABLE IV
COMPLICATIONS RECORDED, HEARING LOSS DETAILED SEPARATELY

	Complete record	Incomplete record	Total
Infection			
—wound infection	4	4	8
—slow healing cavity	4	6	10
BIPP allergy (47 prev operations)	1	2	3
Vertigo/Imbalance	11	3	14
Facial nerve injury	0	0	0
Chorda tympani symptoms	25	0	25
Canal stenosis	0	1	1
TMJ			
—dysfunction	7	0	7
—discomfort	26	0	26

drop at the 4 kHz threshold with preservation of the 8 kHz air conduction threshold at the pre-operative level. This lady had a fistula of the lateral semi-circular canal recognized during surgery and the matrix overlying the fistula was removed after completion of the rest of the procedure and immediately before placement of the fascia graft.

The three other patients showed bone conduction threshold elevation at 4 kHz and air conduction threshold elevation at 8 kHz. The 4 kHz threshold elevation was between 15 and 35 dB and at 8 kHz between 20 and 60 dB. Of these patients, one underwent revision mastoidectomy with mastoid tip removal for recurrent cholesteatoma, and the other two had cortical mastoidectomy with myringoplasty for the management of active chronic mucosal suppurative otitis media.

A further 11 (7.6 per cent) patients showed an elevation of their 8 kHz air conduction threshold with no change to the bone conduction threshold at

TABLE V
HEARING LOSS AFTER SURGERY

N = 144	1/2 kHz and above	4 kHz only	4 and 8 kHz	8 kHz only
Number affected	2	1	3	11

https://doi.org/10.1017/S0022215100145268 Published online by Cambridge University Press

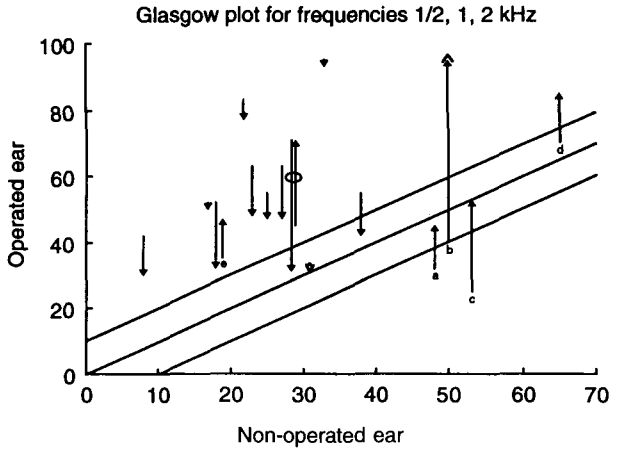

FIG. 1
Glasgow plot for frequencies ½, 1, 2 kHz.

lower frequencies. This threshold elevation was usually between 15 and 30 dB but in one case 45 dB and another 60 dB. The procedures done were mastoidectomy, tympanoplasty and myringoplasty.

The Glasgow plots charted for air conduction thresholds averaged across frequencies ½, 1, 2 kHz and 1, 2, 4 kHz are shown in Figures 1 and 2 respectively. One patient, shown with a loop around two arrows, showed an initial hearing loss across frequencies ½ to 4 kHz that was corrected by ossiculoplasty performed at a second stage operation. Not every patient with a bone conduction, or isolated 8 kHz air conduction threshold elevation following their surgery suffered a hearing loss across the frequencies often used for reporting surgical results, some patients showing an improved averaged hearing threshold following their surgery. Five patients (a–e) showed worse hearing after their surgery, in four cases the threshold elevation demonstrated on the Glasgow plot was primarily due to surgery to the ossicular chain; patient (b) had a bone conduction threshold elevation across all frequencies after a modified radical mastoidectomy.

Discussion

Facial nerve injury

Perhaps the most feared complication of middle-ear surgery is facial nerve injury and this small sample has fortuitously avoided this. Time will tell whether this laudable record can be maintained. Schuring (1988) argues that the occurrence of this complication should not necessarily be considered the result of negligence but rather a bad result of the procedure unless the procedure was done needlessly, without appropriate instrumentation (the use of a facial nerve stimulator is not considered mandatory (Roland and Meyerhoff, 1994; Fenton and Fagan, 1995; Green *et al.*, 1995) and without either the appropriate level of skill or supervision. The incidence of facial palsy as a consequence of chronic suppurative otitis media (CSOM) is estimated at two per cent (Deka, 1988; Wormald and Nilssen, 1997), it should be noted that these estimates are from India and South Africa, countries where there may be a tendency for later presentation and diagnosis. Although one may expect a lower incidence of this presentation of CSOM in the 'western world' it still does present in this fashion. Beeden *et al.* (1969) discussing a retrospective review of 180 mastoidectomies found 2.2 per cent of patients presented with a facial palsy. There are reports giving estimates of the incidence of facial nerve injury following middle ear and mastoid surgery. The Royal College of Surgeons mastoidectomy audit (Harkness *et al.*, 1995) estimated a 0.8 per cent occurrence from 365 open cavity procedures and none following 165 intact canal wall procedures. Lee and Schuknecht (1971) report two from 1074 tympanoplasty operations, Palva *et al.* (1976) had one permanent and one transient immediate palsy and nine delayed onset paresis following 2192 operations, all but the immediate permanent palsy recovered. Wormald and Nilssen (1997) reported a 1.7 per cent incidence of facial nerve palsy following surgery, one per cent being incomplete. They argue that this is similar to the incidence as a result of the disease within their population.

Dekka (1988) does not give an estimate of the incidence of this complication in his review of 10 post-operative facial nerve palsies presenting to and within his department. The sites of injury were to exposed nerve in the middle ear, at the second genu and in the vertical segment running through the mastoid. Another recorded site of trauma is at the stylomastoid foramen (Lee and Schuknecht, 1971). Wormald and Nilssen (1997) found that all cases in their surgical series occurred when the facial ridge was lowered. It should be remembered that an immediate paresis can occur because of the effect of local anaesthetic infiltration at the start of surgery, this should wear off within a few hours but can be disconcerting if the surgeon is uncertain of the integrity of the nerve at the end of the procedure (Madden, 1989). This last event can be avoided by injecting only diluted adrenaline when preparing the ear for surgery (D Kilby-personal communication).

The management of facial nerve trauma during middle-ear and mastoid surgery is not discussed here but is detailed elsewhere (Wiet *et al.*, 1994).

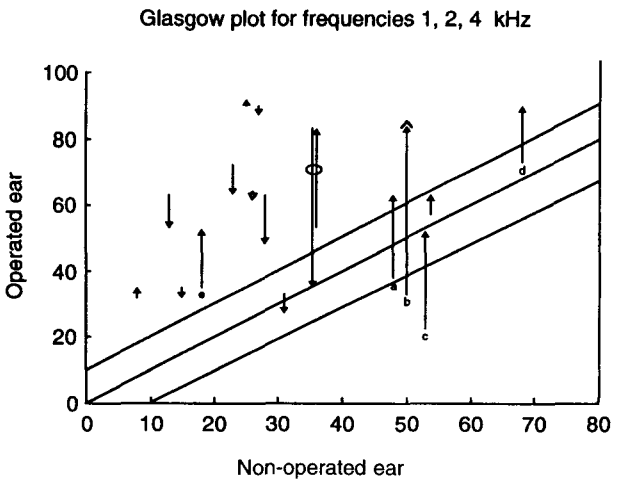

FIG. 2
Glasgow plot for frequencies 1, 2, 4 kHz.

https://doi.org/10.1017/S0022215100145268 Published online by Cambridge University Press

Sensorineural hearing loss

Previous reports of hearing loss following middle ear surgery have examined sensorineural losses by evaluation of peri-operative changes in bone conduction. English *et al.* (1971) reported a 'significant' post-operative increase in sensorineural hearing loss after incus transposition; five per cent of autograft incus procedures and three per cent homograft incus procedures. Smyth (1977) reports an overall risk of 2.5 per cent for a series of 1597 tympanoplasties, Lee and Schuknecht (1971) reviewed 1074 tympanoplasties and reported two profound hearing losses following surgical injury to the lateral semicircular canal, acoustic trauma to the cochlea in eight (0.8 per cent) cases and also record loss of bone conduction threshold in 20–23 per cent of cases, although the degree of loss is not clearly defined. Palva *et al.* (1973) analysed 1650 cases of surgery for chronic ear disease and found 75 (4.5 per cent) cases with some degree of high frequency hearing loss. The majority (57 per cent) showed the loss between four and 8 kHz only, 0.8 per cent of the whole series showed a diminished bone conduction threshold involving 1 kHz and above and 1.8 per cent involving 2 kHz and above. In a subsequent report (Palva *et al.*, 1976) they quote a dead ear rate of 0.5 per cent, some occurring for no apparent reason.

Tos *et al.* (1984) have analysed their results from 2303 cases of surgically treated chronic otitis media. They examined bone conduction thresholds up to 4 kHz and reported a post-operative sensorineural hearing loss in 28 (1.2 per cent) ears, 12 (0.5 per cent) with anacusis and 16 (0.7 per cent) showing a high frequency loss, defined as a loss of 80–100 dB at one frequency in the 0.5–4 kHz range.

Additionally they report another 19 (0.8 per cent) ears that showed a 4 kHz threshold elevation of lesser severity with preservation of the bone conduction threshold at 2 kHz and no loss of speech discrimination. The mastoidectomy audit performed by the Royal College of Surgeons of England (Harkness *et al.*, 1995) gave a 1.9 per cent incidence of dead ear, no comment was made about lesser degrees of hearing loss. None of the above have discussed changes in the air conduction threshold at 8 kHz alone with preservation of the 4 kHz bone conduction threshold at the pre-operative level. Shaan *et al.* (1995) describing the results of their modified Bondy technique, used on 37 patients, detail four patients with a worsening bone conduction threshold at 4 kHz and associated loss at 8 kHz.

The use of the Glasgow plot (Browning *et al.*, 1991) gives some idea of how hearing has changed as a result of surgery and compares this with the opposite ear, the plot is most useful for demonstrating whether the hearing in the operated ear becomes as good as or better than the unoperated ear. The patients reported in this audit were not all undergoing surgery that primarily aimed to improve hearing. The Glasgow plot is used to demonstrate that despite all the patients shown in Figures 1 and 2 having some loss of bone conduction, or a loss at 8 kHz, not all had worse hearing across those frequencies most involved in speech discrimination and so not all will have reported a hearing loss as a consequence of their surgery.

Sensorineural hearing loss following middle-ear and mastoid surgery can be attributed to: drill contact with an intact ossicular chain, excessive manipulation of the stapes or perilymph leakage following footplate trauma, surgical opening of the labyrinth, incautious manipulation of cholesteatoma overlying a fistula, placement of a total ossicular replacement prosthesis (TORP) at a primary procedure, the use of ototoxic preparations within the middle ear (particularly if the middle-ear mucosa appears normal) (Marais and Rutka, 1998) or no obvious reason. The possibility that drill noise contributes to sensorineural hearing loss in the 4–8 kHz range has been examined and the available evidence does not support this hypothesis (Man and Weinerman, 1985; Spencer and Reid, 1985; Urquhart *et al.*, 1992).

Palva *et al.* (1973) and Smyth (1977) give recommendations about peri-operative precautions that should be taken to minimize the occurrence of post-operative sensorineural hearing loss. Instrumentation of the intact chain or isolated stapes should be performed slowly to minimize stapes movement at the oval window. Dissection should be parallel to the malleus handle and at right angles to the long axis of the stapes. If oval window dissection proves difficult this can be halted and the ear re-explored six months to one year later. The incudostapedial joint should be dislocated early in the procedure if the ossicular chain is involved with disease or there is a risk of burr trauma. The possibility of a labyrinthine fistula must be borne in mind and any matrix removal left until the end of the procedure; there are arguments for, and against, matrix removal and there is broad agreement that in a better or only hearing ear the matrix should not be removed (Glasscock *et al.*, 1990; Sanna *et al.*, 1992). Canalis *et al.* (1987) presented six cases of surgical trauma to the lateral semicircular canal with preservation of hearing. Cullen and Kerr (1986) describe the use of bone wax. They recommend intra-operative closure of the defect, bed rest and antibiotic therapy. The potential ototoxicity of any material placed in the middle ear should be considered (Marais and Rutka, 1998).

With the development of laser technology and the use of argon or KTP lasers during middle-ear surgery there is the possibility of better per-operative haemostasis, particularly in the posterior tympanum and additionally stapes manipulation can be reduced, however, care needs to be taken to avoid thermal damage to the footplate and the facial nerve, the latter being at greatest risk if the bony canal is dehiscent.

Other complications

Other complications are usually considered less important. The Royal College of Surgeons of England mastoidectomy audit quoted between 4.1 and 5.9 per cent incidence of other unspecified complications (Harkness *et al.*, 1995). Palva (1976)

reported a 0.5 per cent incidence of wound infection and one case of wound haematoma requiring evacuation. Jackson *et al.* (1985) reported perichondritis in three per cent of their patients, all responded to antibiotic therapy. Samuel *et al.* (1995) described a case of atlanto-axial subluxation following an otherwise uneventful modified radical mastoidectomy.

Wound infection

A wound infection was noted in six per cent of cases, the diagnosis was clinical, based upon the presence of erythema, tenderness, fever or aural discharge. Otitis externa was included in this category. Swabs for culture and sensitivity were not routinely taken. Only one patient required admission for intravenous antibiotic therapy, all cases responded to antibiotic therapy. There were a further eight patients (six per cent) who had undergone open cavity surgery whose cavities were slow to heal, taking between two and six months to become dry.

The role of antibiotic prophylaxis or treatment for this type of surgery has been a source of debate. Raine and Swift (1985) examined British consultants' practice and found that for ear surgery 25 per cent never used prophylaxis and those who did mostly prescribed a single drug for five days. Carlin *et al.* (1987) examined the peri-operative and post-operative bacterial growth from patients entered into a trial examining the effect of peri-operative antibiotic prophylaxis. They concluded that the presence of a dry ear at the time of surgery did not predict an un-infected ear and that conversely wet ears did not necessarily grow pathogens. Additionally the use of systemic antibiotics neither eradicated pathogens present nor prevented their becoming present in the post-operative period. The use of antibiotic and steroid drops post-operatively effectively converted a wet ear to a dry sterile ear. Donaldson and Snyder (1966) have also shown that prophylactic sulphur methoxazole failed to alter the bacterial flora of the ear canal.

Donaldson and Snyder (1966), Bagger-Sjoback *et al.* (1987), Jackson (1988), John *et al.* (1988), Govaerts *et al.* (1998) and Hester and Jones (1998) have reported the results of randomized trials of prophylactic antibiotics used during middle-ear surgery. None of these studies showed a significant effect of antibiotic upon the development of peri-operative infection. Jackson (1988) studied antibiotic prophylaxis for ear surgery using a prospective consecutively assigned design with the analysing surgeon blind to the administration of antibiotic or placebo. He found no benefit from using peri-operative antibiotics. He did find a significant relationship between the pre-operative condition of the ear and post-operative infection, an ear infected before surgery was more likely to show infection afterwards, antibiotic prophylaxis did not reduce this tendency. Govaerts *et al.* (1998) showed that for stapedectomy and dry ears there was very little benefit using antibiotics other than that cefuroxime prophylaxis reduced the development of infection during the first post-operative week. However, they said that the overall effect of using prophylaxis in every case would be no more cost-effective than giving no prophylaxis and treating those infections that developed post-operatively when they presented.

The conclusion reached by Govaerts *et al.* (1998) was that it did not seem mandatory to give antibiotic prophylaxis although they recommended their use when operating upon draining ears and cholesteatoma. In contrast, John *et al.* (1988) and Hester and Jones (1998) could not recommend antibiotic prophylaxis. The latter stress the importance of aseptic technique and meticulous attention to surgical detail as paramount to the prevention of complications. This reflects the finding of Palva *et al.* (1976) that specific instruction of the residents regarding surgical technique prevented the occurrence of wound infection.

BIPP hypersensitivity

Lim *et al.* (1998) have examined the incidence of BIPP allergy and found this occurred in 5.9 per cent of their patients; two per cent of those with no previous BIPP exposure and 10 per cent of those previously exposed. This audit found such allergy in six per cent of 47 patients who had previously had ear surgery, it is probable, given that BIPP was the standard ear dressing used, that all 47 had had prior BIPP exposure. As a result of this there has been a change of practice within the department to avoid using BIPP for those previously exposed, the choice of dressing being the individual surgeon's choice.

Chorda tympani

Twenty-six per cent of patients reported of symptoms attributable to chorda tympani nerve trauma or section. Most had resolved by two weeks, one persisted for three months after surgery. Only one of these patients had had previous surgery to the operated ear. It was not recorded whether the nerve was preserved, stretched or cut during the operation. Chorda tympani trauma is an expected sequel to middle-ear surgery and it is thought that it should resolve within six weeks, this is borne out by these findings. Bull (1965) found that 80 per cent of patients who had chorda tympani nerve section during stapedectomy had subsequent symptoms of taste disturbance. About 50 per cent of those with stretching of the nerve noticed symptoms but most recovered. Bull concluded that it was worthwhile preserving the nerve.

Arnold (1974) noted that 46 per cent of patients with atticoantral CSOM were aguesic when tested using electrogustometry. She related this to the findings of Jeppson and Hallen (1971) that the nerve's function is reliant upon an intact microvascular blood flow which could be jeopardized by the nerve lying at the edge of a pocket or perforation, or being subjected to adjacent purulent discharge. This would also account for the smaller proportion of patients reporting taste disturbance following surgery for CSOM compared to stapedectomy. Chilla *et al.* (1979) have examined the effect of iatrogenic damage to the chorda tympani nerve. Eight patients who had division of the chorda

tympani during surgery for CSOM had immediate loss of gustatory function on the homolateral side of the tongue whereas only one of six patients who had stretching of the nerve was found to have deficient gustation. The patients' symptoms were not recorded and the study only lasted until the seventh post-operative day.

Persistent symptoms can occur following trauma to the chorda tympani and Formby (1971) describes such a case presented to the Medical Defence Union and the success of the defence, bolstered by the defending otologists use of a prepared form of consent that included this complication amongst the possible consequences of surgery. Jones and Fry (1984) describe symptoms of chorda tympani nerve irritation caused by entrapment between an ossicular prosthesis and the tympanic membrane.

Vertigo and imbalance

Post-operative imbalance has not been previously detailed except for those who present with vertigo or imbalance, and those found to have a fistula. In this study following surgery 14 (10 per cent) patients reported imbalance or vertigo. Three suffered vertigo, all had undergone open cavity surgery; one had a fistula and had symptoms for up to one month after surgery, another had a surgically-created fistula sealed with bone wax and had symptoms of BPPV which responded to the Epley manoeuvre and the third only suffered for two days. The others all suffered imbalance or 'dizziness', most were recovered within a week of their operation but in one case symptoms lasted six weeks.

Temporomandibular joint symptoms

Temporomandibular joint region discomfort including pain when eating occurred in 43 per cent of patients and usually had resolved by one week. Of these seven per cent had an altered bite. Patients were more likely to complain if tragal perichondrium was used as a graft. Another patient, not part of this audit, developed trismus following tympanoplasty, examination failed to elicit an alternative cause for the trismus. The temporomandibular joint had not been exposed and the tragal perichondrium had not been disturbed. The trismus had resolved by two weeks.

Meatal stenosis

Meatal stenosis occurred in one patient and responded well to meatoplasty. Lee and Schuknecht (1971) recorded 34 stenoses in their series of 1074 tympanoplasties. Shaan *et al.* (1995) records two cases out of 37, both required meatoplasty.

Haematoma

Bleeding into the wound can cause haematoma, this should be less likely when an endaural incision is used and closed only with skin sutures because there will be communication with the ear canal. The same holds for open cavity surgery. Thus, to some extent, the surgical technique and incision favoured by individual surgeons will influence the occurrence of this complication. The use of pressure dressings has been questioned (Hill *et al.*, 1993; Rowe-Jones and Leighton, 1993) and the argument against their use is based upon small numbers and cannot be called conclusive.

Occasionally there is bleeding from the wound, from granulation tissue which is often seen on the superior canal wall part of the endaural incision, or from a vessel under the wound. The latter may need formal ligation. East *et al.* (1991) have reported seroma as a complication of their mastoid obliteration technique.

Intracranial complications

Intracranial complications are rare. There are reports of nominal aphasia attributed to cortical venous thrombosis (Beeden *et al.*, 1969; Windle-Taylor, 1980; Girgis and Siegler, 1985; Osammor and Baruah, 1989). This being a diagnosis of exclusion and usually resolving spontaneously, treatment with antibiotic and anticonvulsant is recommended but whether their use speeds recovery is not known. Meningitis is a rare consequence of surgery for chronic otitis media, Dammeijer and McCombe (1991) record a case caused by canine *Pasteurella multocida*. Beeden *et al.* (1969) also describe three cases of meningitis and two cases of subdural abscess that they believed developed following mastoid surgery. They considered dural damage to be an important factor in these cases and they recommended the administration of a broad spectrum antibiotic. Dural exposure is common during mastoid surgery but CSF leakage is unlikely to occur unless there is complete perforation of the dura. Even in this situation a CSF leak may not be readily apparent and care should be taken to inspect such areas of injury. Neely and Kuhn (1985), consider full thickness dural injury to be necessary for the development of a CSF leak and later brain herniation. This injury when recognized should be repaired and can be done with fascia, muscle, perichondrium and cartilage (Neely and Kuhn, 1985) or by means of a mini craniotomy with placement of a composite or bone graft (Adkins and Osguthorpe, 1983). The latter techniques being sturdier could be expected to be more effective. This is, to some extent, supported by Matsuba *et al.* (1986) who reported a tension pneumocephalus following fascia repair of a dural tear that occurred during mastoidectomy. A similar complication has been described by Horowitz (1964).

Although O'Connor *et al.* (1977) considered BIPP toxicity unlikely following mastoid packing and despite the widespread use of BIPP as a packing material I have heard of two cases of BIPP extravasation into the posterior fossa (FW Stafford - personal communication and M Fields - personal communication). Both patients developed a headache after their open cavity surgery and one went on to develop signs of meningism. CT scanning showed radio-opaque material in the posterior fossa. Lumbar puncture and CSF culture excluded infection. The management involves removal of the dressing, toilet of the cavity, antibiotic as a precaution and appropriate analgesia.

Conclusion

This audit has recorded the early complications of surgery for chronic otitis media and the incidence is similar to previous reports. Also recorded are the frequency with which patients report symptoms of chorda tympani nerve trauma, jaw discomfort and balance disturbance during the early post-operative period. The potential complications of this type of surgery are discussed as are measures that can be taken to reduce the risk of post-operative sensorineural hearing loss.

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Appendix Summary of audit form used to record data of surgery for chronic otitis media

Patient details:

Pre-operative audiogram: ¼, ½, 1, 2, 4 kHz BC and AC, and 8 kHz AC

Findings
Pars tensa
Pars flaccida
Middle ear
Ossicular chain
Mastoid
Cholesteatoma: Y/N
Granulations: Y/N
Fistula: Y/N

Procedure Grade of Surgeon
Incision:
Procedure: eg. Tympanoplasty
Soft tissue graft
Ossicular chain repair/material
Silastic® in middle ear
Meatoplasty

Early follow-up
Time of pack removal
Infection
Dizzy/Vertigo
Facial nerve
Chorda tympani
Hearing loss
TMJ symptoms

Three month follow-up
State of tympanic membrane
State of cavity
Discharge: Present/Absent
Discharge since last visit
Recurrent/Residual disease
Audiogram: ¼, ½, 1, 2, 4 kHz BC and AC, and 8 kHz AC

Six month, one year and subsequent annual follow-up

As for three month follow-up

https://doi.org/10.1017/S0022215100145268 Published online by Cambridge University Press