

Fat graft myringoplasty in children – a safe and successful day-stay procedure

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Abstract

The surgical closure of dry tympanic membrane perforations in children remains a controversial issue due to conflicting opinions on the appropriate technique, graft material and success rate. We present a review of 342 children who underwent fat graft myringoplasty as a day-stay procedure over a six-year period. Successful closure of the tympanic membrane perforation was achieved in 92 per cent of ears. Subsequent recurrent otitis media with effusion required insertion of ventilation tubes in 12 per cent. No relationship was observed between the age of the child and a successful outcome. We conclude that day-stay fat graft myringoplasty is a safe and successful procedure which results in a dry and safe ear in the majority of children.

Key words: Myringoplasty; Child; Day care

Introduction

The feasibility and success of tympanic membrane repair in children has been well established (Friedberg and Gillis, 1980; Berger *et al.*, 1983; Chandrasekhar *et al.*, 1995). However, the best age to perform this surgery and the choice of graft remains controversial. Some otolaryngologists recommend postponing surgery to the second decade of life. This approach is justified by the assumption that immature eustachian tube function and susceptibility to middle-ear infections would jeopardise surgical results. Other arguments for postponing surgery include the belief that perforations in children would close spontaneously if given enough time and that a perforation acts as a pressure equaliser until good eustachian tube function returns.

Many parents, however, do have problems implementing dry ear precautions especially in children who wish to swim. There is also concern about the long-term effects of a chronically draining ear particularly with regard to ossicular damage and the risk of sensorineural hearing loss (Shih *et al.*, 1991). It is therefore important to give the child the chance of having a safe, dry and carefree ear.

Day-stay surgery has become an integral part of modern otolaryngology. A recent study has documented the success rate and cost effectiveness of performing day-stay tympanic membrane repairs in adults (Benson Mitchell *et al.*, 1996). We present a review of 342 children who underwent a fat graft

myringoplasty as a day-stay procedure and discuss the selection criteria and outcome of this procedure.

Materials and methods

Patient population

The medical records of all children who had undergone a myringoplasty as a day-stay procedure at the LeBonheur Children's Medical Center from January 1990 to December 1995 were reviewed. Six hundred and four myringoplasties were performed of which 342 (199 M, 144 F; age range three to 16 years) were fat graft myringoplasties and form the basis of the study. Patients were included in the study based on a set of general and specific criteria (see Tables I and II). Active allergies, rhinosinusitis and adenotonsillitis were optimally controlled prior to the operation.

Fellows and consultant physician staff from the department of Paediatric Otolaryngology performed the surgery under general anaesthesia with an oral airway and a mask. The ears were prepared and draped using sterile techniques. The ear lobule was

TABLE I
SPECIFIC SELECTION CRITERIA FOR FAT GRAFT MYRINGOPLASTY

1. Dry central perforation not exceeding 25 per cent of pars tensa
2. Perforation present for at least six months
3. A hearing threshold of better than 20 dB in both ears
4. Absence of ossicular or mastoid pathology
5. Absence of grommets *in situ*

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Accepted for publication: 12 December 1996.

TABLE II
GENERAL SELECTION CRITERIA FOR DAY-STAY SURGERY

Age >three years
No history of chronic illness
No previous history of complications following a general anaesthetic
No past history of prolonged bleeding
Permanent or temporary residence within 50 miles
Availability of personal transport
Adult companion in attendance

infiltrated with one per cent lignocaine with 1/100,000 adrenaline. The ear was examined under the microscope and the rim of the perforation carefully removed with a Rosen's needle and cup forceps. A small incision was made posterior to the ear lobule and a piece of fat extracted using sharp dissecting scissors. Care was taken to ensure that the graft was more than twice the size of the perforation. The incision behind the ear lobule was closed with interrupted 4-0 chromic sutures. The middle ear was then packed with a single piece of gelfoam soaked in Cortisporin ear drops. The fat graft was inserted through the perforation in a hourglass fashion in order to cover both sides of the margins. The ear canal was then packed with antibiotic-moistened gelfoam pledgets and Cortisporin ointment placed over the pledgets.

No ear dressing was employed and patients were discharged approximately four hours after surgery and instructed to keep the ear dry until the first post-operative visit, three weeks after the procedure. Further follow-up was arranged on a three monthly basis thereafter depending on the status of the ear.

Results

Six hundred and four myringoplasties were performed over a six-year period of which 370 (61 per cent) were fat graft myringoplasties. All children admitted for day-stay fat graft myringoplasty were discharged on the day of surgery with no major complications. The follow-up period ranged from four to 20 months (mean 8.5 months). Unilateral procedures were performed in 314 children (92 per cent) and bilateral procedures in 28 children (eight per cent). Successful closure of tympanic membrane

TABLE III
RESULTS

	Number	Percentage (%)
Total procedures	370	100
Successful closure	340	92
Graft failure	30	8
Grommet reinsertion	44	12

TABLE IV
DISTRIBUTION OF GRAFT FAILURES AND GROMMET REINSERTION

Age in years	No. of patients	Graft failures	Grommet reinsertion
Below 7	86	5 (6%)	7 (8%)
7-13	182	17 (9%)	18 (10%)
Above 13	74	5 (7%)	6 (8%)

perforations were achieved in 340 ears (92 per cent). In the 28 children who underwent bilateral procedures, one patient had bilateral residual perforations and three were unilateral. The overall success rate in children undergoing bilateral procedures was 82 per cent as compared to an overall success rate of 92 per cent. Forty-four ears (12 per cent) required grommet reinsertion (see Table III). The post-operative hearing thresholds were within normal limits in all patients. The rate for successful closure and grommet reinsertion was not related to the age of the child (see Table IV).

Discussion

Tympanic membrane perforations in children are generally a result of chronic otitis media, previous ventilation tube placement or trauma. Several clinical series on paediatric myringoplasty have been published, with success rates ranging from 35 per cent to 95 per cent (Friedberg and Gillis, 1980; Berger *et al.*, 1983; Halik and Smyth, 1988; Hyden, 1994; Chandrasekhar *et al.*, 1995). A comparative analysis of these studies is not possible because of the varied criteria used to define success and the non-uniform follow-up.

There is no consensus on the optimum age at which myringoplasty can be successfully performed in children. There is some evidence that the Eustachian tube may not be fully developed and functional until eight years of age. (Chandrasekhar *et al.*, 1995). The importance of Eustachian tube function in predicting the outcome after myringoplasty remains unclear. Shih *et al.* (1991) reported a success rate for children of 10 years and younger of 54 per cent compared to 94 per cent for children of 11 years and older. Friedberg and Gillis (1980) concluded that age was a significant factor in determining success, but favoured the younger patient. There were no graft failures under 11 years of age in their series. Chandrasekhar *et al.* (1995) did not detect any magical age at which the success rate of tympanic membrane repair improves and found no statistical difference in the three age groups studied 0-8, 9-12 and 13-19 years. These conflicting results clearly demonstrate that age alone cannot predict the success or failure of a myringoplasty and our study supports this observation.

The safety and efficacy of fat graft myringoplasty has been well documented in the literature (Ringenberg, 1962; Goodman, 1971; Deddens *et al.*, 1993). Fat has the advantage of being easily obtained with little morbidity associated with harvesting it. The ease and simplicity of performing a fat graft myringoplasty makes this procedure particularly suitable as a day-stay procedure. There are other advantages including a short, single anaesthetic without the need for endotracheal intubation and the limited need for post-operative ear care which is important in a young child. As there is virtually no manipulation of the middle ear structures, the risk of iatrogenic otological trauma is very low making it safe to perform simultaneous bilateral myringoplas-

ties. Gross *et al.* (1989) are of the opinion that an adipose plug myringoplasty produces less otologic trauma than the insertion of ventilation tubes. Indeed, no major complications were documented in this study and all children went home on the day of surgery. However, adipose myringoplasty is not suitable for all patients (Table I). Children who had a hearing loss of over 20 dB, those in whom the conductive hearing loss could not be explained by the size of the perforation alone, and those who had previous ear surgery or active middle ear disease were offered a formal tympanoplasty with temporalis fascia.

Day case repair of the tympanic membrane under local anaesthesia or intravenous sedation has been previously reported (Kane *et al.*, 1980; Kaddour, 1992). More recently, Benson Mitchell *et al.* (1996) have reported no difference in the success rate for myringoplasty performed as a day-stay procedure when compared to inpatient myringoplasty. The advantages of day-stay surgery include minimal disruption to the working and domestic life of patients, cost-effectiveness, and, in children, a reduction in the psychological trauma of hospitalisation.

We conclude that day-stay fat graft myringoplasty in children is a safe and successful procedure provided strict selection criteria are used. The procedure can be unilateral or bilateral and does not require endotracheal intubation. The procedure requires minimal post-operative care and can be offered to children of all age groups as there is no evidence of a decreased success rate in the first decade of life. In the majority of children this will result in a safe, dry ear without the need for cumbersome ear protection.

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