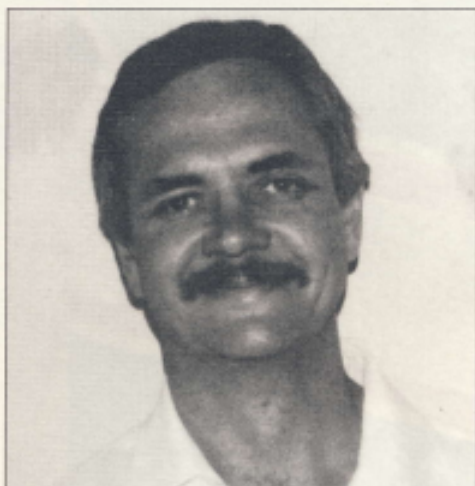


A Personal View of the Use of Grommets

— Dr Neil A Clifton



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Curriculum vitae

Dr Neil Clifton was born in 1951 in Pretoria where he went to school and University: he obtained a BCom (Marketing) in 1973 and an MBChB in 1979. After internship in Port Elizabeth, some private GP work in the Wilderness and George, he came back to Pretoria to do Obs and Gynae (1982) and then from 1983 to 1986 was a Registrar in Otorhinolaryngology. Since 1987 he has been in private practice in Pietermaritzburg. His special interest is deafness in children.

The first grommet (or tympanostomy tube, vent tube) of the 20th Century was inserted by Beverly Armstrong in 1952 in Charlotte, North Carolina. This grand old man who I had the pleasure of meeting and getting to know, thought he was the inventor of the device, but later found out that an Ears, Nose and Throat Surgeon called Politzer had tried a small rubber grommet in the 1860's.

The first tube was a simple 1 cm piece of vinyl levelled at one end (Fig 1). The tube was progressively improved until the fifth model (Fig 2) which is the one I use today.

Summary

The author discusses and illustrates the effective use of grommets: the indications, complications and precautions.

S Afr Fam Pract 1989; 10: 168-71

KEYWORDS: Physician, Family; Grommet Insertion; Otitis Media.

Since 1952 millions of tubes of all shapes, sizes and materials have been used.

Contra-Indications

There are no known contra-indications for the use of tympanostomy tubes.

Procedures

The procedure itself entails a myringotomy (incision in tympanic membrane) under anaesthetic which can be local or general. The ideal location for long term middle ear ventilation is in the anterior superior quadrant of the drum (Fig 3). The tube is then placed (Fig 4). The length of time that the tube stays in position is dependent mainly on three factors:

- * the tube shape and material
- * the incision - size and direction
- * the site on the drum

Tubes are extruded by epithelial migration and this may cause movement of the grommet from its original placement site. The time taken for extrusion can be anything from 1 to 18 months, with my average being 1 year.

Complications

Complications after the procedure are relatively scarce and should not be confused with

Use of Grommets

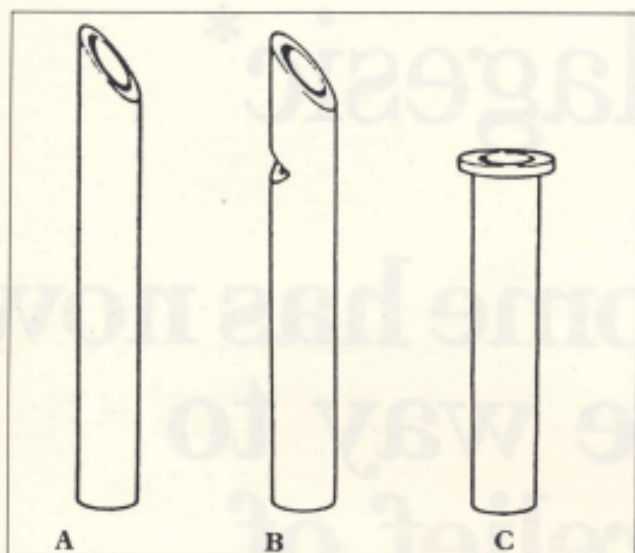


Fig 1. Armstrong ventilating tubes. A) Original beveled vinyl ventilating tube (1952). B) Similar tube with notch to engage margin of drum (1954). C) First flanged tube molded of polypropylene (1959).

complications of the primary pathology:

- * Firstly, complications as a result of the anaesthesia.
- * Chronic otorrhoea - often not as a result of the grommets but from the primary problem. In surveys around the world, 0,2% of patients eventually require a mastoidectomy. A concomitant adenoidectomy seems to reduce the likelihood of this complication. For this indication the size of the adenoids does not seem to be of importance.

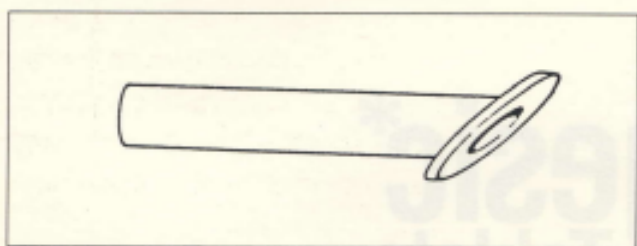


Fig. 2 Above: Tube designed to conform to anatomy and to be inserted through small incision (1965).

Below: Armstrong ventilating tube designed to mate with companion inserter/suction instrument, which affords easy, precise insertion. Machined and molded of Teflon, tube has inside diameter of 1,15 mm and 7 mm long.

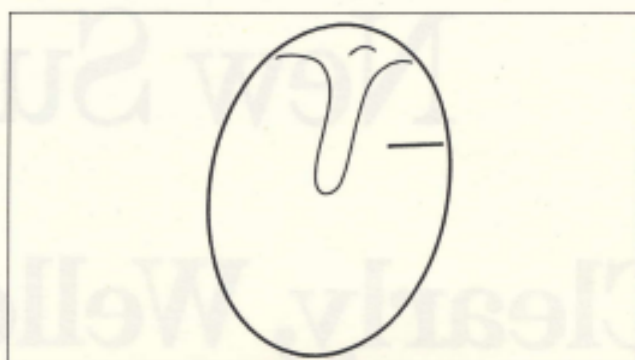
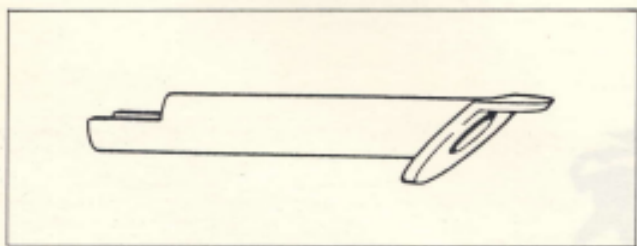


Fig 3. Ideal location of myringotomy incision close to annulus in anterosuperior quadrant.

- * Persistent perforation in the tympanic membrane.
- * Tympanosclerosis which consists of a white chalk patch on the drum in the area from which the grommet was extruded. Most of the time these are of no significance and do not interfere with hearing.
- * Cholesteatoma. There have been a couple of reported cases but once again the primary pathology was more likely to be responsible (otitis media).

Indication

There is usually only one indication for the placement of a vent tube - this is chronic eustachian tube dysfunction that fails to respond to non surgical treatment.

The eustachian tube acts very much like a one way valve, allowing air out of the middle ear passively, but only allowing air up into the middle ear on active opening of the tube. The eustachian tube is opened on swallowing mainly by the m tensor palatini which, as we know, go around the hamulae to meet in the soft palate - hence the

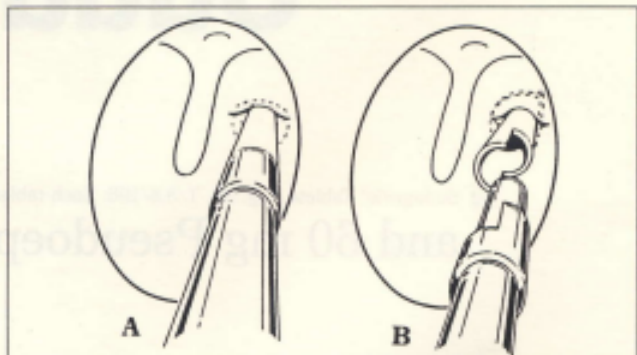


Fig 4. Placement of tube for long term ventilation. A) Insertion of tube through small radial incision near annulus in anterosuperior quadrant. B) Rotation of external tab until parallel with malleus handle. Suction is applied to clear lumen as inserter is withdrawn.

eustachian tube malfunction in cleft palate patients. The tube however can only be opened while the pressure difference between the middle ear and the nasopharynx is not too great. If the pressure gradient is excessive the tube becomes locked. The eustachian tube itself is lined by a ciliated respiratory epithelium and surfactant - interference with this can also cause malfunction.

The kind of pathology that leads to chronic eustachian tube dysfunction includes:

- * Otitis media in all its forms
- * Adenoiditis or nasopharyngitis
 - primary
 - secondary to tonsillitis, sinusitis etc.
 - with or without hypertrophy
- * Rhinitis especially allergic
- * Tumours of the nasopharynx - classically causing unilateral serous otitis media in an adult
- * Barotrauma - the importance of often physically opening the tube, eg by swallowing to equalise, is important here
- * Cleft palate and submucosal cleft palate
- * Ciliary Dyskineses - range of syndromes from Kartagener's, to milder forms with repeated respiratory tract infections

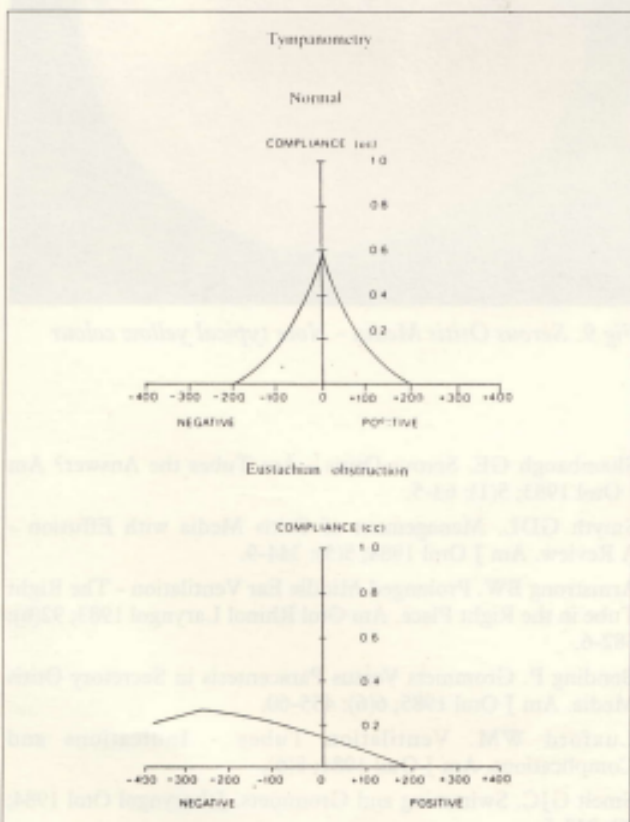


Fig 5. Tympanometry graphs showing patency of the middle ear by measuring ear drum compliance.

- * Skull base fractures with physical disturbance of the anatomy (scarce)
- * Von Recklinghausen's disease with skull base tumours (scarce)

One interesting indication is the patulous eustachian tube where it is permanently open and the patient complains of hearing himself talk, eat and breathe. This usually occurs after severe weight loss.

Diagnosis

How does one diagnose eustachian tube dysfunction? Firstly, of course, by the history which will most likely include complaints of deafness and otalgia.

Secondly, from the examination which may show anything from frank pus and a perforation to an atelectatic collapsed drum.

And thirdly, from special investigation, for example, hearing tests and/or tympanometry. Tympanometry, simply put, is the process whereby the tympanic membrane is made artificially stiffer by changing the pressure in the external canal from -400 daPa to 200 daPa. The changes of acoustic impedance are then plotted on a graph (Fig 5). Otitis media would give a flat tympanogram while negative middle ear pressure indicates an eustachian tube malfunction.

A grommet can last from 1 - 18 months.

Precautions

After grommet insertion, there exists a pathway from the external ear to the middle ear. Water (especially dirty water eg bath water and water under pressure while diving) can therefore enter the middle ear and cause irritation and otitis media. I therefore advise my patients to try and keep water out of their ears.

This can be accomplished by a number of ways (Fig 6). Pre-formed plugs like "Doc's Proplugs" which come to various sizes and are supplied by chemists are the easiest to use. But "Prestik", Silicone ear putty and others are also effective.

Important to explain is that they must not be used deep in the canal and must be replaced if they start breaking or flaking.



Fig 6. There are many ways to keep water out of the ears.

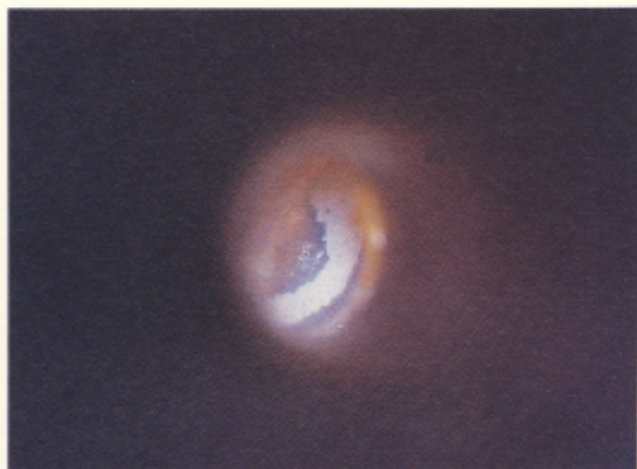


Fig 7. Tympanosclerosis

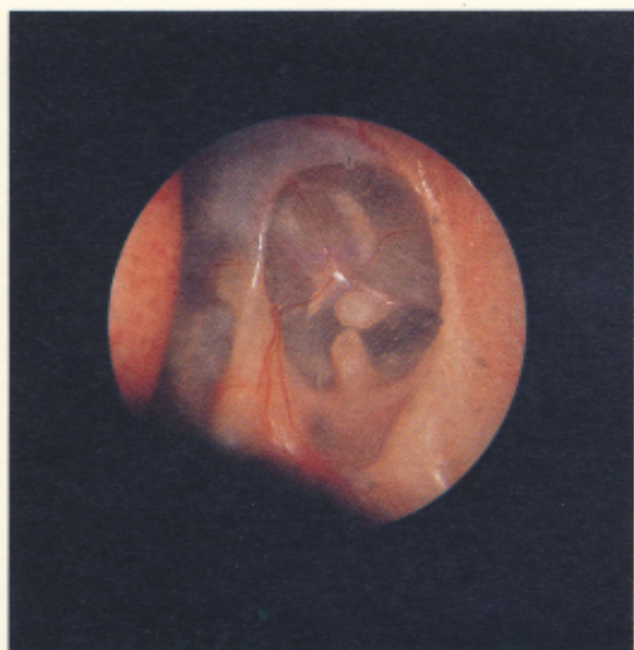


Fig 8. Atelectatic ear drum with retraction

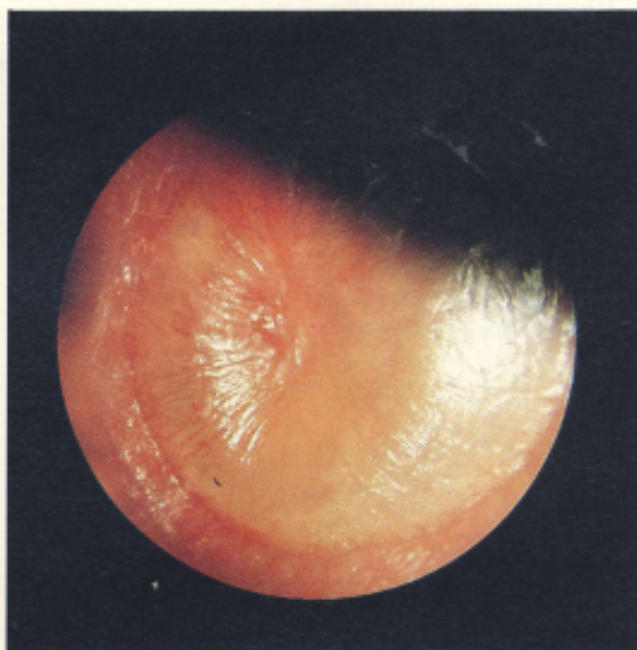


Fig 9. Serous Otitis Media - Note typical yellow colour

Conclusion

Grommets are an effective treatment of chronic eustachian tube dysfunction that does not respond to other management. But chronic eustachian tube dysfunction is a symptom and one must look for the underlying cause.

Bibliography

- Bluestone CD. Update on Antimicrobial Therapy for Otitis Media and Sinusitis in Children. *Cutis*; 1985. Nov 15.
 Bluestone CD. Otitis Media in Children - To treat or not to treat? *N Engl J* 1982; 306: 1399.
 Falk B. Eustachian Tube closing Failure in Children with Persistent Middle Ear Effusion. *Int J Ped Otorhino* 1984; 7: 97-106.

- Shambaugh GE. Serous Otitis - Are Tubes the Answer? *Am J Otol* 1983; 5(1): 63-5.
 Smyth GDL. Management of Otitis Media with Effusion - A Review. *Am J Otol* 1984; 5(5): 344-9.
 Armstrong BW. Prolonged Middle Ear Ventilation - The Right Tube in the Right Place. *Am Otol Rhinol Laryngol* 1983; 92(6): 582-6.
 Bonding P. Grommets Versus Paracentesis in Secretory Otitis Media. *Am J Otol* 1985; 6(6): 455-60.
 Luxford WM. Ventilation Tubes - Indications and Complications. *Am J Otol* 1984; 5(6).
 Smelt GJC. Swimming and Grommets. *J Laryngol Otol* 1984; 98: 243-5.
 Tos M. Epidemiology and Natural History of Secretory Otitis. *Am J Otol* 1984; 5(6): 459-62.