

## A comparison of performance of Shepard and Sheehy collar button ventilation tubes

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### Abstract

This study was designed to confirm the longer *in situ* life of the Sheehy collar button compared with the Shepard tube and to assess the complication rates associated with the two tubes. Cases of bilateral otitis media with effusion had a Shepard tube inserted in one ear and a Sheehy contralaterally. The insertion position was allocated randomly. The patients were then assessed at three-monthly intervals for two years. In 71 per cent of those in whom at least one tube had extruded, the Sheehy remained *in situ* longer. The antero-inferior tube remained longer than the postero-inferior whichever type was used. There was no significant difference between complication rates, or recurrence rates of middle ear effusion after tube extrusion, for the two types. We conclude that use of a Sheehy rather than a Shepard tube carries no increased risk of complications and the patient may require further surgery less often in total.

### Introduction

Ventilation tubes were re-introduced in 1954 for treatment of chronic secretory otitis media (Armstrong, 1954). Since then, ventilation tube insertion has become one of the commonest otological procedures performed in the world today. The rate of insertion has risen 60 fold in 20 years in the Tayside region of the United Kingdom (Padgham *et al.*, 1989). Ventilation tubes (grommets) are currently the most effective surgical treatment of otitis media with effusion.

Successful treatment (*i.e.* the prevention of recurrence of middle ear effusion requiring repeat grommet insertion) is directly related to the time the grommet remains functional (Smyth *et al.*, 1982; Smyth and Hall, 1983). Gibb and Mackenzie (1985) in a study of 939 grommets demonstrated that the Sheehy collar button had a longer functioning lifespan than the Shepard ventilation tube. They found that 50 per cent of Shepard grommets extruded by six months and practically 100 per cent by 15 months, while the figures for Sheehy collar buttons were 50 per cent extruded by 15 months and 80 per cent by 24 months. These findings were confirmed by a smaller study by Moore (1990).

Therefore, it would appear preferable to insert a Sheehy collar button as the initial surgical treatment of middle ear effusion, provided that the complication rate related to its use was no higher than with the shorter-stay Shepard tube.

This study was designed to confirm the longer *in situ* life of the Sheehy collar button compared to the Shepard tube and to assess the complication rates associated with the two types of tube. The recurrence rate of middle ear

effusion following tube extrusion was documented and the relative merits of grommet insertion in the antero-inferior or postero-inferior quadrants were considered.

### Method

Cases of otitis media with effusion requiring bilateral grommet insertion at Ninewells Hospital between September 1986 and December 1987 were entered for the trial.

The surgeon recorded any pre-existing abnormalities of the tympanic membrane on a form provided. In each patient a Shepard grommet was inserted in one ear and a Sheehy in the other ear, so that each patient acted as his or her own control. The ear in which a particular grommet was inserted was allocated randomly, as was the position in the tympanic membrane in which the tube was inserted. The surgeon recorded the presence and type of middle ear effusion, the type of grommet inserted and the quadrant in which it was inserted. The surgeon's name and grade were recorded, together with any other operation performed at the same time, *e.g.* adenoidectomy or tonsillectomy.

The patients were followed up at three-monthly intervals. The state of the grommet in each ear was recorded (*i.e.* *in situ* and patent, *in situ* but blocked, extruded but tympanic cavity aerated, or fluid returned to middle ear). Pneumatic otoscopy, otomicroscopy, tympanometry and pure tone audiometry were used to assess the state of the middle ear and the presence or patency of the ventilation tube. Any complications or changes in the drumhead were recorded under the headings of: tympano-

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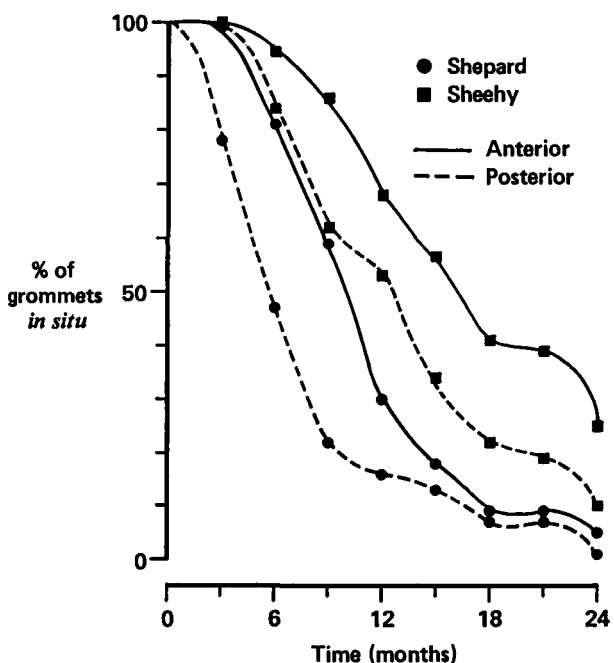


FIG. 1

Comparison of extrusion rates of Sheehy collar button and Shepard ventilation tubes.

nosclerosis, otorrhoea, perforation, sensorineural hearing loss and 'other'.

When the grommets had extruded, the patient was followed for a further 12 months, and if there was no evidence of recurrent effusion after this time, the patient was discharged from the clinic. All the case notes were reviewed for the results to be evaluated two years after the last of the operations was performed.

**Results**

During the 15 month operative phase of the trial, 146 patients (292 ventilation tubes) entered the study. Eleven patients were lost to follow-up, leaving 135 patients (270 grommets) with adequate documentation for statistical analysis. The length of post-operative follow-up ranged from 21 to 36 months.

There were 77 male and 58 female patients. The age range was one to 44 years, but only five patients were over the age of 12 and the mean patient age was six years.

Ninety-four pairs of grommets were situated in the antero-inferior position and 34 pairs were in the postero-inferior position. Three patients received a grommet in one position on one side and the contralateral grommet in the alternative position. In four patients the position of the grommets was not specified.

TABLE I  
COMPARISON OF COMPLICATION RATES

Complications	Shepard		Sheehy	
	Anterior (n = 96)	Posterior (n = 35)	Anterior (n = 95)	Posterior (n = 34)
Tympanosclerosis	31 (32%)	6 (17%)	31 (33%)	9 (26%)
Otorrhoea	5 (5%)	2 (6%)	9 (9%)	3 (9%)
Perforation	1 (1%)	1 (3%)	1 (1%)	-
Total	37 (38%)	9 (26%)	41 (43%)	12 (35%)

*Extrusion rates*

Comparing the two types of grommet as pairs within the same patient, in order to exclude other variables, it was found that in 88 (71 per cent) of the 124 pairs followed up until at least one grommet extruded, the Sheehy collar button remained *in situ* longer than the Shepard tube. In 26 (21 per cent) the two types lasted equally long, leaving only 10 (eight per cent) in which the Shepard lasted longer.

The comparison of the overall extrusion rates is demonstrated in Figure 1. The Sheehy grommets had a significantly longer retention rate than the Shepard grommets (L Rank test,  $p < 0.0001$ ).

The position in which the grommet was inserted also affected extrusion, the antero-inferior grommet remaining *in situ* longer than the postero-inferior whichever type was used (L Rank test,  $p = 0.002$ ).

*Complication rates*

There was no significant difference between the complication rates for the two types of grommet, whichever position they were placed in ( $\chi^2$  test,  $p = 0.33$ ). Table I demonstrates the complications encountered. There were no cases of sensorineural hearing loss. No patient had more than one complication.

*Recurrence rates*

The incidence of recurrence of middle ear effusion after grommet extrusion is shown in Table II. There was no significant difference between recurrence rate for the two types of grommet or the two positions. ( $\chi^2$  test,  $p = 0.02$ .)

To exclude the effect of the variables mentioned above, the patients in whom both grommets had extruded were then analyzed to see whether there was any difference in the recurrence rate of effusion between the two grommets in the same patient. This showed that, of the 96 pairs followed up until after both grommets extruded, there was no recurrence of middle ear fluid in either ear in 57 (59 per cent) and recurrence in both ears in 23 (24 per cent). In nine pairs there was recurrence in the 'Shepard' but not the 'Sheehy' ear, while the reverse was true in seven pairs. There was no statistically significant difference.

**Discussion**

The present study has confirmed the findings of Gibb and Mackenzie (1985) in that our extrusion rates were 50 per cent by nine months and 98 per cent by 24 months for Shepard grommets, and for Sheehy grommets 50 per cent by 15 months and 79 per cent by 24 months. The reason for the different extrusion rates for the two types

TABLE II  
COMPARISON OF EFFUSION RECURRENCE RATES

	Shepard		Sheehy	
	Anterior (n = 96)	Posterior (n = 35)	Anterior (n = 95)	Posterior (n = 36)
Effusion recurred	29 (30%)	9 (26%)	23 (24%)	5 (14%)
Tube still <i>in situ</i>	9 (9%)	2 (6%)	28 (29%)	3 (8%)

of grommet is uncertain. Possible causes are differences in size, shape (especially angle of flange), weight and materials.

Bingham and Milroy (1989) discuss the initial mechanism of ventilation tube extrusion as a result of the hyperplastic reaction of the tympanic membrane. Inspection of the graphs in Figure 1 shows that, particularly for the Shepard tube, there is an initial six-month time lag for the antero-inferior versus postero-inferior segment, and the survival curves thereafter run parallel to each other. This suggests that the initial hyperplastic extrusion reaction may be slower to come into action in the anterior compared to the posterior quadrant. Possibly a reduced blood supply to the antero-inferior segment secondary to a middle ear effusion may be the explanation.

It was encouraging to find a low incidence of complications during the study. Other authors have found an otorrhoea rate of approximately 20 per cent (Slack *et al.*, 1987). For certain longer-term grommets the otorrhoea rate is very high—68.8 per cent for Per Lee tubes (Per Lee, 1981) and 70.4 per cent for Goode tubes (Von Schoenberg *et al.*, 1989). The overall rate for the present study was 7.3 per cent.

There were only three post-extrusion perforations, none of which persisted or required surgical intervention. Perforation rates are reported in the literature as being higher for long-term tubes, being 0.5–3.4 per cent for short-term tubes and 8.5–47.5 per cent for longer-term tubes (Curley, 1986; Bingham *et al.*, 1989; Von Schoenberg *et al.*, 1989).

The commonest complication was an increase in tympano-sclerosis, and this is in agreement with the findings of other studies of an approximately 30 per cent tympanosclerosis rate (Hughes *et al.*, 1974). No complications were recorded under the heading 'Other', which would have included such changes as development of atelectasis of the tympanic membrane. None of the complications occurred in one type of grommet more frequently than the other.

The rate of recurrence of middle ear effusion was the same after extrusion of the Sheehy collar-button as the Shepard tube. This suggests that although the Sheehy tube remains *in situ* longer, it does not do so for long enough for the patient to outgrow the predisposition to otitis media with effusion.

Although the position of the grommets in the tympanic membrane was randomized by tossing a coin, they did not fall into the near-equal distribution one would expect as a result of such a process. It is possible that the surgeons tended to place the grommets in the position they personally preferred.

## Conclusion

Use of a Sheehy collar button as the initial surgical

treatment in chronic secretory otitis media is preferable to use of a Shepard ventilation tube, because the Sheehy collar button functions significantly longer, while the complication rates are comparable. The tube's lifespan can, and should, be prolonged by situating it in the antero-inferior rather than the postero-inferior quadrant of the tympanic membrane.

The similar effusion recurrence rates despite differing lifespan suggest that duration of ventilation is not the only factor involved in recurrence of middle ear fluid, and that prolonged problems with Eustachian tube dysfunction may be more important. However, use of the Sheehy collar button in the patient with a tendency to recurrence means they require surgery less often in total. This is an important benefit psychologically for paediatric patients.

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