

Use of hearing aids in the management of children with cleft palate

A.A. Maheshwar^{a,*}, M.A.P. Milling^b, M. Kumar^a, M.I. Clayton^a,
A. Thomas^c

^a Department of Otorhinolaryngology and Head and Neck Surgery, Royal Gwent Hospital, Newport NP20 2UB, UK

^b Welsh Regional Burns and Plastic Surgery Centre, Royal Gwent Hospital, Newport NP20 2UB, UK

^c Department of Audiology, Royal Gwent Hospital, Newport NP20 2UB, UK

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Abstract

Objective: The incidence of otitis media with effusion in children with cleft palate is high. There are numerous reports looking at early insertion of ventilation tubes (VT) with associated complications. We believe that this is the first paper that discusses the use of hearing aids (HA) as the first line of management. **Methods:** Children with cleft palate are managed in a special multidisciplinary clinic in our hospital. Detailed records of these children are maintained. We studied the otological management of 70 children with repaired cleft palate. **Results:** 12 of the 70 (17.1%) had VT inserted, 17 (24.3%) were provided with HA, 14 (20%) had both grommets and HA and 27 (38.6%) had neither. Of the 31 (44.3%) children who had HA, 16 (51.6%) had good compliance with the HA. The hearing, speech and language developments in these children have been good. Twelve of the 70 patients (17.1%) have had one or more otological complications. These were significantly higher in children treated with VT. **Conclusion:** We have successfully treated 62.9% of our patients with non-surgical intervention, and show a low incidence of long term complications. © 2002 Elsevier Science Ireland Ltd. All rights reserved.

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1. Introduction

Since 1878, when Alt described the presence of otorrhoea in a child with cleft palate, physicians have been aware of the fact that cleft palate is

associated with middle ear effusion. The work done by various authors [1–7] have confirmed this to be more than 90%. The pathogenesis for this is the inability of the eustachian tube to open actively on swallowing [8]. In addition, very few muscle fibres of the tensor veli palatini muscle are inserted into the eustachian tube in children with cleft palate [9] and there is a significantly greater shallow angle between the tensor veli palatini muscle and the lateral lamina [10]. These two factors combine to make the eustachian tube to be

* Corresponding author. Address: Apartment L2, Siddall Hall, 2580, Corbett Drive, Cincinnati, OH 45219, USA. Tel.: +1-513-558-4249/556-8986; fax: +1-513-558-5203

E-mail address: maheshwar_arcot@hotmail.com (A.A. Maheshwar).

a malformed inefficiently functioning unit in children with cleft palate [6].

Based on the fact that there is a high incidence of otitis media with effusion (OME) in children with cleft palate, several authors have recommended early placement of ventilation tubes (VT) to correct the hearing impairment, improve speech and language development and prevent long term complications of OME [2,5,11–13]. Some authors even suggest that the VT should be routinely placed at the time of palatal repair [5] and that this tube should be a long term VT [3]. However a few authors [14–16] recommend a more cautious approach, suggesting insertion of VT as and when indicated by the degree of hearing loss and other clinical factors. The problems associated with repeated VT insertion and long-term tubes are well documented [17]. In the report by Hawthorne et al. [18] there was a 30% incidence of residual perforation following Goode T tube extrusion.

Although there are numerous reports on the otological management of children with cleft palates, there are no reports indicating the usage of hearing aids (HA) in this special group. In view of the fact that middle ear effusion resolves spontaneously even in children with cleft palates [15] and the complications of repeated insertion of VT, we have developed a more non-interventionist approach. This includes mainly in providing HA to our children with repaired cleft palates. These children are closely monitored in a special clinic and VT are inserted only in limited clinical circumstances. By doing so, the children have satisfactory hearing levels with very limited complications.

This retrospective study looks at the otological management, hearing results and the long term complication rates of OME across this group of children.

2. Materials and methods

The Ear, Nose and Throat department at the Royal Gwent Hospital in Newport, South Wales runs a special clinic for children with sensorineural deafness, cleft palate, and genetic and

multi-system abnormalities. The special paediatric otology clinic is run by a Consultant Paediatric Otolologist, Paediatric Audiological Scientist, Peripatetic Teacher for the deaf, Speech and Language Therapist and Associate Specialist in Community Paediatric Audiology. The early surgery for cleft palate is carried in the Welsh Plastic Surgery Centre at Morriston Hospital (formerly based at St. Lawrence Hospital, Chepstow). All cleft palate repairs have been either Wardill-Kilner or Langenback type. The children also undergo regular speech assessment and therapy by a Speech and Language Therapist who works as a part of the cleft palate multidisciplinary team. Their otological management is transferred to the care of ENT Surgeons.

Between 1984 and 1998, 135 children with cleft lip, cleft palate or a combination of both were operated in the Gwent area, and were followed up in this clinic. We have carried out a retrospective study of the otological management of these children. Children with cleft lips only, sub mucosal cleft palates, patients who have moved to other areas, are deceased and those patients who defaulted were excluded from the study. Case notes were reviewed and the following details were extracted from them; the type of cleft palate and age at cleft repair, tympanic membrane findings, initial audiological findings, and associated syndromes. Details of HA including age, number of HA and compliance with the aids were noted. The number of VT including age, indications for insertion of VT and complications were also recorded.

The children underwent speech assessment and therapy by an experienced Speech and Language Therapist who works in conjunction with the plastic surgeon. Parents and the Peripatetic Teacher for the deaf were asked about the child's schooling and speech development. The Peripatetic Teacher for the deaf provided reports from the class teacher regarding individual children. This information was also taken into account.

Children were discharged from the special clinic to the community clinics when they have had a minimum of three visits over a period of 18 months when their audiogram has been normal, (a normal audiogram being an average pure tone

threshold of 20 dB or less in the 500 Hz, 1 kHz and 2 kHz. frequencies) their parents and teachers have been satisfied with their speech and schooling and the child has not had any otological symptoms. There is close liaison between the community clinics and our special paediatric otology clinic. Hence, if there is any problem, the child is referred back to our clinic.

3. Results

The case notes of 96 children were retrieved. Of these 70 children were included in the study. The remaining 26 patients were excluded for reasons noted earlier. The type of palatal defects is noted in Table 1. Forty-three (60.6%) were males and 27(31.4%) were females. Eleven of the 70 (15.7%) patients had co-existing syndromes (Table 2). The treatment instituted is set out in Table 3 and the hearing thresholds in Table 4.

The total number of children who had HA was 31. Of these, 25 (80.6%) had unilateral HA and 6 (19.4%) had bilateral HA. The children's compliance for HA was classified as being 'good', 'poor', and 'average', depending on parents' and teachers' information. Most of the average compliers started off being poor users and later became good users. (Table 5).

The mean age at first usage of HA is 3 years and 2 months, (range being 12 months to 8 years). Of the 17 children who had only HA, 9 (52.9%) were less than 2 years of age at the time of prescribing HA. In the 14 patients who had both HA and VT, 6 children had HA as the first line of treatment. When these children became less compliant with the aids (4) or developed recurrent suppurative otitis media (2), they were subsequently treated

Table 1
Types of Cleft Palate

Type of cleft	No. cases
Palate	39
Unilateral cleft lip and palate	25
Bilateral cleft lip and palate	6

Table 2
Associated syndromes

Syndrome/other abnormalities	No. of cases
Pierre'-Robin	4
Crouzon's syndrome	1
Neurofibromatosis	1
Cornelia-De lange syndrome	1
Duplex kidney	1
Chromosome 4 abnormality/V S D	1
Colostomy/vesicostomy	1
Unilateral dead ear	1

Table 3
Treatment instituted

Treatment instituted	No. cases	Percentage (%)
HA only	17	24.3
VT only	12	17.1
HA + VT	14	20
No treatment	27	38.6
Total	70	100

with VT. The remaining 8 children had VT inserted first followed by HA later.

Twelve of the 70 (17.1%) children had only VT inserted and 14 (20%) had both VT and HA prescribed. 18 of these 26 had one set of VT inserted, 2 patients each had two, three and four sets of VT inserted respectively. 2 patients had two sets of 'T' (long-term) tubes inserted. The average number of VT insertions was 1.7. On performing myringotomy, 23 of the 26 (88.7%) cases showed the presence of fluid and in 3 cases there was a 'dry tap'. In recent years we have moved towards using HA as the first line of management in children with purely hearing problems without recurrent suppurative otitis media. However in the past VT were used more frequently to treat this category of patients. This is reflected in the details in Table 6.

Twelve of the 70 patients have (17.1%) had one or more otological complications (Table 7). Ten of this 12 (83.3%) had these complications after VT and the other 2 occurred in patients not having VT. Thus, 10 of the 26 (38.4%) patients with VT, and 2 of the 44 (4.5%) without VT developed complications. Using χ^2 -test this is statistically

Table 4
Hearing thresholds-initial and current levels

Type of treatment	Initial thresholds (dB)		Current thresholds (dB)	
	Range	Mean	Range	Mean
HA	35–60	45	5–35	30
VT	35–55	45	20–40	30
No Rx	25–45	35	5–20	15

Table 5
Compliance with HA

Compliance with HA	No. of cases	Percentage (%)
Good	16	51.6
Poor	4	12.9
Average	11	35.5
Total	31	100

Table 6
Indications for insertion of VT

Type of treatment	Hearing loss	REC. S.O.M	Total
VT only	7	5	12
VT+HA	10 (4 After failed HA)	4	14
TOTAL	17	9	26

Table 7
Complications

Complication	After		Total	%
	VT	HA		
Retraction (type III)	3	1	4	5.7%
Perforation	4	0	4	5.7%
Persistent otorrhoea	3	0	3	4.2%
BIL.cholesteatoma	1	0	1	1.4%
Total	11	0	12	17.1%

significant ($P < 0.005$) (Fig. 1). The complications are listed in Table 7. One patient had bilateral modified radical mastoidectomies with revisions for extensive cholesteatoma and granulations. The children with perforations are awaiting myringo-

plasty when older. Although a few patients have had tympanosclerosis, these have been asymptomatic. The patients with severe retraction (type III), have conductive loss of 30–40 dB and are being treated with HA.

Twenty of the 70 (28.5%) patients have been discharged from the special paediatric otology clinic (Table 8). The mean age at discharge was 6 and half years, the range being 3–9 years. The indications for discharge are mentioned earlier. As can be noted from the above table, children who needed little or no intervention were most likely to be discharged from the clinic.

Nonetheless a few of these patients are being followed up by community clinics. There is close liaison between the community clinics and our special paediatric otology clinic. Hence, if there is any problem, the child is referred back to our clinic. The details of the present status of all these patients are shown in Table 8.

4. Discussion

Our study with 70 patients is comparable with those of Robson et al. [15] (70 cases), Muntz [6] (132 cases), Robinson et al. [5] (150 cases) and Gordon et al. [13] (50 cases). It is universally accepted that there is a high incidence of OME in children with cleft palate. Numerous authors have quoted this to be more than 90% [1–3,5–7].

Although there are numerous reports on the management of OME in children with cleft palates, all of these have relied on using VT to treat this problem. Contrary to this, we have used HA successfully with very little morbidity. This is similar to the conservative policy that we follow in non-cleft children. Several authors have advised

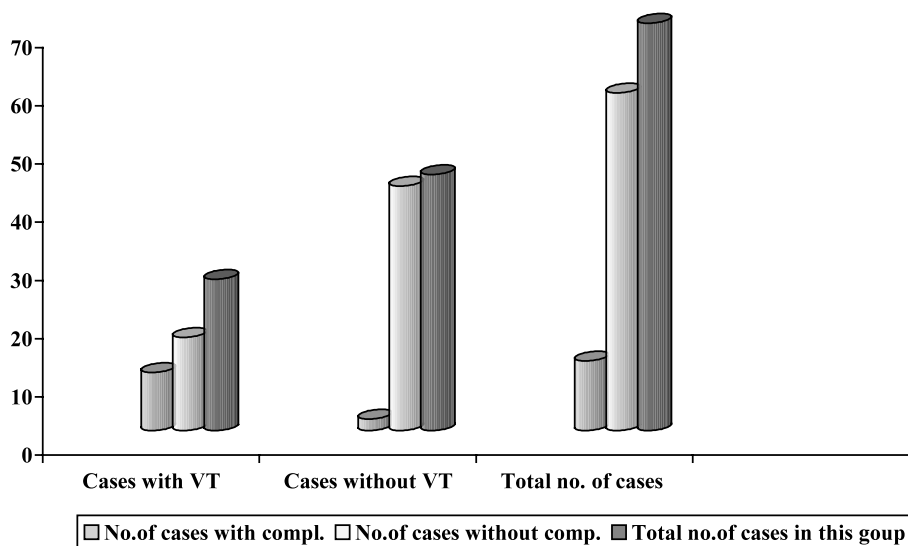


Fig. 1. Complications rate in patients with and without VT.

Table 8
Present status of these patients

Present status	No. cases
Discharged	20
No treatment	16
VT	2
HA	2
Under review	38
Defaulted/transferred to other clinics	8
Waiting list for VT/myringoplasty	4
Total	70

that VT should be inserted routinely to treat OME in children with cleft palates [2,5,11–13]. The reasons extolled by these authors for routinely inserting VT are correction of hearing loss, treatment of recurrent suppurative otitis media and prevention of complications of untreated OME.

We believe HA can be used to correct the hearing impairment satisfactorily. In our study, 24.3% of the children had HA only, and 38.6% had no intervention. Thus, 62.9% of the cases were treated without recourse to VT, avoiding its potential complications. 51.6% of our children showed good compliance with HA and 35.5%, average compliance. The remaining 12.9% i.e. 4 children with poor compliance were later inserted

with VT. There appear to be no papers looking at the role of HA in the management of OME in children with cleft palate. However, a few authors [19,20] have looked at the usage of HA to treat OME in children without cleft palate. They have reported significant improvement in hearing levels, performance at school and good compliance. Robson et al. [15] reported that there was no difference in speech development between those treated with VT for OME and those untreated. Moreover, in their study, audiological thresholds were worse in the treated group. Gordon et al. [13] have reported that grommet insertion did not result in better long term hearing but was strongly associated with tympanosclerosis.

Some authors [16] have commented on the high incidence of recurrent suppurative otitis media in untreated OME. They suggest that middle ear effusion predispose to secondary infection and thus increase the incidence of acute otitis media as well as chronic otitis media. On the other hand, Maw et al. [21] have reported that 90% of middle ear effusions occurring following acute suppurative otitis media resolve spontaneously. In addition, these authors have shown that 20% of untreated OME resolves at 1 year, 35% at 2 years and 60% at 3 years. In our study, only 9 of the 70

children (12.8%) had VT inserted for recurrent suppurative otitis media.

Regarding long term complications of untreated OME, Robinson et al. [5] have stated that persistent middle ear effusion will result in a small proportion developing chronic middle ear changes such as perforation of the tympanic membrane and cholesteatoma and a slight risk of high frequency sensori-neural hearing loss. However a number of reports have confirmed that the risks of developing these complications are indeed very slight or just as much as in the general population. Dominguez et al. [22] reported the risk of developing cholesteatoma in cleft palate children was 2.6%, and Moller [23] 1%. In our study, only 1 child (1.4%) had cholesteatoma (in both the ears), needing mastoid surgeries. This complication occurred in a child who had VT inserted previously. Ahonen et al. [24] reported that statistically significant impaired hearing in children with cleft palate was noted in levels above 9000 Hz only. Hubbard et al. [25] found that ear drum scarring, cognitive, language and psychosocial development was equal in cleft palate children with and without VT. This last point was also confirmed by Robson et al. [15]. Gordon et al. [13] found no difference in long-term hearing between those that had VT and those that did not, but there was a much higher incidence of tympanosclerosis in the group that had VT. However they comment that despite having tympanosclerosis, a significantly large proportion of these continue to have normal hearing and tympanograms.

The details and complications of VT have been well recorded. Robson et al. [15] reported that 54% of their cases had VT insertion, with an average of 1.66 VT insertions. Muntz [6] reported that 96.2% of his cases needed VT insertion, Rynnel-Dagoo et al. [16], 31.8%, Lokman et al. [26], 57.6%, and Gordon et al. [13], 50%. In our study, 37.1% of our children needed VT insertion and the average number of insertion was 1.7. As regards the complications, Robson et al. [15] reported 47% had one or more complications in patients with VT and 9% in those without VT. On a comparative note, in our study, 42.3% of those with and 2.2% without VT had complications. The nature of

complications in our study is similar to those in other studies [13,15].

In general, most authors accept that OME resolves and hearing gets better in these children, as age advances. Gopalkrishna et al. [27] have reported that the incidence of patent eustachian tube in children with operated cleft palates is nearly the same as in normal children after the age of 6 years. Webster et al. [28] have reported that there is a progressive improvement in hearing and only 2 of their 98 patients with cleft palate, had a hearing loss of more than 20 dB in both the ears, in the adolescent age group. Muntz [6] has commented that less than 50% of the children will need VT beyond the age of 3 years. Similarly, Rynnel-Dagoo et al. [16] commented that at the age of 3–4 years, 82% of the children had normal hearing. In keeping with this trend, we have discharged our patients at a mean age of 6 and half years. The discharge criteria and follow up in the community have been discussed earlier.

We do not routinely perform aided thresholds on our children at every visit to the clinic. We rely on the information provided by the parents and the peripatetic teacher for the deaf. There has been criticism of relying on the parents' perception of their child's hearing. Lokman et al. [26] reported that only 12.1% and Paradise, [2] 12.0% of their patients complained of hearing loss. However, Fria et al. [29] have concluded from their study that when parents do suspect hearing impairment, they are likely to be correct. In our set up, the peripatetic teacher for the deaf is a very good liaison between the school and our clinic, providing valuable information regarding the child's performance at school and his or her compliance with the HA.

5. Conclusion

We have shown that OME in children with repaired cleft palates can be managed satisfactorily without recourse to VT insertion. The presence of OME does not lead to long term complications in all patients. Hearing impairment due to OME can be satisfactorily treated with HA in a majority of children. VT need to be inserted only if the child is

not compliant with using a HA or develops recurrent suppurative otitis media. As age advances, eustachian tube function improves, OME tends to resolve and hearing levels are nearly normal. By following this non-interventionist policy, our complication rate is minimal and the children have satisfactory hearing levels.

We are able to provide this service thanks mainly to the Paediatric Audiological Scientist. She has a very good rapport with the children and hence there is good compliance with the HA. The special joint clinic works very well due to valuable input from various sources, in particular, the peripatetic teacher for the deaf.

As this is an ongoing review, we plan to reaudit this data in a few years. Since our rate of VT insertion has been reduced in the last few years, we expect a much lowered incidence of complications in the future.

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