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Mastoidectomy packs: Xeroform® or BIPP?

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Abstract

A retrospective study comparing adverse events using bismuth iodoform paraffin paste (BIPP) and Xeroform as dressings for newly fashioned mastoid cavities after mastoidectomy was undertaken. There were 20 patients in each group. Adverse events were defined as offensive packs, mastoid cavity infections and systemic signs of infection. There were no adverse events using BIPP packs whether or not prophylactic antibiotics were used. Xeroform packs were associated with a significantly higher incidence of adverse events compared to BIPP when using no antibiotic prophylaxis ($P<0.005$) or amoxycillin ($P<0.005$). Adverse events with Xeroform packs were abolished using ciprofloxacin and metronidazole prophylaxis. We conclude that BIPP is the mastoid dressing of choice.

Introduction

Ribbon gauze impregnated with bismuth iodoform paraffin paste (BIPP) is a time-honoured antiseptic dressing used in ENT, oral and maxillofacial surgery. Its use has been relatively trouble free even when left in a cavity for several weeks. The paste consists of two parts iodoform and one part bismuth subnitrate in a liquid paraffin base. It was first introduced by Rutherford Morison (1916) as an effective dressing in the management of war wounds. It was used routinely at the Royal London Hospital to pack mastoid cavities until April 1990 when the hospital pharmacy was unable to obtain BIPP paste from Evans Pharmaceutical.

Xeroform (Chesebrough Pond's Inc., Greenwich, CT 06830) is sterile non-adherent absorbent gauze impregnated with 3 per cent bismuth tribromophenate in a petroleum blend and is supplied in sterile packs. The Xeroform ribbon gauze preparation has been used to pack mastoid cavities at The Royal London Hospital since April 1990. The authors soon observed an apparent increase in infection rates in newly fashioned mastoid cavities packed with Xeroform. A foul-smelling discharge from the cavity necessitated early removal of the pack, frequent aural toilet and administration of systemic antibiotics. Many of these infected cavities grew *Pseudomonas aeruginosa* and coliforms on swab culture sensitive to ciprofloxacin and anaerobes sensitive to metronidazole. To test these observations, a retrospective study was commenced to determine if there was a significant difference in post-operative modified radical mastoidectomy cavity infection rates using Xeroform instead of BIPP. It was also hoped to determine if the addition of peri-operative ciprofloxaxin and metronidazole reduced the infection rate in those cavities packed with Xeroform.

Materials and methods

Forty adult patients having modified radical mastoidectomies were studied. Twenty consecutive patients in whom Xeroform was used to pack the mastoid cavity were studied. They were compared with the last 20 patients to undergo a similar operation but packed with BIPP before the adoption of Xeroform by the hospital. It was intended that all packs should have been left in place for at least two weeks. The notes of the 40 patients were scrutinized for the following information:

1. Reason for performing the operation.
2. The use and type of peri-operative antibiotics. The consultant surgeons had differing policies concerning the use of peri-operative antibiotics in mastoid surgery—some routinely gave amoxycillin, or erythromycin to patients allergic to penicillin.
3. Length of time the pack was left *in situ* and reason for its removal.
4. Post-operative infection and other complications.
5. Swab or mastoid pack cultures and sensitivities of any organisms isolated.
6. Treatment instituted.

Adverse events were defined as follows:

1. Offensive pack.
2. Bacteriologically proven mastoid cavity infection.
3. Systemic signs of infection.

The incidence of adverse events was determined for each group of patients and comparisons made using the Fisher exact test.

Results

Forty patients were studied. The indications for a modified radical mastoidectomy were cholesteatoma (20), chronic mucosal disease (7), acute mastoiditis secondary to cholesteatoma (2), revision of mastoidectomy cavity for residual disease (8) and cholesterol granuloma (3).

Table I shows the results for the 20 patients in the Xeroform group. Ten had no peri-operative antibiotics, seven of whom had an adverse event. All seven cases developed an offensive pack necessitating early removal of the pack at one week. One patient with a faeculent aural discharge had meningism and was admitted for intravenous antibiotic therapy.

Of the 10 patients with a Xeroform pack that received peri-operative antibiotics, four had an offensive pack, one of whom needed hospital admission for perichondri-

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TABLE I
XEROFORM GROUP

No. of patients	Antibiotic	Adverse events
10	None	7 Offensive packs
4	Amoxycillin	4 Offensive packs
1	Erythromycin	None
5	Ciprofloxacin Metronidazole	None

tis. All four patients with adverse events had received peri-operative amoxycillin.

Table II shows the results for the 20 patients in the BIPP group. There were no adverse events with the use of BIPP packs whether peri-operative antibiotics were used or not.

It must be stressed that the term 'offensive' is an understatement. Patients and relatives complained of the smell and one of the packs was mistaken for a stool specimen by the laboratory. Cultures of the offensive packs showed a mixed growth of organisms including coliforms, *Proteus, Pseudomonas, Bacteroides, Streptococcus* and *Staphylococcus.*

Treatment of an offensive pack began with its removal followed by daily aural toilet, topical antibiotic drops, and administration of appropriate systemic antibiotics.

The results show that when no prophylactic antibiotics are used there is a significant difference in the adverse event rate with Xeroform (7/10) compared with BIPP (0/9; $p = 0.003$, Fisher exact test). Amoxycillin prophylaxis does not prevent adverse events occuring with Xeroform (4/4) and there is again a significant difference in the adverse event rate compared to BIPP (0/10; $p = 0.001$, Fisher exact test). Ciprofloxacin and metronidazole prophylaxis prevented adverse events when packing with Xeroform. This may be because anaerobes, *Proteus* and *Pseudomonas* were commonly isolated from the offensive Xeroform packs and would not be sensitive to amoxycillin. Ciprofloxacin and metronidazole however are active against these organisms and would therefore be expected to prevent adverse events.

Discussion

The results of this study have confirmed that BIPP is superior to Xeroform as a mastoid dressing.

In vitro experiments examining the antiseptic properties of BIPP have not confirmed the clinical impression of its efficacy. Chambers and Goldsmith (1917), reported the bactericidal properties of BIPP to be due to the slow release of iodine liberated from the oxidation of iodoform on contact with oxygen and to the release of dilute nitric acid formed by the hydrolysis of bismuth subnitrate. Their culture experiments showed that BIPP reduced the number of bacteria in a wound but failed to sterilize it. Saint (1937), reporting on its use in acute osteitis, claimed that the nascent iodine released acted as a mild antiseptic which was bacteriostatic but harmless to the tissues. Garrod (1940) showed that a mass of BIPP gauze did not prevent growth of *Streptococcus* in a test-tube containing nutrient broth. Nigam and Allwood (1990) found BIPP had negligible antibacterial activity using growth inhibition studies against *Staphylococcus aureus, Escherichia coli* and *Pseudomonas aeruginosa.* In addition, no release of iodine was detected over a four week period. The authors proposed that the clinical efficacy of BIPP might be due to the meticulous wound debridement that accompanies its use and to the ribbon gauze impregnated with BIPP being impervious to blood and other body fluids thus limiting the nourishment for bacteria to thrive in its interstices.

TABLE II
BIPP GROUP

No. of patients	Antibiotics	Adverse events
9	None	None
10	Amoxycillin	None
1	Erythromycin	None

In our study, the same debridement of the mastoid cavities was performed prior to the use of both types of pack thus casting doubt on Nigam and Allwood's first hypothesis. The petroleum blend in Xeroform makes it impervious to blood but Xeroform clearly allows bacteria to thrive in its interstices resulting in a highly offensive pack and cannot be used without systemic broad spectrum antibiotic cover against aerobes and anaerobes. This casts doubt on Nigam's and Allwood's second hypothesis. BIPP packs on the other hand can be left in place for long periods without the need for systemic antibiotics. It is the most appropriate choice for packing the mastoid cavity after mastoidectomy.

Conclusion

This retrospective study confirms that BIPP is a safe dressing to use to pack a mastoid cavity without antibiotic prophylaxis. Xeroform, however is associated with a high incidence of adverse events and should not be used without suitable systemic antibiotics.

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