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Main Article

Myringoplasty: a comparison of bismuth iodoform paraffin paste gauze pack and tri-adcortyl ointment ear dressing

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Abstract

Objectives: To assess the myringoplasty graft take rate, comparing two methods of post-operative ear packing: bismuth iodoform paraffin paste (BIPP) gauze versus tri-adcortyl ointment (TAO).

Methods: A retrospective study of patients who had undergone myringoplasty at our department within a three-year period was undertaken. Data, including age, site and size of perforation, grade of surgeon, surgical approach, use of post-operative ear dressings, complications, and audiometric outcome, were collected from the patient notes and analysed. The overall success rate of the operation (with success being defined as an intact tympanic membrane at six months) was noted.

Results: One hundred and seventy myringoplasties were performed over the study period, but data were complete on 154 patients and these constituted the study population. Age ranged from nine to 71 years (mean age 34 years) and the mean follow-up period was seven months. Consultants performed 62 per cent of the operations, with an 85 per cent success rate, whereas trainees performed the remaining 38 per cent, with a success rate of 73 per cent ($p = 0.059$). The overall success rate was 80 per cent; 79 per cent for BIPP and 83 per cent for TAO ($p = 0.55$), and 87 per cent for small perforations and 75 per cent for subtotal perforations ($p = 0.22$). There was audiometric improvement in 74 per cent of cases.

Conclusion: We found no significant difference in outcome between patients packed with TAO and BIPP. Packing with TAO is therefore a suitable alternative to BIPP gauze ear dressing following myringoplasty.

Key words: Myringoplasty; Otologic Surgical Procedures; Biological Dressings; Postoperative Care

Introduction

Myringoplasty is a commonly performed operation in otolaryngology, and many authors have quoted graft take rates ranging between 65 and 90 per cent.[1,2] Many factors influencing graft success have been cited, including size and site of the perforation, presence of infection, and surgical technique.

It is traditional practice to place a dressing pack within the external ear canal following myringoplasty. This is believed to provide protection to the operated site, hold the graft in situ, prevent sagging of the posterior canal wall and, perhaps, contain bleeding. The type of ear dressing used appears to vary and is determined by previous training, personal preference and, possibly, local availability. Ribbon gauze impregnated with bismuth iodoform paraffin paste (BIPP) is the traditional post-operative ear dressing currently used in many ENT departments in the UK. This is usually removed at the first post-operative out-patient visit, approximately two weeks post-operatively, and causes significant patient discomfort.[3]

Various types of ear packs have been described but none is as popular as BIPP. A prospective trial comparing four different ear packs following middle-ear surgery[3] (BIPP, Pope wick, Silastic sheeting and tri-adcortyl ointment (TAO)) did not show any significant difference in the degree of canal granulation, stenosis or discharge.

Tri-adcortyl ointment (containing triamcinolone acetonide 0.1 per cent, gramicidin 0.025 per cent, neomycin 0.25 per cent (as sulphate) and nystatin 100 000 units/g in Plastibase® (Squibb, Hounslow, England)) is thick and therefore provides some degree of support to the tympanomeatal flap and graft when applied as an ear canal dressing. It is easy to apply directly onto the tympanic membrane with a syringe and Zolner ear suction nozzle, is well tolerated by patients when left in situ and can be left to extrude spontaneously. This avoids the

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discomfort of ear pack removal and an unnecessary out-patient visit.

The success rate of myringoplasty packed with TAO has not been sufficiently reported in the literature. Therefore, we set out to evaluate the difference in myringoplasty outcome (with a satisfactory outcome being defined as an intact graft at six months) between patients who received a traditional BIPP pack and those who received only TAO.

Material and methods

This retrospective study examined all patients who had undergone a myringoplasty at the City Hospital, Birmingham, within a three-year period (January 2001 to January 2004). These patients were identified via a search of the theatre logbooks. Only patients with mucosal chronic otitis media who had undergone a simple myringoplasty (tympanoplasty type one) were included in the study. Patients who had undergone any other procedures (e.g. cortical mastoidectomy or ossiculoplasty in addition to myringoplasty) were excluded in order to obtain as homogenous a group as possible. Data collected from patients' notes included the following variables: age, grade of operating surgeon, size and site of perforation, surgical approach, use of post-operative ear canal dressing, complications, and audiometric outcome.

The overall success of the operation (with a satisfactory outcome being defined as an intact tympanic membrane at six months) was documented and used as our main outcome measure. We specifically set out to determine whether post-operative ear dressings (i.e. bismuth iodoform paraffin paste (BIPP) pack versus tri-adcortyl ointment (TAO) alone) affected the success rate of the operation. The success rates of the two groups of patients (BIPP versus TAO) were subjected to statistical analysis using the chi-square test. We also sought to identify any risk factors leading to graft failure.

Perforation size was graded according to percentage of the tympanic membrane pars tensa involved, as follows: small (<40 per cent), medium (40–70 per cent), and large or subtotal (>70 per cent).

The audiometric outcome of the operation was documented but was not the main focus of the study. A four frequency mean change between pre- and post-operative air conduction thresholds was calculated. A positive value indicated an improvement in mean hearing threshold.

Statistical analyses of the difference in success rates between consultants and trainees, large and small perforations, and different perforation sites were also conducted using the chi-square test.

Results

A total of 170 myringoplasties were performed over the three-year study period. However, data were incomplete on 16 patients and these were therefore excluded from the results. The mean age of the patients was 34 years, with a range of nine to 71 years. There were 124 (81 per cent) adult patients (aged 16 years and above) and 30 children in the study population.

The endaural approach was used in 127 (82 per cent) cases, whereas a post-aural or permeatal approach was used in 16 (10 per cent) and eight (5 per cent) patients, respectively. The surgical approach was not stated for three (2 per cent) patients. Temporalis fascia was used in 152 myringoplasties using an underlay technique and a fat graft in two patients. The wound was closed using subcuticular resorbable sutures in 137 patients, whereas external sutures were used in 15 patients. The method of wound closure was not stated for the remaining two patients.

The follow-up interval ranged from six to 28 months (mean, seven months).

Grafts were intact in 124 patients at the last follow-up visit, giving a success rate of 80 per cent. The success rate was 85 per cent for consultants and 73 per cent for trainees, as shown in Table I (chi-square = 3.557 on one degree of freedom, $p = 0.059$).

The size and site of the perforation were assessed from diagrams and figures completed by the operating surgeon and the success rates determined for each variable. The results for perforation size and site are shown in Tables II and III, respectively. The success rate for large or subtotal perforations was 75 per cent, compared with 87 per cent for small perforations. However, a chi-square test for association between size of perforation and outcome, performed using Minitab® Student Release 12, a statistical software for windows, gave a result of 3.043 on two degrees of freedom, with a p value of 0.218, i.e. the association was not statistically significant. Thus, there is no evidence to suggest an association between perforation size and success rate. The size of the perforation was not stated for three cases and these were therefore excluded from the analysis. There was also no significant difference in outcome between the perforation sites ($p = 0.106$).

One hundred and six patients received a bismuth iodoform paraffin paste (BIPP) dressing inserted into the ear canal post-operatively and 48 received tri-adcortyl ointment (TAO) alone. Success rates were 79 per cent (84/106) for the BIPP dressing and 83 per cent (40/48) for TAO application (Table IV). This was not found to be statistically significant (chi-square = 0.352 on one degree of freedom, $p = 0.553$). The overall complication rate was 13.6 per cent (21/154) and included ear infection in 16 patients, wound infection in four and a hypersensitivity reaction to BIPP in one patient, as shown in Table V.

There was an improvement in the average hearing thresholds on pure tone audiometry in 74 per cent of

TABLE I

OPERATING SURGEON GRADE AND MYRINGOPLASTY OUTCOME

Grade of surgeon	Outcome (n)		Total (n)
	Success	Failure	
Consultant	81 (85%)	14	95
Trainee	43 (73%)	16	59
Total	124	30	154

Chi-square = 3.557, one degree of freedom, $p = 0.059$

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TABLE II

PERFORATION SIZE AND MYRINGOPLASTY OUTCOME

Perforation size	Outcome (*n*)		Total (*n*)
	Success	Failure	
Small (<40%)	27	4	31
Medium (40–70%)	37	6	43
Large (>70%)	58	19	77
Total	122	29	151

Chi-square = 3.043, one degree of freedom, $p = 0.218$

TABLE III

PERFORATION SITE AND MYRINGOPLASTY OUTCOME

Perforation site	Outcome (*n*)		Total (*n*)
	Success	Failure	
Anterior central	37	5	42
Posterior central	26	3	29
Subtotal	58	19	77
Not stated	3	3	6
Total	124	30	154

Chi-square = 4.480, two degrees of freedom, $p = 0.106$

TABLE IV

DRESSING TYPE AND MYRINGOPLASTY OUTCOME

Dressing	Outcome (*n*)		Total (*n*)
	Success	Failure	
BIPP gauze	84	22	106
TAO	40	8	48
Total	124	30	154

Chi-square = 0.352, one degree of freedom, $p = 0.553$. BIPP = bismuth iodoform paraffin paste; TAO = tri-adcortyl ointment

TABLE V

POST-OPERATIVE COMPLICATIONS,* BY DRESSING

Complication	BIPP (*n*)	TAO (*n*)	Total (*n*)
Ear infection	14	2	16
Wound infection	3	1	4
Hypersensitivity reaction	1	0	1
Total	18	3	21

*Number of patients. Chi-square = 0.583, two degrees of freedom, $p = 0.747$. BIPP = bismuth iodoform paraffin paste; TAO = tri-adcortyl ointment

the patients; however, there was no change in 3 per cent of cases and a deterioration in hearing in a further 3 per cent. In the remaining 20 per cent of cases, the post-operative audiogram was either not performed or could not be identified in the case notes.

There was a higher failure rate amongst patients with large perforations (compared with those with small perforations) and in patients operated on by trainees (compared with those operated on by consultants), although the difference was not statistically significant in either case. The types of ear dressing, age of the patient, presence of infection and revision status were not found to influence the outcome of surgery.

Discussion

The graft take rate following myringoplasty using temporalis fascia is generally around 80 per cent.[1,4,5] Graft take rates as low as 56 per cent[4] and as high as 92 per cent[2] have been reported by different authors. Most studies have shown a significant difference between the take rates for small and large perforations, with small perforations giving better results.[1,4] This present study also showed proportionately better results in patients with small perforations (87 per cent) compared with large perforations (75 per cent). However, this difference was not statistically significant ($p = 0.218$); thus, there is no evidence from the present study to suggest an association between perforation size and success rate. The excellent results reported by Yung[2] in 1995 in patients with large perforations have not been replicated by other UK series. This could be explained by the fact that this was a single surgeon's series concentrating on a particular repair technique, and was thus not necessarily representative of routine techniques used in current practice.

It is traditional practice to place a dressing pack within the external ear canal following myringoplasty; this is believed to protect the operated site, hold the graft in situ, prevent sagging of the posterior canal wall and, perhaps, contain bleeding. The results of the present study indicate that there is no significant difference ($p = 0.553$) in myringoplasty success rates following bismuth iodoform paraffin paste (BIPP) (80 per cent) and tri-adcortyl ointment (TAO) (83 per cent) ear dressings applied post-operatively. This finding is important and clinically relevant, as it implies that TAO, which already has several potential advantages, may well be a suitable alternative to the traditionally used BIPP pack. Tri-adcortyl ointment is thick and therefore provides some degree of support to the tympanomeatal flap and graft. It is easy to apply directly onto the tympanic membrane using a syringe and Zolner suction nozzle. It is well tolerated by patients when left in situ and can be left to extrude spontaneously. This avoids the discomfort of ear pack removal and an unnecessary out-patient visit, thereby potentially reducing the cost of care. In contrast, BIPP gauze has several potential disadvantages. The BIPP ear canal dressing must be gently packed into the ear canal – if it is packed too tightly it may disturb the graft and if too loose it may extrude early. The BIPP pack may also adhere to the graft, ear canal or, in particular, the tympanomeatal flap, traumatizing these and disturbing the graft on removal.[6]

The type of ear dressing used is determined by previous training, personal preference and, possibly, local availability. Ribbon gauze impregnated with BIPP is the traditional post-operative ear dressing currently used in many ENT departments in the

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UK.[3] The BIPP pack was introduced by Rutherford Morison in 1916 for the treatment of infected, suppurating war wounds[7] and became popular due to its astringent and antiseptic properties. However, Nigam and Allwood[8] found that BIPP had negligible antibacterial activity in their study using growth on seeded agar plates. Also, use of BIPP packs is not without risk, as hypersensitivity reactions of varying degrees and idiosyncratic toxic side effects (the latter particularly in children) are occasionally seen.[9] The pack also causes significant discomfort and irritation to the patient whilst in situ, and patients find it unpleasant to remove. In a study comparing four different ear packs applied following middle-ear surgery (BIPP, Pope Wick, Silastic sheeting and TAO), Zeitoun *et al*.[3] found no statistically significant difference in the degree of canal granulation, stenosis or ear infection. They did, however, find a significant difference in the degree of itchiness with the dressing in situ and pain on removal, with Silastic sheet being the best and BIPP the worst. The use of a Pope wick requires strict compliance as the patient is required to apply ear drops regularly in order to keep it moist and expanded,[3,6] and this therefore makes it a less than ideal dressing.

Using subcuticular sutures to close the wound, rather than the removable ones commonly used in many centres, reduces patient visits to the hospital or general practitioner, and this in turn releases time to see other patients.

The graft take was higher (85 per cent) in patients operated on by consultants than in those operated on by trainees (72 per cent). However, this was not statistically significant ($p = 0.059$).

Most of the perforations were centrally sited, with the success rate for anteriorly sited perforations being marginally lower (88 per cent) than that for more posteriorly sited perforations (91 per cent). These findings are comparable with the results of Kotecha *et al*., who reported success rates of 76 per cent and 91 per cent for anterior and posterior perforations, respectively.[1]

- **Myringoplasty is a common ENT procedure**
- **Bismuth iodoform paraffin paste (BIPP) impregnated gauze is routinely used post-operatively as an ear pack in order to support and protect the graft**
- **This study compared the success rates of BIPP gauze and tri-adcortyl ointment (TAO) as ear packs following myringoplasty. The results indicate no significant difference in success rates between patients with BIPP and TAO post-operative ear dressings**
- **Tri-adcortyl ointment is a suitable alternative ear dressing to BIPP following myringoplasty**

This was a retrospective study, and there were limitations in obtaining complete data in some of the cases. Also, no standard method of documentation and reporting was adopted during the period of study, in common with most such studies. A prospective, randomized study comparing BIPP and TAO ear dressings may be desirable.

Conclusion

This present study did not demonstrate any difference in the outcome of myringoplasty procedures between patients packed with TAO and BIPP gauze dressing. Therefore, TAO is a suitable alternative to BIPP gauze pack for post-myringoplasty ear canal dressing.

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