

Audit of the incidence of persistent perforation of the tympanic membrane following T-tube removal or extrusion

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Abstract

Audit of the incidence of persistent perforation of the tympanic membrane following T-tube removal or extrusion was carried out on 100 patients (151 ears). The incidence was found to be 11.9 per cent. This was independent of whether the tube was surgically removed or extruded; of the grade of surgeon carrying out the operation; and whether the patient treatment was carried out privately or on the N.H.S. Changes of practice have resulted from the audit.

Key words: Tympanostomy tube insertion; Tympanic membrane, perforation; Audit

Introduction

Perforation of the tympanic membrane following T-tube removal or extrusion has been reported as a complication in most series. In the literature the incidence has varied considerably (Table I).

The aim of this audit was to compare the perforation rate at Odstock and New Hall Hospitals, Salisbury to a standard of 20 per cent. If the rate exceeded this standard, the practice of using T-tubes for middle ear ventilation was to cease. In addition, any correlation between the incidence of persistent perforation to the length of time the T-tubes remained in the ear; to whether the T-tubes were spontaneously extruded or surgically removed; and to the grade of surgeon carrying out the operation, were observed. A comparison of results of N.H.S. and private patients was noted.

Method

In this audit, the patients were initially identified by OPCS but this only began in Salisbury Health authority on the first of April 1987 and encompassed both T-tube and grommet insertions. The capture rate of operations was estimated to be 89 per cent. The theatre log book was then

used to increase the sample size. It was found to be more satisfactory as it enabled only T-tube insertions to be identified, had a higher capture rate of operations and gave both the patient's name and hospital number. A 97 per cent retrieval of patient case notes was obtained from the N.H.S. theatre log book and 100 per cent of private patients'. A total of 390 case notes were examined, of which 117 had T-tubes inserted between the first of April 1987 and the thirty-first of March 1989 which were then subsequently removed or extruded. Cases which were not available for follow-up i.e. patients who had moved from the area (10) or who repeatedly did not attend clinic appointments (seven) were excluded from the study. As a result the audit included a 100 patients (151 ears) who had T-tubes inserted between the first of April 1987 and the thirty-first of March 1989 which were then subsequently removed or extruded.

Results and discussion

Persistent perforation was defined as a perforation of the tympanic membrane not healing within six months. In

TABLE I
RESULTS OF PREVIOUS STUDIES

Author	No. of insertions	No. of tubes extruded	Persistent perforations	Percentage
Rothera and Grant (1985)	131	23	2	9
Brockbank <i>et al.</i> (1988)	130	37	8	22
Hawthorne and Parker (1988)	64	30	8	27

TABLE II
THE INCIDENCE OF PERSISTENT PERFORATION

Total number of N.H.S. patients:	89
Total number of private patients:	11
Total number of patients included:	100
Total number of N.H.S. T-tube operations:	132
Total number of private T-tube operations:	19
Total number of T-tube operations:	151
Total number of persistent perforations (N.H.S.):	16
Total number of persistent perforations (private):	2
Total number of persistent perforations:	18
Total percentage of persistent perforations (N.H.S.):	12.1
Total percentage of persistent perforations (private):	10.5
Total percentage of persistent perforations:	11.9

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TABLE III

RELATIONSHIP BETWEEN PERCENTAGE OF PERSISTENT PERFORATIONS TO LENGTH OF TIME T-TUBES REMAINED IN THE EAR

Months	Percentage of persistent perforation	No. of ears	No. of perforations
0-6	16.7	6	1
7-12	29.4	17	5
13-18	13.0	23	3
19-24	9.5	21	2
25-30	10.5	38	4
31-36	4.8	21	1
37-42	7.1	14	1
43-48	12.5	8	1
49-54	0	3	0

$\chi^2 = 6.8 p < 0.001$.

one instance, the perforation healed in 18 months. The rate of persistent perforation of 11.9 per cent was well below the standard of 20 per cent (Table II). The figure of 10.5 per cent for private patients was lower than that for N.H.S. patients although only 11 private patients were eligible for inclusion in the study.

The highest perforation rate was in T-tubes remaining in the ear for only seven to 12 months (Table III). It was observed that in a number of these cases the tympanic membrane was either very atelectatic or showed signs of tympanosclerosis which may account for their relatively early extrusion. These results would suggest that the optimum period for T-tubes to remain in the ear is over 31 months. Only two patients (three ears) had T-tubes which remained in the ear for longer than 48 months. There were no perforations in this group. A χ^2 test showed that the probability of these results being random was less than 0.001. Brockbank *et al.* (1988) reported a persistent perforation rate only in ears in which the tube had extruded spontaneously, not in ears in which the tube was surgically removed. The results do not follow this pattern, but seem to show a fairly even balance (Table IV).

An analysis of the grade of surgeon carrying out the operation was made to assess any difference in the inci-

TABLE IV

RELATIONSHIP BETWEEN THE PERCENTAGE OF PERSISTENT PERFORATIONS AND WHETHER T-TUBES WERE SPONTANEOUSLY EXTRUDED OR SURGICALLY REMOVED

Total number of perforations:	18
Total number of perforations - spontaneously extruded:	8
Total number of perforations - surgically removed:	10
Percentage perforations - spontaneously extruded:	44.4
Percentage perforations - surgically removed:	55.6

TABLE V

RELATIONSHIP BETWEEN THE PERCENTAGE OF PERSISTENT PERFORATIONS AND GRADE OF SURGEON CARRYING OUT THE OPERATION

<i>Grade: Consultant</i>	
Total number of operations:	81
Total number of perforations:	10
Percentage persistent perforations:	12.3
<i>Grade: Doctors in training</i>	
Total number of operations:	70
Total number of perforations:	8
Percentage of persistent perforations:	11.4

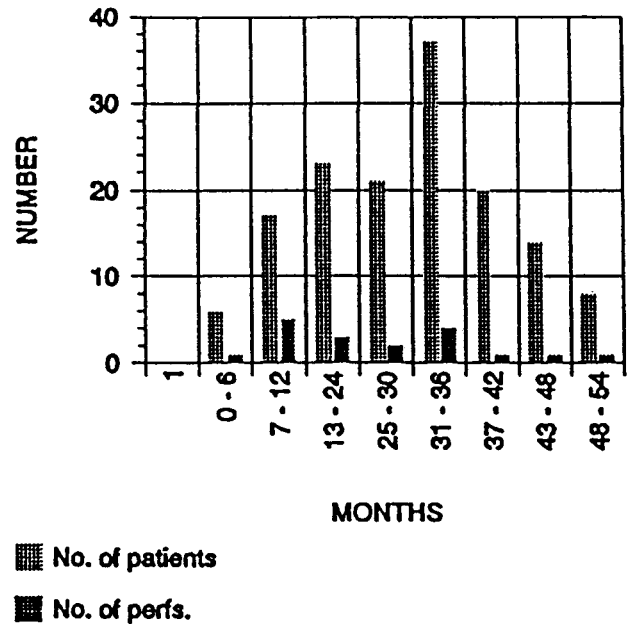


Fig. 1

The ratio of number of perforations to number of patients.

dence of persistent perforation. The audit included both locum and regular members of staff. There was no significant difference (Table V).

Private patients

Of the 19 operations carried out privately, there were

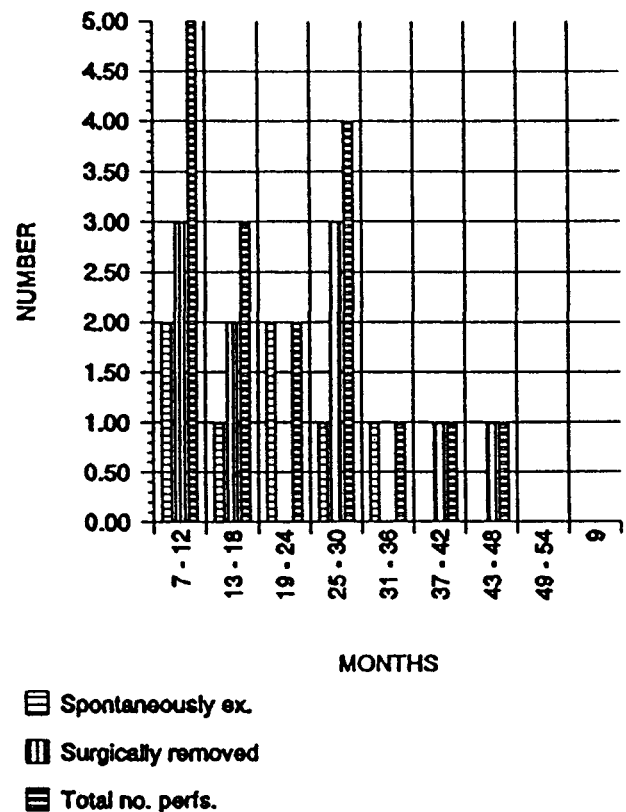


Fig. 2

Percentage of persistent perforation related to T-tube removal or extrusion.

two persistent perforations and both T-tubes were surgically removed.

Conclusion

The rate of persistent perforation was 11.9 per cent. The highest rate was in T-tubes remaining in the ear for seven to 12 months; the lowest rate was in T-tubes remaining in the ear for over 31 months. The rate of persistent perforation was not related to the grade of surgeon carrying out the operation nor to whether the T-tubes were spontaneously extruded or surgically removed.

Change of practice

Although the rate of persistent perforation was well below the target of 20 per cent, the 11.9 per cent incidence is significant. It was therefore agreed that, in future:

1. T-tubes would be inserted as a tertiary procedure following two grommet insertions.
2. T-tubes should be left *in situ* for at least three years unless there are complications (e.g. infection).
3. Repair of perforations (with Spongostan) is carried out at the same time as removal of the T-tubes.

Follow-up audit

To assess the incidence of persistent perforation following grommet removal or extrusion.

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