

Main Articles

Myringoplasty: update on onlay pedicle skin flap and temporalis fascia sandwich graft

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Abstract

The technique of onlay sandwich grafting of tympanic membrane perforations fashioned by the use of pedicle flap raised from the posterior deep meatal skin and autologous temporalis fascia is described. The results of a series of 124 ears operated between 1987 and 1999 are the basis of this report. Of these 106 patients had myringoplasty for the first time. The operation was successful in 102 (96.23 per cent) patients. Eighteen patients had revision myringoplasty, with a successful result in 14 (77.78 per cent). None of the patients developed complications usually associated with onlay grafting. A preliminary report of this work was presented at the XVI World Congress of Otolaryngology Head and Neck Surgery at Sydney in 1997.

Key words: Myringoplasty

Introduction

The earliest reported successful myringoplasty was by Berthold in 1878, using skin graft. Since then, myringoplasty has gone through many changes in techniques and materials. The materials used ranged

from homograft and autograft skin, dura mater and fascia to synthetic prosthetic materials. Various techniques for onlay and underlay grafting have also been described. Even then, it was felt that better surgical technique and graft materials were needed. In this report, the authors are describing a simple, reliable technique for myringoplasty.

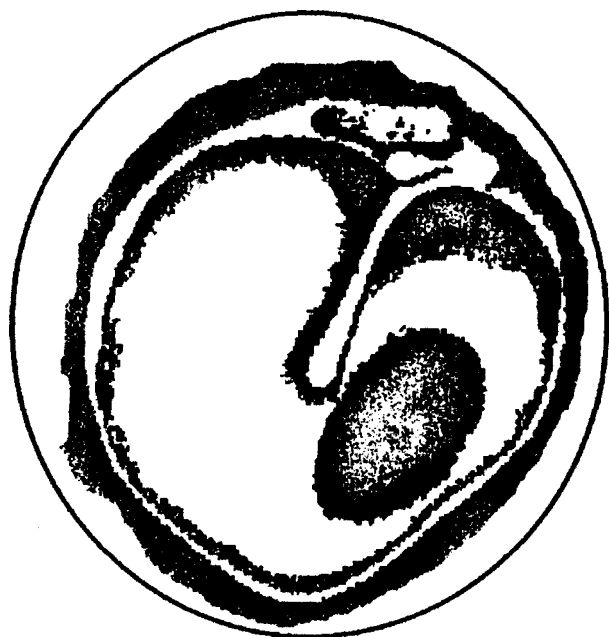


FIG. 1

Anterior central perforation.

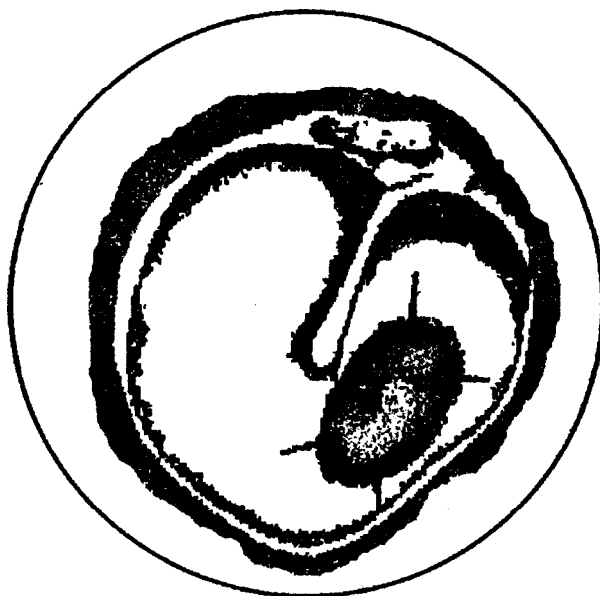


FIG. 2

Marking of skin flaps.

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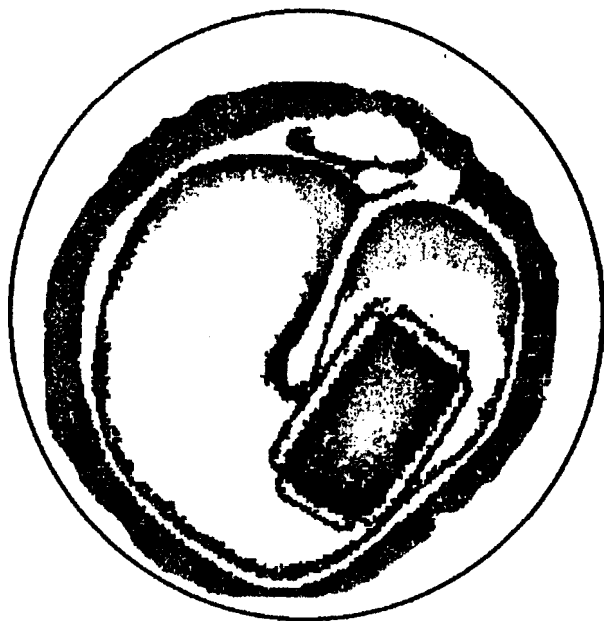


FIG. 3
Elevation & excision of skin flaps.

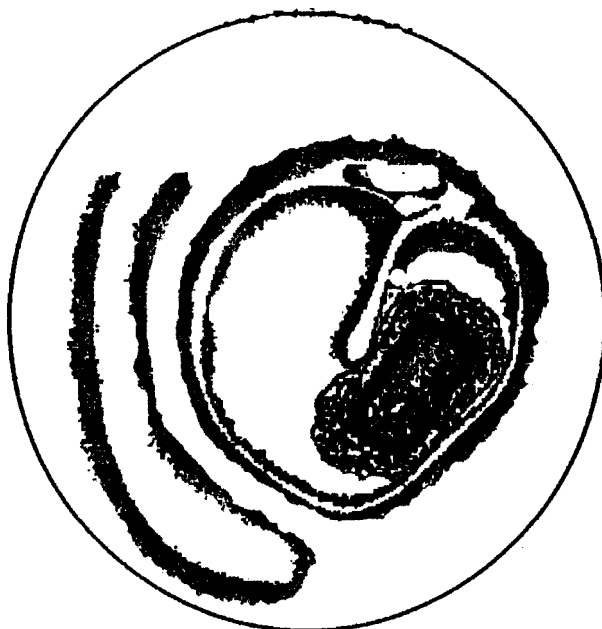


FIG. 5
Application of T.F. graft.

Materials and methods

One hundred and twenty four patients had myringoplasty using the onlay pedicle skin flap and temporalis fascia sandwich graft at the Edith Cavell Hospital, Peterborough, between 1987 and 1999. All of them had had dry central perforations for at least six months. Eighteen of these patients had a residual perforation following previous failed myringoplasty, where other techniques had been used. Patients younger than 10 years were not operated on. Patients with a narrow canal or prominent anterior hump were not selected for this procedure, as they required bone work in the external canal. All the patients were

operated by the senior author as well as by the trainee junior doctors under his supervision.

The procedure was performed on all cases under hypotensive general anaesthesia and infiltration of one per cent xylocaine with 1/80 000 adrenaline into the supra-auricular area of the temple and in the subcutaneous area of the deep posterior meatal wall. Temporalis fascia was harvested from the supra-auricular area. The edges of the perforation were excised (Figure 1). Four radial incisions were made on the surface of the tympanic membrane remnant from the perforation margins (Figure 2). The outer squamous epithelium was elevated from the perforation margins for about 3–4 mm towards the annulus using a small Beale's elevator (Figure 3). Two

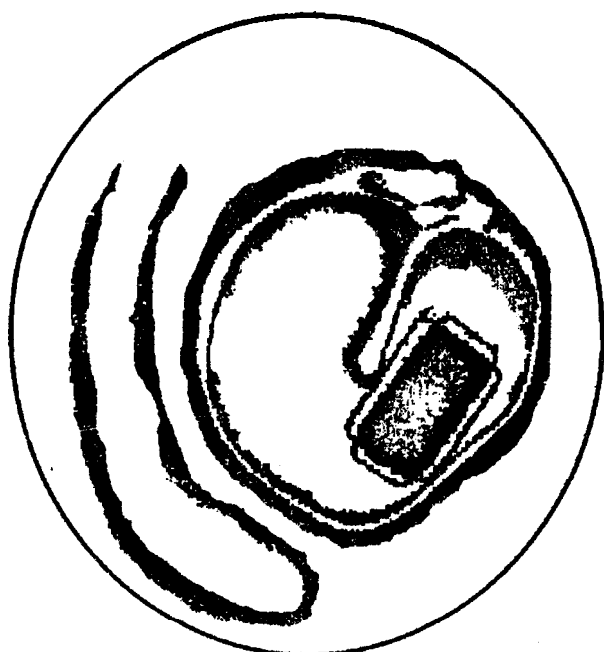


FIG. 4
Raising of meatal pedicle flap.

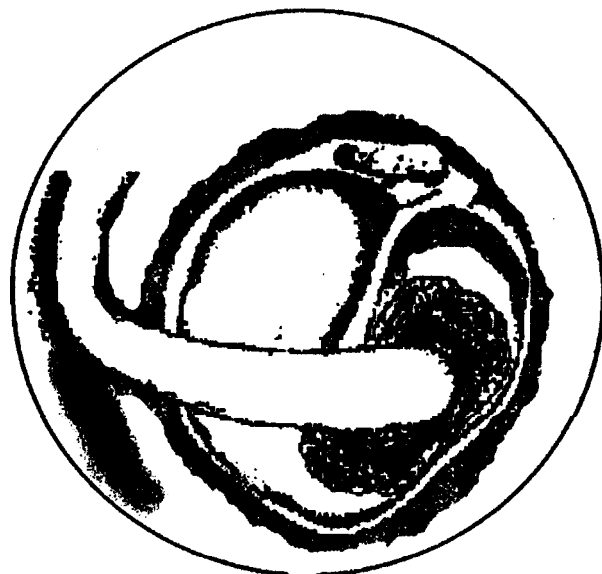


FIG. 6
Rotation of pedicle flap over T.F. graft.

parallel incisions were made in the skin of the deep posterior meatal wall starting at six o'clock and finishing at 12 o'clock. The medial of the two incisions is about 2–3 mm lateral to the tympanic annulus and the second is about 7–8 mm lateral to the first. Both incisions are joined at six o'clock but not at 12 o'clock (Figure 4). The created flap was gently dissected and lifted off the bony wall and left attached superiorly, and kept protected with a moist piece of half inch ribbon gauze loosely packed in the deep part of the ear canal. The dried temporalis fascia was applied over the perforation as an onlay (Figure 5), and then the pedicled flap was rotated to cover most of the grafted area (Figure 6). Multiple small counted BIPP packs were inserted for two weeks. A loose head bandage was applied for 24 hours. All patients were given antibiotics for five days.

Results

Sixty eight patients (54.95 per cent) were female and 56 (45.05 per cent) were male. Medium-sized perforations (less than half the size of the tympanic membrane) were seen in 71 ears (57.3 per cent), large perforations (more than half the size of the tympanic membrane) in 34 ears (27.4 per cent) and small perforations (less than a quarter the size of tympanic membrane) in 19 ears (15.3 per cent) of cases. Revision myringoplasties were made in 18 ears (14.52 per cent) of the total number of ears operated. Of these 14 ears (77.78 per cent) had complete closure of perforation. Of the 106 patients who had myringoplasty for the first time, 102 patients (96.23 per cent) had complete closure of perforation (Figure 7). This procedure failed in eight patients. Four of them had a medium-sized perforation, three had a large perforation and one had a small perforation. Thus, 8.8 per cent of patients with a large perforation, 5.6 per cent of those with a medium sized perforation and 5.2 per cent of those with a small perforation failed to close the tympanic membrane perforation following this procedure. All patients who failed to close the perforation had the anterior margin of the perforation extending close to the annulus. The follow-up period ranged from four months to six years. None of the patients developed epithelial pearl, lateralization of graft or anterior blunting. Crusting, otitis externa or epithelial pearl formation in the external canal was not seen.

Discussion

Onlay grafting technique has given good results. This depends on the presence of an intact ossicular chain, the absence of pre-operative adhesions and regular post-operative follow-up. The success rate of myringoplasty in general varies between different authors and different techniques.

The basic principle in all myringoplasty technique is to de-epithelialise the edges of the perforation and the adjoining few millimetres of outer squamous epithelium. The graft is applied over the raw surface, which acts as a scaffold over which the outer

squamous epithelium and mucosa tends to grow and close the perforation. This growth is from the periphery to the centre of the perforation. If this is too slow, the centre of the graft necroses, before the epithelium can close the perforation completely, leaving a residual perforation.

Various materials have been tried for grafting tympanic membrane perforations. Auricular skin,¹ vein graft,^{2,3} temporalis fascia,⁴ fat graft,⁵ perichondrial graft,⁶ buccal mucosa,⁷ periosteum⁸ and dura mater⁹ have all been reported with varying success rate. In 1993 Vartiainen¹⁰ reported his findings of revision myringoplasty and suggested that better surgical technique and graft materials need to be developed.

A success rate varying from 91.7 per cent to 97 per cent has been reported.^{11,12} A success rate of 93.1 per cent was reported following sandwich technique using an endaural approach.¹³ In most cases, the follow-up was under 12 months. Reports of long follow-up of over 10 years showed that the success rate tends to fall to nearly 70 per cent and to 60 per cent in revision cases.¹⁴ The disadvantages of onlay grafting are epithelial pearl formation, lateralization of graft and anterior blunting. This is usually due to improper surgical techniques such as incomplete removal of the outer squamous epithelium from the grafting site.

The new technique described encourages the growth and migration of the squamous epithelium from the meatal flap as well as from the perforation margins. This should help in rapid closure of the perforation, as the squamous epithelium from the pedicle skin flap will cover the temporalis fascia graft along with the squamous epithelium from the perforation margins. The authors achieved closure of perforation in 96.2 per cent of ears, that were operated on for the first time. In ears that had revision surgery, 77.78 per cent healed well. The follow-up period for these patients ranged between four months to six years. None of the 124 patients developed epithelial pearls, lateralization of graft or anterior blunting. This is due to the extreme care exercised during de-epithelialization and placement of graft and due to proper patient selection. Only 3–4 mm of outer squamous epithelium around the perforation was removed. As only a small area need to be de-epithelialized, the chance of leaving squamous epithelium behind is minimized. The meatal skin defect re-epithelializes and can be used again for revision cases.

Conclusions

Sandwich onlay material skin pedicle flap with temporalis fascia used for repair of various types of tympanic membrane perforations proves to be a technique with more than a 96 per cent success rate in primary repaired cases and over 77 per cent success in revision cases. The complications commonly associated with onlay grafting were not seen with this sandwich technique. This is a simple and reliable technique for onlay myringoplasty.

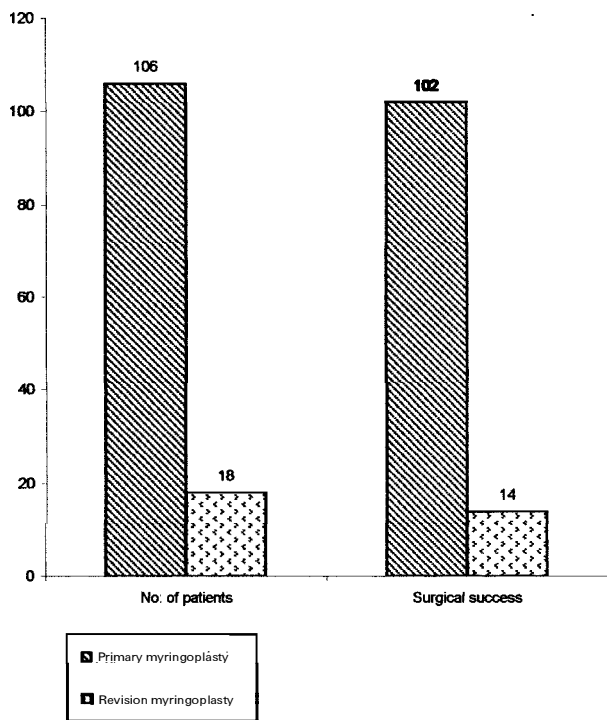


FIG. 7

Surgical success of myringoplasty.

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