Vent tubes (Grommets)

Clinical Roles

- Designed to admit air to the middle ear cleft
- A secondary role is to drain acute effusions to promote healing and minimise pain
- Barotrauma: prevention or treatment
- To stabilise the ear during Eustachian insufficiency and maintain function; tubes do not treat the origin

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Vent Tubes
Design Features

- Internal flange
- “Waistline” – commonly used to delay extrusion
- Lumen size, shape
- Material
- Handling qualities
- Overall size
Internal flange design. The larger the flange, the longer the tube retention. The .75 mm lumen Shah mini, left, is for short term (4-6 months), the Collar Button, right, for 24/12 or more.
The Shepard-with-wire design exhibiting the retention “waistline”. The wire aids removal.
Lumen shapes and size. The Collar Button is the 1.27 mm pattern for viscous effusions. The Collar Bobbin, right, has a 1.14 lumen, for general use.
Duravent medium term (18/12) tubes displaying the flared lumen that is designed to permit inspection, resist blockage and to permit debris clearance. The flexible dual silicone flanges permit simple insertion of a longer term tube.
A silicone T-tube, intended for very long term. The overall size does not permit insertion as such. The tube is trimmed to size to facilitate insertion.
Vent Tubes
Selection Criteria

- Duration
- Infection
- Effusion type
- Blockage
- Handling qualities
- Material
The Collar Bobbin “family” of tubes for 4-6/12, 12/12 and 18/12 durations, approx. All have a flared lumen.

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A selection of longer term patterns: T-tube, large straight flanges; Jahn hydroxylapatite implantable type; Paparella, large circular flanges; Duravent with dual silicone flanges.
Acute infection tends to extrude tubes rapidly. Larger flange patterns are used to resist this trend.
A serous effusion permits the use of mini-grommets if the effusion is of short duration, e.g. after a viral URTI.
Thick mucoid effusions block grommets readily. A wide bore flared lumen is prudent.
Thick mucus tends to block a cylindrical lumen more than a flared type.
Optimal handling features enable the surgeon to negotiate a variety of insertion scenarios.
The material of manufacture evidently plays only a minor role, provided the material has acceptable biocompatibility aspects. Illustrated are hydroxylapatite, silicone, titanium, Teflon and stainless steel.
Vent Tubes
Insertion Techniques

Anaesthesia: topical, local, general
(local infiltration is quite painful)

Positioning site

Instrumentation
Topical anaesthesia: a cotton ball soaked in Bonain’s solution (phenol-menthol-cocaine); this takes about 20 minutes.
The opaque spot induced by the Bonain’s is anaesthetic and receptive to a tube insertion. This method is painless and useful in younger patients. EMLA cream may be used, but removal is noisy.
Phenol topical anaesthesia is immediate and easily applied with a Duberstein applicator (Gyrus-Olympus) or a fine sucker tip. Few adults require general anaesthesia.
The twin claws of the Duberstein device hold a small droplet of phenol, for application to the drum.
Phenol topical anaesthetic application. The anesthetised skin rapidly turns white.
A myringotomy performed through the phenol site
A myringotomy is best performed in the antero-inferior quadrant, to avoid middle ear structures.
A “toe” on the inner flange facilitates tube insertion. Collar Bobbin pattern.
Vent tube in situ. The flared lumen permits better inspection in situ.
Vent Tubes

Complications

- Premature extrusion
- Blockage
- Medial displacement
- Drum atrophy, perforation
- Infection
- Granulation formation
- Inclusion cholesteatoma
Premature extrusion commonly follows insertion into an inflamed drum. Here a serous effusion has reformed, giving the drum a characteristic yellow discolouration.
Blocked grommet. A cylindrical lumen is more prone to this problem, particularly in the longer shaft tubes.
Local postero-inferior pars tensa atrophy, subsequent to a longer term vent tube insertion. Repeated insertions may cause a permanent perforation.
Anterior drum perforation, secondary to a long term tube insertion. The ragged edge suggests a possible healing process underway.

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A retrotympanic Duravent tube, displaced medially by cotton bud/Q-tip use. The tube may be left indefinitely if not causing other difficulties.
Vent tube infection, a very common complication, especially amongst water-sport orientated children. Passage of water through the tube admits pathogens to the middle ear. Alternatively, a URTI may trigger the event.
Tube extrusion due to a granulation formation. Such reactions are common in tubes that have been in situ for protracted periods.
Inclusion cholesteatoma secondary to a long term tube insertion. Keratin cysts are seen on the inferior margin of a (probably permanent) perforation.
VENT TUBES

Summary

- Commonly used to relieve tubal insufficiency
- Multiple patterns for niche roles
- Tubes overcome deafness and pain
- The tubes stabilise the ear, but do not cure the cause of Eustachian insufficiency

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