

Main Articles

A randomized prospective trial to compare four different ear packs following permeal middle ear surgery

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Abstract

Surgeons choice of an ear pack is dictated by availability, previous training and personal preference. There has been no recent prospective study evaluating the use of different types of ear packs. This randomized prospective study compares the use of BIPP impregnated ribbon gauze (Aurum), Pope wicks (Xomed-Teace), silastic sheeting (Dow Corning) and tri-actocortyl ointment (Squibb) as an ear dressing following 'clear' middle ear procedures via a permeal approach. The results showed that there was no statistically significant difference in post-operative pain and discomfort experienced, neither was there any significant difference regarding the otolaryngologist's assessment of the degree of canal granulation, stenosis or discharge with the above named packs. This study concludes that non-traditional dressings such as tri-actocortyl ointment or simply a thin silastic sheet placed on the drum are no worse than time honoured BIPP. They have, as well, the advantage of being well-tolerated by the patients.

Key words: Surgery, ear; Earache; Ear canal; Biological dressings

Introduction

It is believed that a dressing pack within the external ear canal following ear surgery provides protection to the operated site, holds the graft *in situ*, prevents sagging of the posterior canal wall and may stop, or contain, bleeding. The type of ear dressing used appears to be dictated by availability, previous training and personal preference. There has been no recent prospective study comparing the use of different types of ear dressings.

Ribbon gauze impregnated with bismuth iodoform paraffin paste (BIPP) is the traditional ear dressing (Nigam *et al.*, 1991). Its popularity has been due to its astringent and antiseptic properties (Nigam and Allwood, 1990). However, it has occasionally been associated with severe hypersensitivity reactions as well as idiosyncratic toxic side-effects (Le Quesne, 1981; Jones, 1990; Nigam *et al.*, 1991). More recently, less traditional methods to dress the ear have been introduced, which are the merocel Pope ear wick, antibiotic-containing ointments or simply a thin silastic sheeting. Pope wick is a compressed polyvinyl acetate sponge which expands transversely when wet and exerts pressure on the restored meatal flap, its use as a post-operative ear pack has been described before (McRae *et al.*, 1992). Antibiotic ointments form a thick paste, its viscosity supports the tympanic

membrane, graft or meatal flap post-operatively (Shea, 1994). The use of a thin silastic sheet covering the drum and the posterior meatal flap as an ear dressing has not been previously reported.

It has been our clinical impression that the post-operative ear dressing and its subsequent removal often causes the most discomfort to the patient. Therefore, this study was designed to allow a subjective (patient) and objective (surgeon) comparison of four different ear dressings following 'clean' middle ear surgery performed via a permeal approach. It did not aim to evaluate rare complications of individual ear dressings as previously described in the literature (Le Quesne, 1981; Jones, 1990; Nigam *et al.*, 1991).

Materials and methods

Forty consecutive patients undergoing clean middle ear procedures (tympanoplasty or tympanotomy), through a permeal approach, were randomized by a sequential numbered, opaque, sealed, envelope system to one of four methods of post-operative ear dressing. The ear dressings compared were BIPP-impregnated 1.25 cm ribbon

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gauze (Aurum Pharmaceutical), Pope wick (Xomed-Treace), silastic sheet (0.01 inch by Dow Corning) or tri-adcortyl ointment (Squibb).

All operations were performed by a consultant or a senior trainee (two consultants and MM or HZ). In each case a posterior tympano-meatal flap was raised via a permeatal approach. For myringoplasties a temporalis-fascia graft was taken through a separate incision and an underlay technique on an absorbable gelatine sponge (Spongistan by Johnson and Johnson) base was used (Frootko, 1987). After replacing the tympano-meatal flap the randomized ear dressing was applied.

The BIPP impregnated gauze was cut to a length of approximately 5 cm and inserted into the operated external ear canal on a single layer of Spongistan covering the graft and flap. The Pope wick was inserted on a layer of Spongistan, then moistened with a few drops of Sofradex (dexamethasone, framycetin and gramicidin by Roussel) to allow its expansion. The silastic sheet was cut to a width of approximately 0.5 cm and a length twice that of the bony external auditory canal. The centre of the strip was inserted to overly the tympanic membrane (Figure 1). Triadcortyl ointment was applied via a syringe and a suction tip into the external auditory canal until the tympanic membrane and tympano-meatal flap were covered (Figure 2). No head bandages were used.

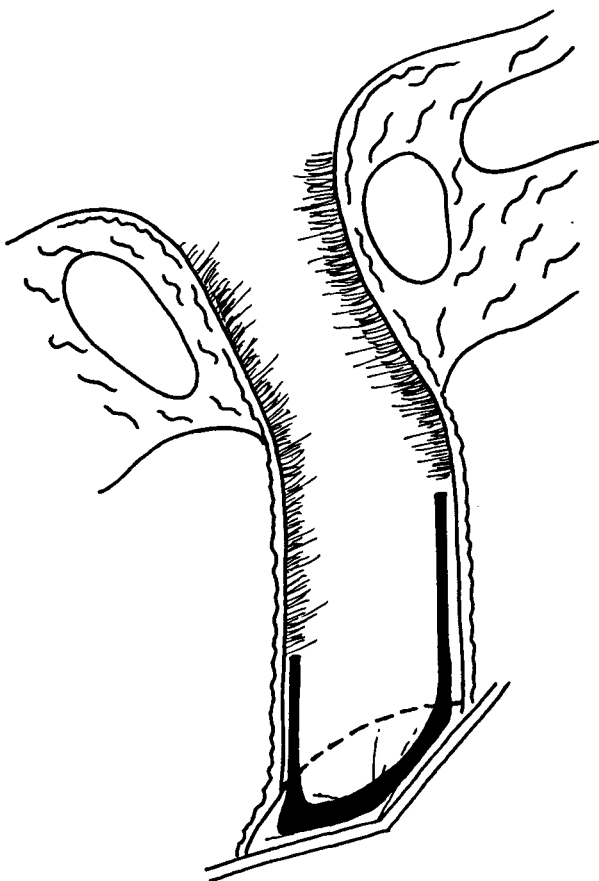


FIG. 1

A silastic sheet *in situ*, notice that its centre overlies the drum while its posterior third covers the posterior meatal flap.

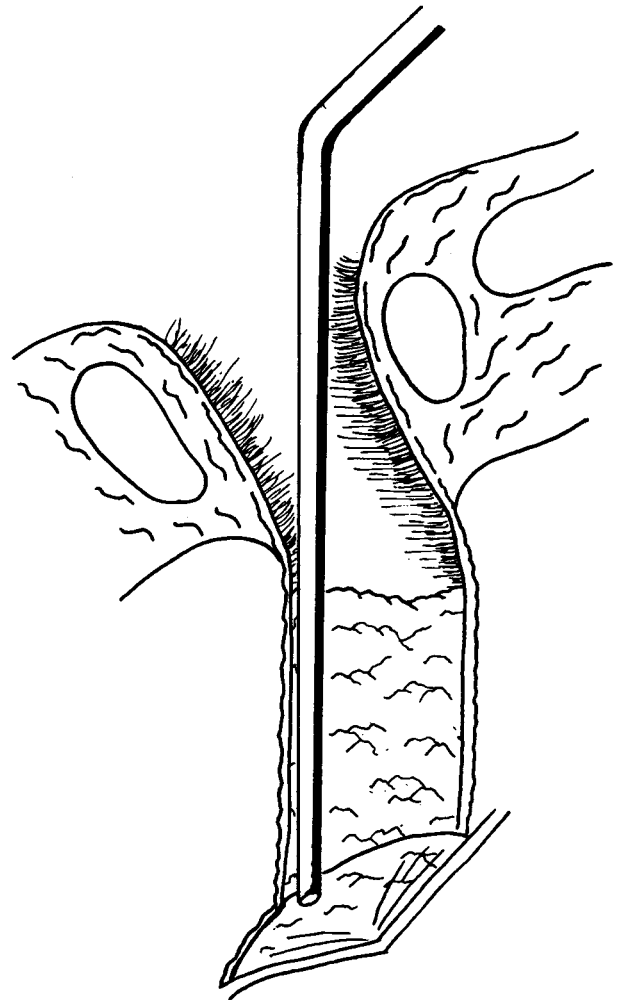


FIG. 2

The technique for applying tri-adcortyl ointment. Note that the thin suction tip is placed in the anterior recess, while the ointment is injected through it via a syringe. That technique insures the spread of the ointment on the drum.

All patients were discharged home with a known amount of paracetamol the day following surgery, and were asked to keep their ear clean and dry. Patients allocated the Pope wick were prescribed Sofradex ear drops, two drops applied to the wick three times a day until its removal. Follow-up appointments were arranged two and four weeks post-operatively.

Ten cm, linear, unmarked visual analogue scales (VAS) were used to score the patients post-operative ear symptoms. Zero represented no symptoms and '10' the worst imaginable symptom (Jensen *et al.*, 1986). Each patient was asked to indicate the degree of post-operative discomfort before the first dose of analgesia (paracetamol).

At the first follow-up visit (two weeks post-

TABLE I
TYPES OF MIDDLE EAR PROCEDURES INCLUDED AND THE EAR DRESSING USED

	BIPP	Pope	Silastic	TAC oint.
Myringoplasty	7	7	6	6
Tympanotomy	3	3	4	4

TABLE II

TABLE OF RESULTS SHOWING EAR RELATED SYMPTOMS, EXPRESSED ON VISUAL ANALOGUE SCALE, WITH DIFFERENT POST-OPERATIVE EAR DRESSINGS

Ear related symptoms	Linear analogue scores (0 to 100 millimetres)				Kruskal-Wallis test
	BIPP gauze Median (Interquartile range)	Pope wick Median (Interquartile range)	Silastic sheet Median (Interquartile range)	TAC oint. Median (Interquartile range)	
Immediate post-operative pain	26.5 (12-45)	11 (3-16)	14 (2-17)	17.5 (3-36)	No significant difference
Discomfort during first 2 post-operative weeks	21 (2-30)	15 (2-22)	15 (2-40)	3 (2-4)	No significant difference
Itching during first 2 post-operative weeks	56.5 (38-83)	37 (28-51)	5.5 (2-13)	19.5 (1-50)	Overall $p = 0.015$
Weeping during first post-operative weeks	18.5 (3-50)	11.5 (2-24)	16.5 (8-24)	15 (3-36)	No significant difference
Pain on removal of ear dressing at end of second post-operative week	46.5 (19-69)	18.5 (15-22)	5.5 (3-10)	48.5 (4.71)	Overall $p = 0.007$

operatively), the use of analgesia since hospital discharge was noted, the ear dressing was removed, a swab for culture was taken from the external ear canal and ear toilet was performed. Each patient was asked to describe the severity of pain, itching and weeping over the preceding two weeks and the discomfort on removal of ear dressing all on the visual analogue scales. As blinding was not possible each patient was assessed by two otolaryngologists, a trainee and one consultant, who entered on a visual analogue the degree of ear canal granulation, stenosis and ear discharge. The mean scores of both clinicians provided the data for this study. Only the first doctor could record the ease of dressing removal and ear cleaning.

On the second follow-up appointment (four weeks post-operatively), ear toilet was repeated. The patients were asked to describe the severity of pain, itching and weeping over the preceding two weeks on a similar visual analogue scale. Then patients were reassessed by the two doctors as described previously.

The data was not normally distributed and included four unrelated groups, therefore it was analysed using a non-parametric (Kruskal-Wallis) test (Seigel, 1956). Results were considered significant where p was less than 0.05.

Results

Forty consecutive patients were recruited, 10 for each group, into the study. Twenty-eight were females and 12 males. Twenty-six patients had a tympanoplasty and 14 had a tympanotomy. Patients were found to be age and sex matched in the different groups and no one surgeon was found to have used a particular ear dressing more frequently than can be expected by chance. Table I shows the types of operations performed and the ear dressings used.

Table II shows the severity of various symptoms described by the patient. There was no statistically significant difference in post-operative pain and discomfort between these four groups and similarly there was no difference in analgesia use. For post-

TABLE III

TABLE OF RESULTS SHOWING CLINICAL FINDINGS AFTER EAR DRESSING REMOVAL EXPRESSED ON VISUAL ANALOGUE SCALES

Ear canal related findings by the doctor	Linear analogue scores (0 to 100 millimetres)				Kruskal-Wallis test
	BIPP gauze Median (Interquartile range)	Pope wick Median (Interquartile range)	Silastic sheet Median (Interquartile range)	TAC oint. Median (Interquartile range)	
<i>End of second week</i>					
Ease of dressing removal at end of second week	11.5 (3-40)	9.5 (2-11)	5 (3-6)	4.5 (3-8)	No significant difference
Discharge	21.5 (7-29)	15 (3-20)	2.5 (2-10)	5 (4-5)	Overall $p = 0.05$
Granulation tissue	12 (3-37)	18.5 (3-23)	4 (2-7)	5 (3-10)	No significant difference
Stenosis	2 (2-4)	1 (1-2)	2 (2-3)	4 (3-5)	Overall $p = 0.01$
<i>End of fourth week</i>					
Discharge	1.5 (0-3)	2.5 (1-4)	1.5 (0-2)	3 (2-5)	No significant difference
Granulation tissue	1.5 (0-2)	5.5 (2-7)	2 (0-2)	3.5 (3-4)	Overall $p = 0.023$
Stenosis	2.5 (0-4)	3 (1-4)	1.5 (0-2)	3 (2-4)	No significant difference

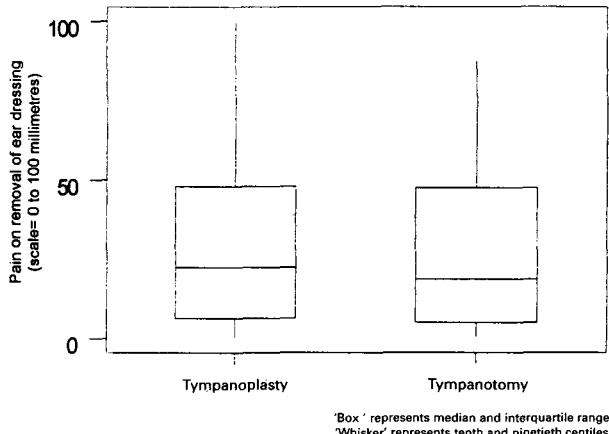


FIG. 3

Box and whisker plot of visual analogue pain scores for removal of ear dressing, in tympanotomy and tympanoplasty.

operative itching there was a significant difference ($p < 0.015$) between the groups with BIPP gauze and Pope wick as compared to silastic sheet dressing.

Patients with BIPP gauze and tri-alcortyl ointment also described significantly ($p < 0.007$) more ear pain than the silastic sheet group when it came to removal of dressing at the end of two weeks. The inclusion of a pain score for removal of tri-alcortyl ointment is artificial since it would normally be allowed to be expelled naturally and hence pain free.

Table III shows outpatient findings as scored by the doctors on the follow-up appointments. Statistical significance was only reached for discharge within the ear at two weeks. Silastic sheet dressing was significantly ($p = 0.05$) better for this than BIPP gauze.

Culture studies produced three positive results for the BIPP group of patients, two positives for the silastic sheet and one positive for the tri-alcortyl ointment group. One patient with a Pope wick showed pus and discharge from the ear post-operatively, his swab grew Gram positive cocci.

It was noted that one Pope wick dressing fell out because it was kept too dry. Two patients with silastic ear dressings had minor bleeding from the operated ear immediately post-operatively. In both cases this bleeding subsided spontaneously within a few hours. One patient with a BIPP gauze dressing had a residual perforation four weeks following a tympanoplasty.

No statistically significant difference was recognized for the different parameters on regrouping the studied ears according to the procedure undertaken, tympanoplasty or tympanotomy, rather than type of ear pack. Figure 3 demonstrates the similarity in position and distribution of both groups regarding the pain score on pack removal. Neither was there any significant difference on regrouping the studied ears according to the assessors, the trainee or consultants, regarding the clinical findings after removal of the ear dressing.

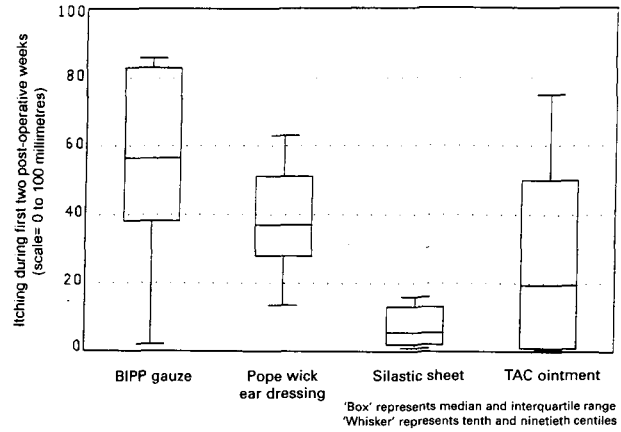


FIG. 4

Box and whisker plot of post-operative itching, described on visual analogue scores, for different types of ear dressings.

Discussion

The following are features one would expect from an ideal ear pack following surgery:

- Easy to apply and remove
- Comfortable *in situ*
- Bactericidal
- Hypo-allergenic
- Inert
- Non ototoxic
- Provide mechanical support to ext. canal

No pack, to our knowledge, is ideal. All ear dressings in this study are suitable with some differences.

BIPP impregnated gauze was the least satisfactory ear dressing in this study. It scored worst on most parameters. Patients with a BIPP pack suffered the most pain immediately post-operatively. It was the most uncomfortable pack *in situ* and caused considerable itching (Figure 4). In addition, it was fairly painful to remove (Figure 5). Objectively, BIPP packs caused considerable irritation to the external auditory canal in the form of discharge and granulation (Figure 6). Although none of the BIPP packs were associated with an ear infection, it did not have

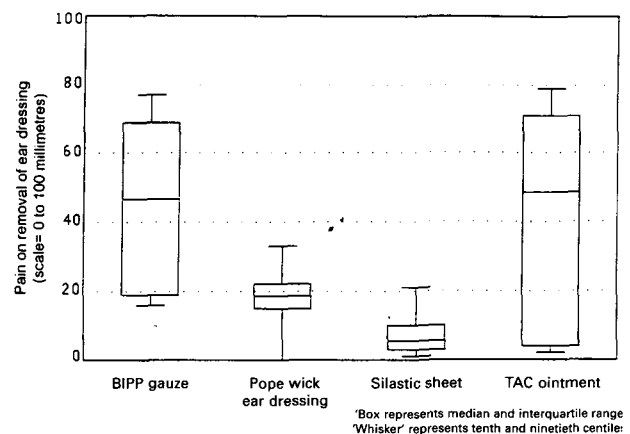


FIG. 5

Box and whisker plot of visual analogue pain scores for removal of different ear dressing two weeks post-operatively.

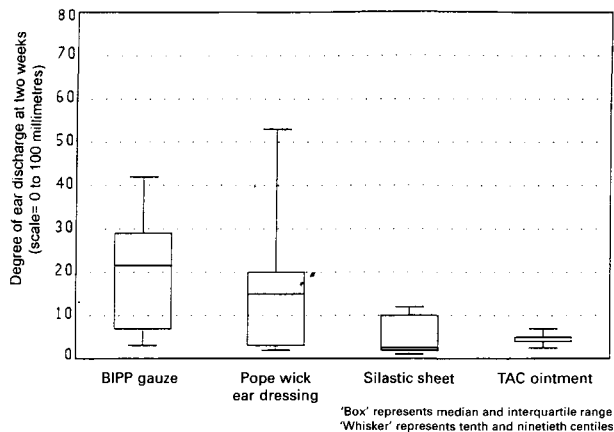


FIG. 6

Box and whisker plot of ear discharge two weeks post-operatively for different ear dressings as described on visual analogue scores by the doctor.

good antiseptic properties as previously described (Nigam and Allwood, 1990). There were three positive cultures for assorted organisms in this group.

Less traditional packs proved more comfortable. Silastic sheeting is easy to insert and remove. It proved the most comfortable dressing in this study in terms of itching and scored well for pain. Ear dressed with a silastic sheet showed the least granulation and contained the least amount of discharge. The finding that two patients had minor post-operative bleeding in this group stresses the need for meticulous haemostasis.

Tri-actocortyl ointment is thick and therefore provides some degree of support to the tympanomeatal flap. It scored well in most parameters in this study. As tri-actocortyl is well tolerated *in situ*, it could be left to extrude spontaneously to avoid the discomfort associated with its removal.

Merocel Pope ear wick is expensive and requires to be kept moist. Poor patient compliance can cause it to dry, fall out or render its removal uncomfortable, as observed in one of the patients in this study. Although it scored better than BIPP in most parameters, the presence of a cheap readily available alternative to dress the ear canal such as tri-actocortyl ointment make its use difficult to justify.

Otologists follow various regimes for post-operative care of their patients (eg. the period packs are kept *in situ* varies from one to four weeks in different institutions). In this study a relatively shorter period of two weeks for removal of packs was followed to ensure patients compliance and to evaluate the condition of the ear canal during healing. That period was fixed to allow direct comparison between the different packs. It may prove that the removal of some ear packs is more comfortable after most

healing is completed (four weeks), although the added discomfort of their presence has to be considered.

Conclusion

There is no ideal ear pack. Non-traditional ear dressings described in this study are certainly no worse than BIPP and in some areas proved better. Covering the drum with a silastic sheet proved the best tolerated method for dressing the ear following a permeal approach, although surgical technique to minimize the chances of a post-operative bleeding has to be meticulously adhered to.

This study identifies minimal differences between the above ear packs and raises the question whether packs are necessary at all following a permeal approach.

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References

- Frootko, N. G. (1987) Reconstruction of the ear. In *Scott-Brown's Otolaryngology*. 5th Edition, vol. 3. (Kerr, A. G., ed.), Butterworths & Co. Publishers, London, pp 238-241.
- Jensen, M. P., Kardy, P., Braver, S. (1986) The measurement of clinical pain intensity: a comparison of six methods. *Pain* **27**: 117-126.
- Jones, J. A. H. (1990) BIPP: A case of toxicity? *Oral Surgery, Oral Medicine and Oral Pathology* **69**: 668-671.
- Le Quesne, P. M. (1981) Toxic substances and the nervous system; the role of clinical observation. *Journal of Neurology, Neurosurgery and Psychiatry* **44**: 1-8.
- McRae, D., Dilkes, M., Kenyon, G. (1992) The Pope wick as a myringoplasty ear canal dressing. *Journal of Laryngology and Otolaryngology* **106**: 327-328.
- Nigam, A., Allwood, M. C. (1990) BIPP - How does it work? *Clinical Otolaryngology* **15**: 173-175.
- Nigam, A., Ruddy, J., Robin, P. E. (1991) BIPP induced methaemoglobinemia. *Journal of Laryngology and Otolaryngology* **105**: 78-79.
- Seigel, S. (1956) *Non-parametric Statistics: for the Behavioural Sciences*. McGraw-Hill, Tokyo. pp 184-193.
- Shea, M. C. (1994) Tympanoplasty the undersurface graft technique. In *Otologic Surgery*, (Backman, D. E., Shelton, C., Arriago, M. A., eds.) W. B. Saunders Company, London, pp 133-140.

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