OPEN ACCESS ATLAS OF OTOLARYNGOLOGY, HEAD & NECK OPERATIVE SURGERY

CC BY NC

CANALPLASTY FOR EXOSTOSIS

Loren Britto & Thomas Linder

Definition of Exostosis

Exostosis is an abnormal benign bony growth within the external ear canal. It is frequently multiple and bilateral and is very common in individuals with repeated exposure to cold water and wind. Patients may develop conductive hearing loss and/or recurrent ear infections due to trapped water and earwax between the tympanic membrane and the exostosis.

Indications for Canalplasty

Retention of cerumen and keratin in the external ear canal (EAC) associated with recurrent episodes of external otitis.

Preoperative assessment

Otomicroscopy

The findings are partial or total obstruction of the bony external ear canal and retention of cerumen. In some cases it is not possible to visualize the eardrum at all. It is important to assess the cartilaginous entrance to the ear canal in order to plan for a meatoplasty at a later stage *(Figures 1, 2)*

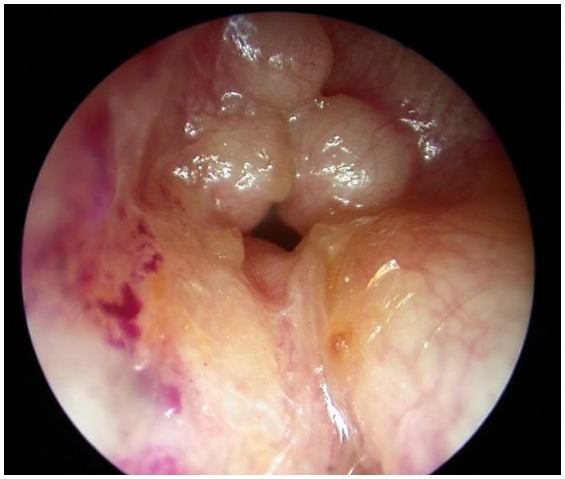


Figure 1: Multiple exostoses

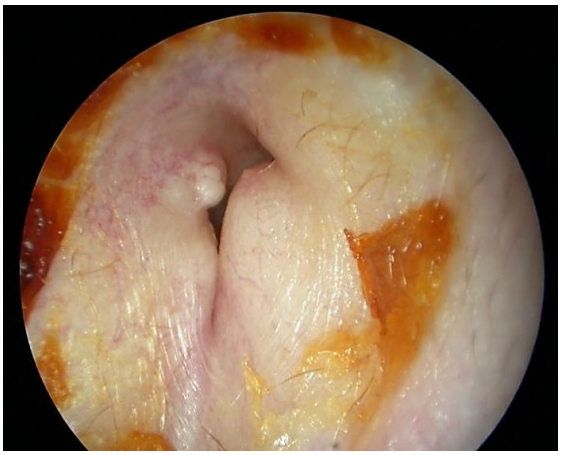


Figure 2: Exostoses

Audiometry

The audiogram may be normal in case of partial obliteration or may reveal a conductive hearing loss in cases of complete or almost total exostoses with retention of cerumen *(Figures 3, 4).*

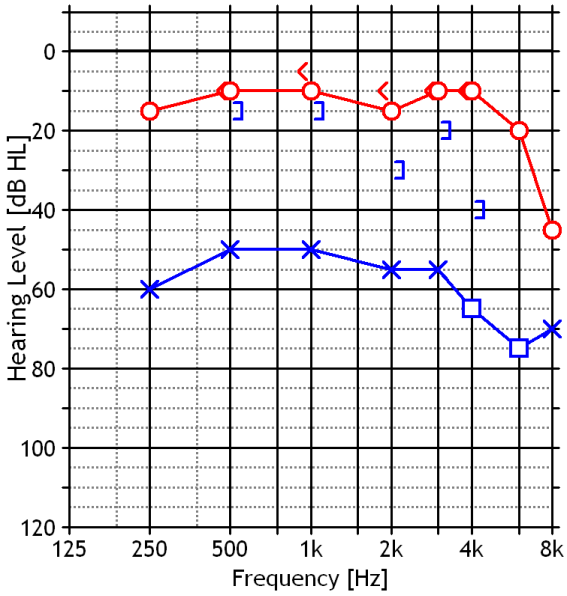


Figure 3: Conductive hearing loss in the left ear

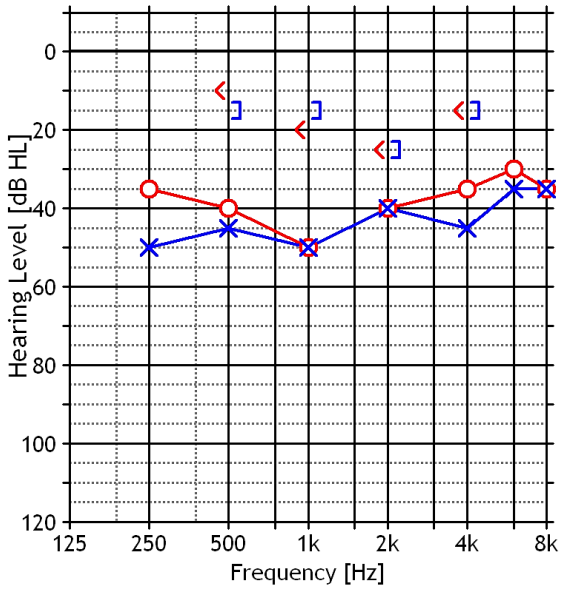


Figure 4: Bilateral conductive hearing loss

Imaging

CT scan shows the extent of the exostoses and helps the surgeon to determine the amount of bone that needs to be removed and avoiding injuries to nearby structures *(Figures 5, 6).*



Figure 5: Multiple, bilateral exostoses with retention of cerumen on the left side

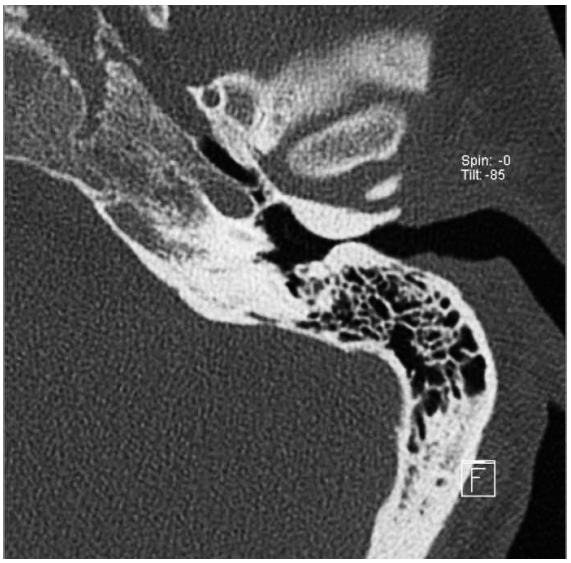


Figure 6: Axial CT scan of left ear with anteroposterior exostoses without retention of cerumen

Surgical Principles

- Removal of external canal exostoses requires complete elimination of the overhanging bone lateral to the tympanic annulus
- The meatal skin should be kept intact and vital to promote rapid reepithelisation following enlargement of the bony ear canal
- With a narrow ear canal entrance, meatoplasty is combined with the canalplasty, removing the excess conchal cartilage and subcutaneous tissue, thereby yielding a large cartilagenous external canal that ensures excellent visibility of the exostotic posterior canal
- In cases of severe bilateral exostosis, wait three months to operate on the other side

Surgical Approaches

The pathology can be addressed by an endaural or a retroauricular approach. The endaural approach is well suited to less severe exostoses and for surgeons who are familiar with endaural approaches for other

pathologies. Less experienced surgeons may favour a retroauricular approach as the exposure is more familiar to them and there is a wider field of action.

Endaural Approach

Video: http://youtu.be/IpCR8hPCyiA

General Considerations

Although the surgery can be performed under local anaesthesia with sedation, we prefer general anaesthesia due to the uncomfortable drilling noise. Antibiotic prophylaxis is not required.

Surgical Steps (left ear)

- Infiltrate the site of the endaural skin incision as well as the ear canal in 4 quadrants with local anaesthetic (lidocaine 1% & adrenaline diluted to 1:200 000) *(Figure 7)*
- Using a nasal speculum, make a helicotragal incision with a #15 blade and *(Figure 8)*
- Make a posterior semicircular incision over the edge of the exostosis, meeting the endaural incision at 12 o'clock *(Figure 9)*

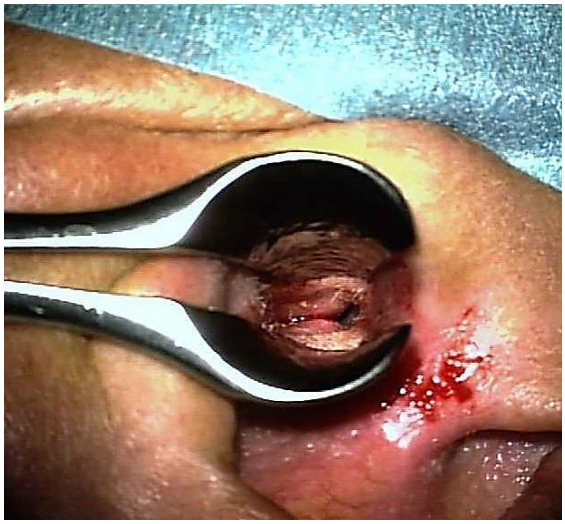


Figure 7: Speculum aiding infiltration

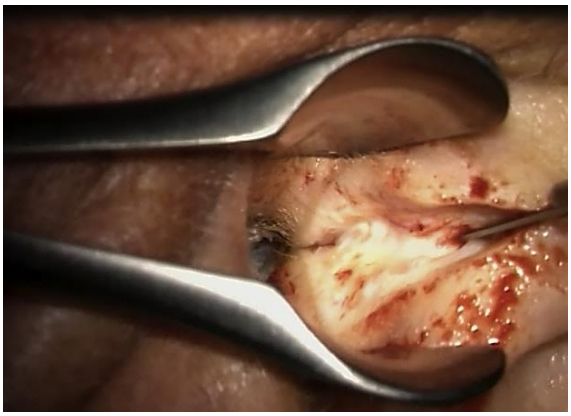


Figure 8: Helicotragal incision

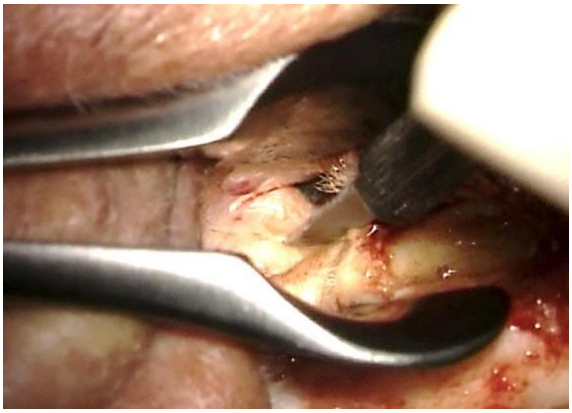


Figure 9: Posterior incision

- Prolong the inferior part of the incision posteriorly and reflect the posterior skin laterally *(Figures 10, 11)*
- Enlarge the entrance of the canal with two Fisch endaural retractors

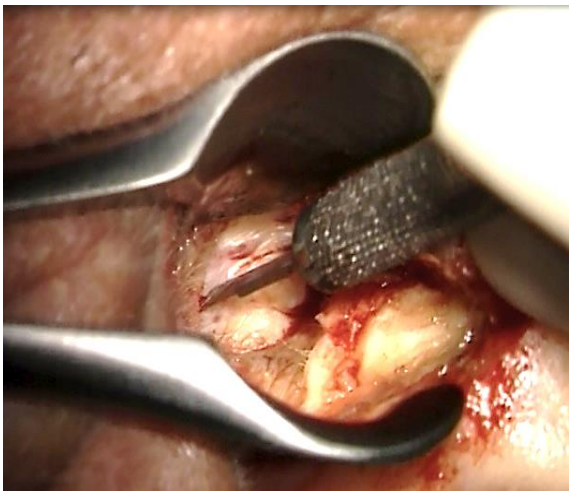


Figure 10: Prolong the posterior incision



Figure 11: Reflect posterior skin laterally

- An anterior semicircumferential incision is made along the lateral margin of the anterior exostosis
- Reflect the anterior canal skin and soft tissue laterally using a Fisch or Iowa microraspatory and a Key raspatory. A round knife may also be used, but will get blunt when dissecting on bone *(Figures 12, 13)*

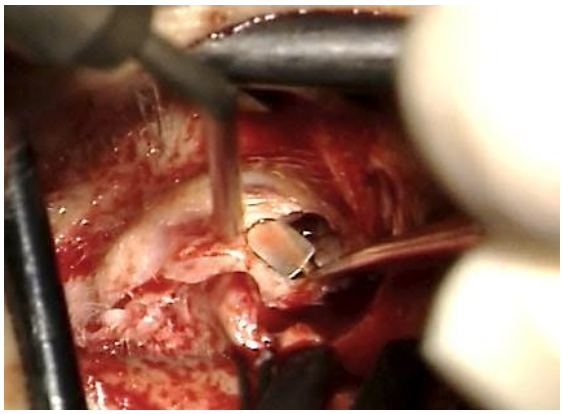


Figure 12: Elevate anterior skin laterally

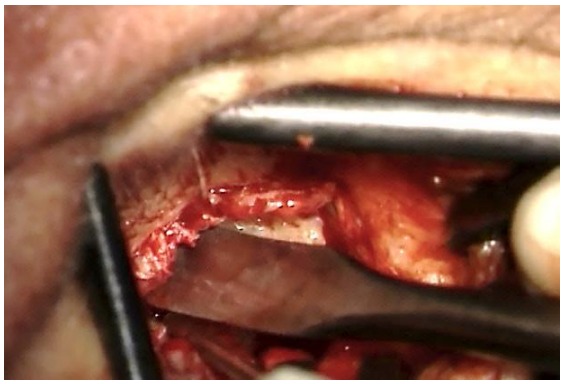


Figure 13: Elevate anterior skin laterally

- The anterior skin flap is kept elevated and retracted from the lumen with an aluminium strip anchored to the Fisch endaural retractor *(Figure 14)*
- Elevate the skin over the exostotic bone using microraspatories and small gauze strips (1-1.5cm in length) soaked in adrenaline solution. The gauze strips allow careful dissection between skin and bone and avoid lacerations to the skin flaps *(Figure 14)*

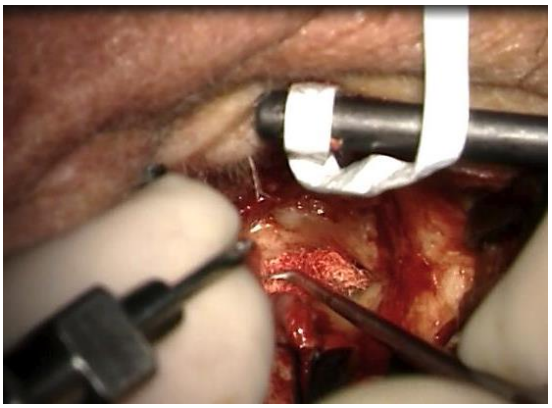


Figure 14: Elevate skin with Fisch microraspatory and adrenaline gauze

- Remove the excess bone along the canal wall. A sharp drill is only used at the outer entrance to the bony ear canal far away from the skin flaps. Once the dissection proceeds into the bony ear canal, diamond burrs are used. *(Figures 15, 16)*

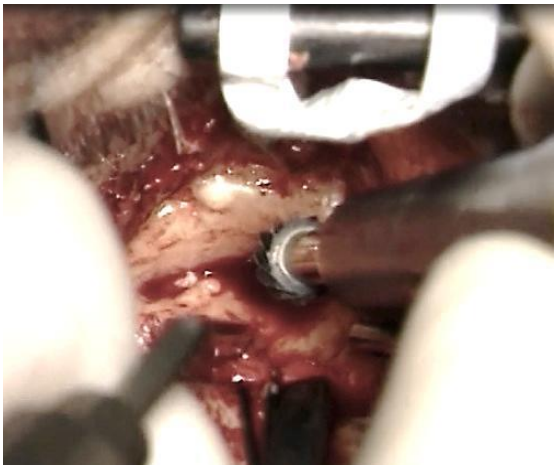


Figure 15: Sharp burr

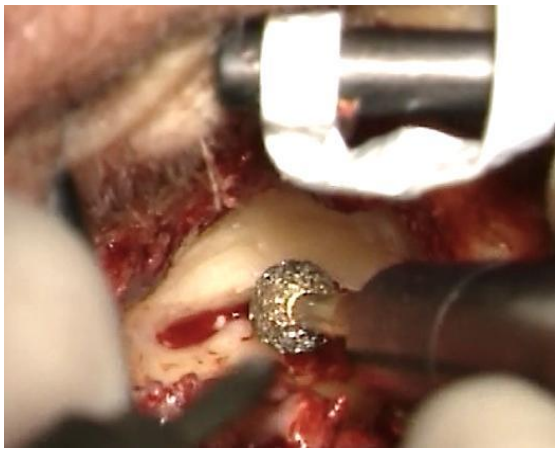


Figure 16: Diamond burr



Figure 17: Skin protected

- Since preservation of the ear canal skin is vital to allow proper wound healing, the following steps and tricks are helpful to achieve this goal:
  - The left hand (for right-handed surgeon) cleans the field holding otosclerosis suction tips and assists the right hand while drilling
  - Continuous irrigation is mandatory to see any colour changes within the bone (appearance of temporomandibular joint anteriorly or mastoid air cells posteriorly)
  - To protect the skin from damage, a groove or sulcus is made in the exostosis, leaving a thin layer of bone covering the elevated skin. Avoid drilling on the edge; always stays behind the edge of the groove/sulcus. The outer limits are the temporomandibular joint anteriorly and the mastoid air cells posteriorly
  - Elevate the skin with an adrenaline gauze, leaving the skin safe medial to the edge of bone *(Figures 17-20)*
- Drilling should be discontinued if a bluish colour in the bone is noted anteriorly while irrigating to avoid entering the temporomandibular joint
- Approaching the eardrum, drill at the edge, using a silastic sheet to protect the skin *(Figure 21)*

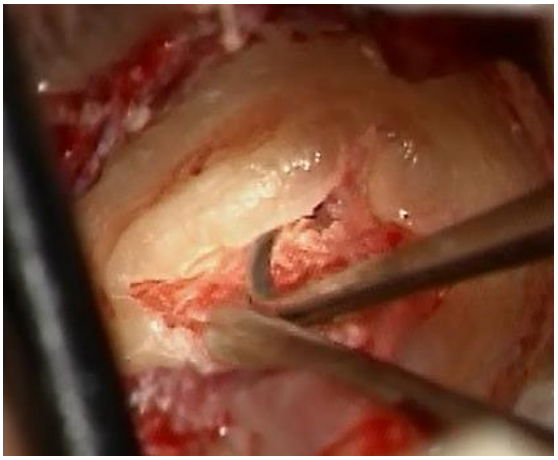


Figure 18: Elevating skin with adrenaline gauze

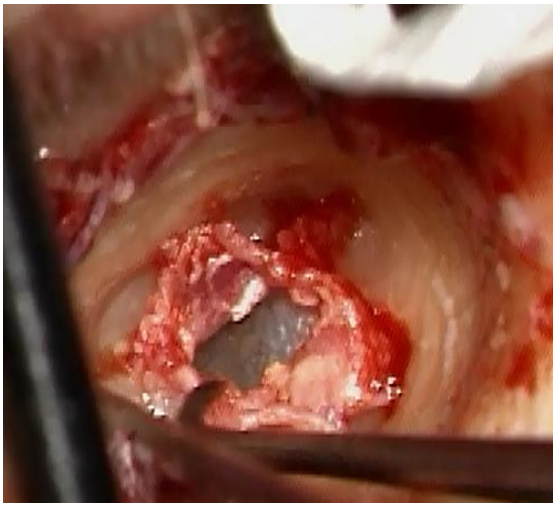


Figure 19: Checking vitality of the skin

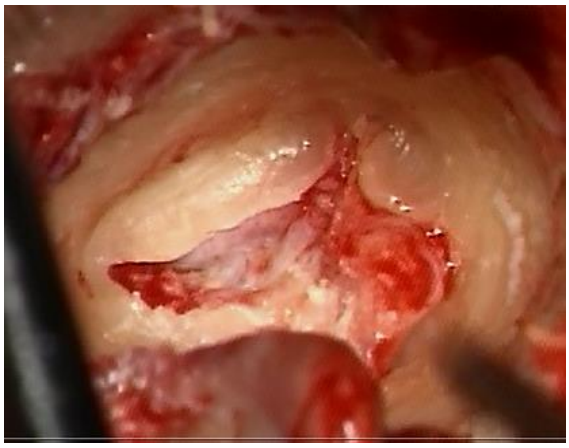


Figure 20: A groove is made, and the skin left protected medially



Figure 21: Silastic sheet

- When the tympanic annulus appears through the posterior side of the flap, the eggshell of bone protecting the meatal skin is removed with a Fisch microraspatory and curette *(Figures 22, 23)*

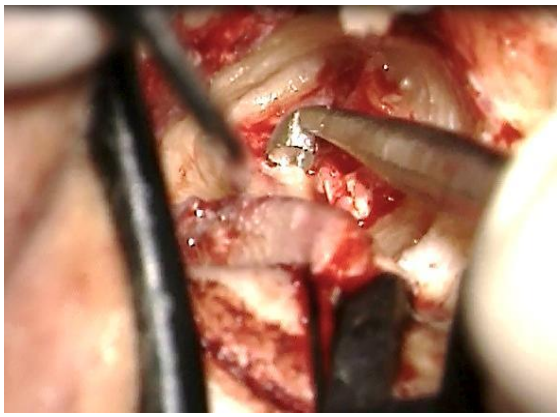


Figure 22: Curetting bone over annulus

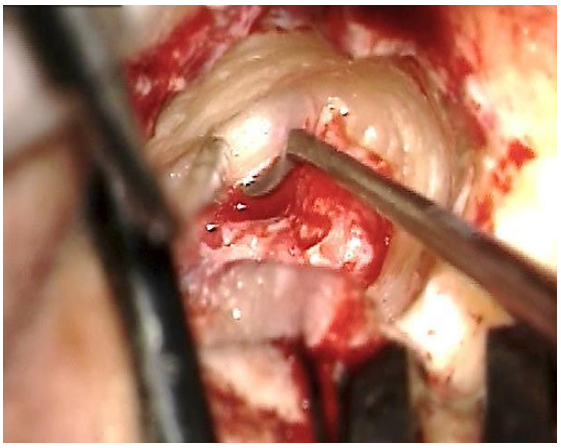


Figure 23: Curetting bone over annulus

- The EAC is shaped into an inverted truncated cone
- Correct widening of the EAC requires elimination of all overhanging bone lateral to the tympanic annulus. Failure to open the tympanomeatal angle at the level of the annulus causes accumulation of keratin with recurrence of the exostoses
- The flap of ear canal skin is placed back in position. Releasing cuts are made at 11 and 7 o'clock (right ear) to accommodate the skin properly on the new bone canal *(Figures 24, 25)*

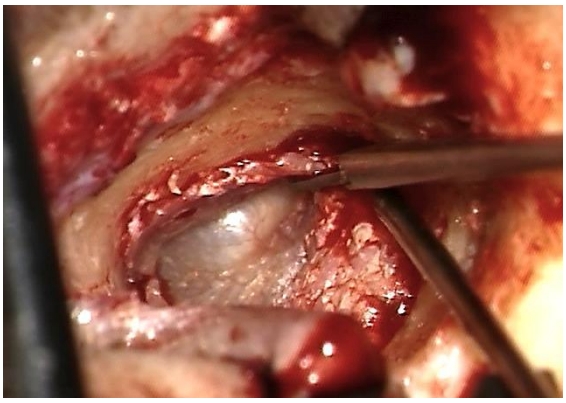


Figure 24: Incising at 1 & 5 o'clock

- The meatal skin flap is repositioned and covered with Gelfoam pledgets soaked in corticosporin *(Figures 26, 27)*
- The endaural incision is closed with 3/0 Vicryl and 4/0 Prolene sutures

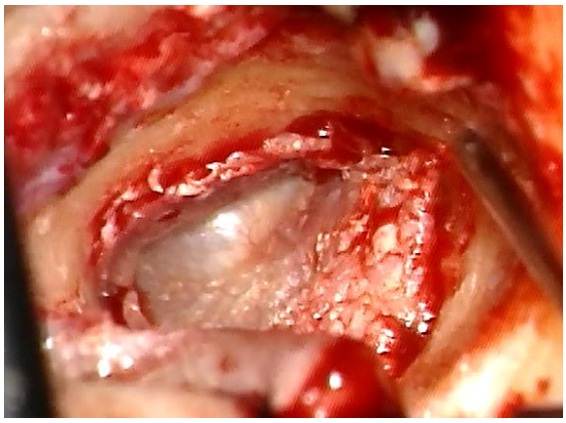


Figure 25: Incising at 1 & 5 o'clock

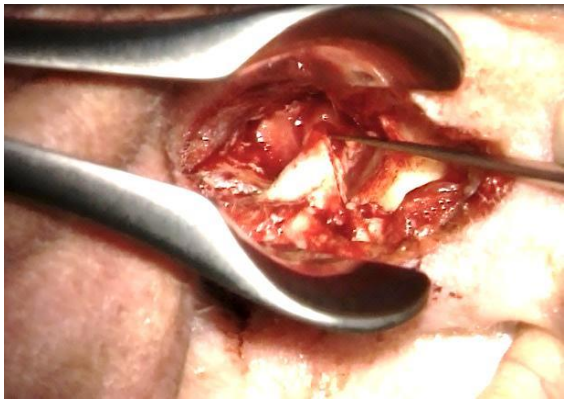


Figure 26: Repositioning posterior meatal skin and covering it with gelfoam

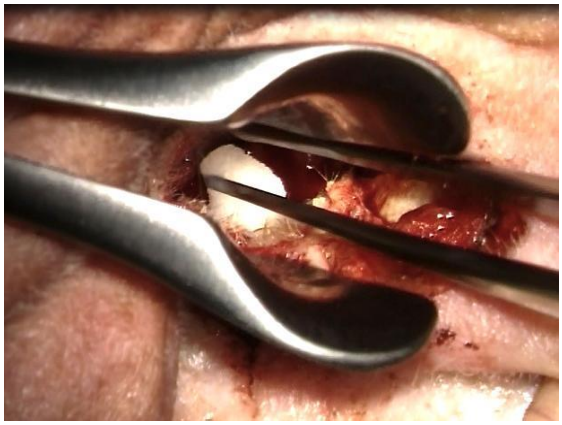


Figure 27: Positioning the gelfoam

Retroauricular Approach

Video: http://youtu.be/nkSq6w9uhmY

This approach allows better visualization of the canal.

Indications

- Total exostosis without lumen
- Less experienced surgeon (better landmarks, larger operative field, same outcome)

General Considerations

The surgery is performed under general anaesthesia (local anaesthesia is possible, but noise of drilling burr can be difficult for the patient to accept). Antibiotic prophylaxis is not required.

Surgical Steps (Left ear)

- Using local anaesthetic (lidocaine 1% and adrenaline diluted to 1:200 000), infiltrate the postauricular sulcus. Then advance the needle and infiltrate the tissues anteroinferiorly and anterosuperiorly
- Use a Lempert's speculum to visualize the bony-cartilaginous junction and injecting the 4 quadrants of the skin of the ear canal
- Using a Lempert's speculum, make a posterior transcanal incision over the edge of the exostosis, with an inferior extension. Reflect the skin flap laterally *(Figures 28-30)*
- Start the retroauricular approach like for tympanoplasty *(Figures 32, 33)* (Myringoplasty & tympanoplasty chapter)
- The end of the periosteal flap elevation meets the posterior transcanal incision

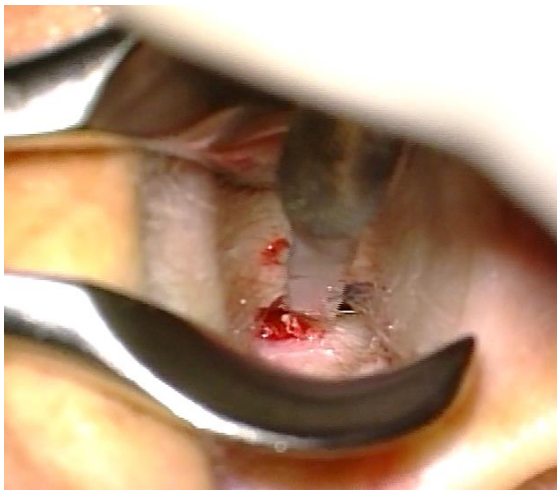


Figure 28: Posterior incision

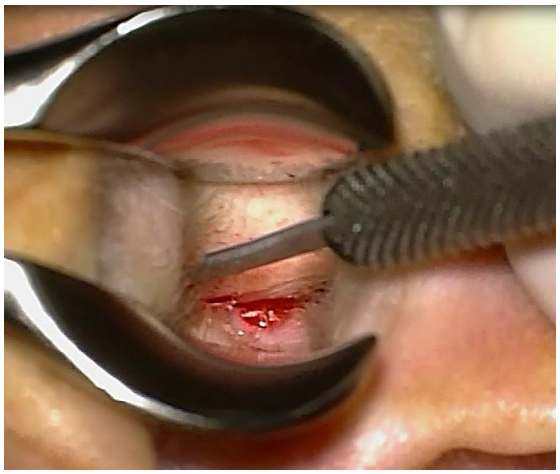


Figure 29: Extending the posterior incision inferiorly

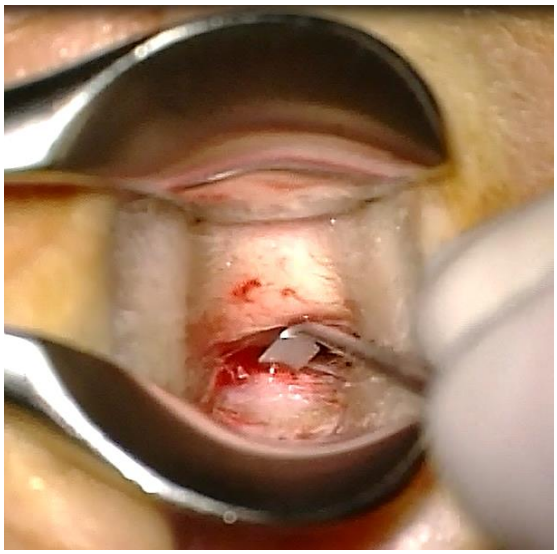


Figure 30: Reflecting the posterior flap



Figure 31: Retroauricular skin incision

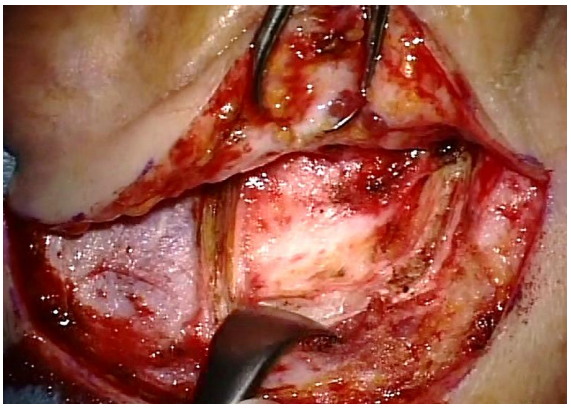


Figure 32: Periosteal flap

- Incise the anterior canal wall with an #11 blade and reflect the skin laterally. Keep the anterior skin out of the surgical field with an aluminium strip *(Figures 33-35)*

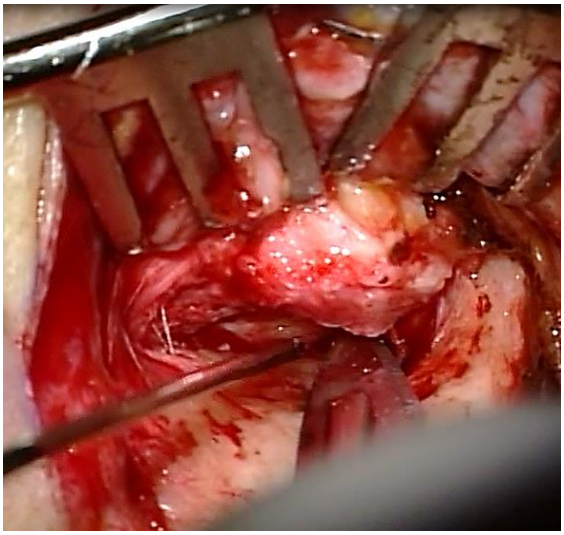


Figure 33: Anterior incision

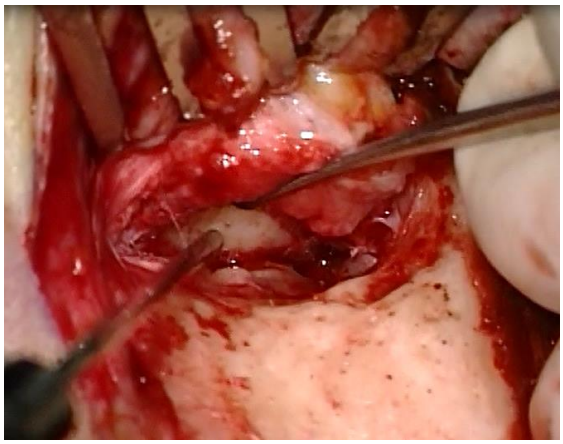


Figure 34: Reflecting the anterior skin flap laterally

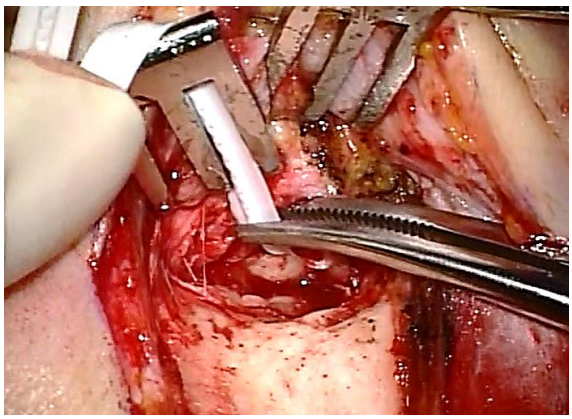


Figure 35: Aluminium strip

- Perform the next steps as for *Endaural approach (Figure 36)*

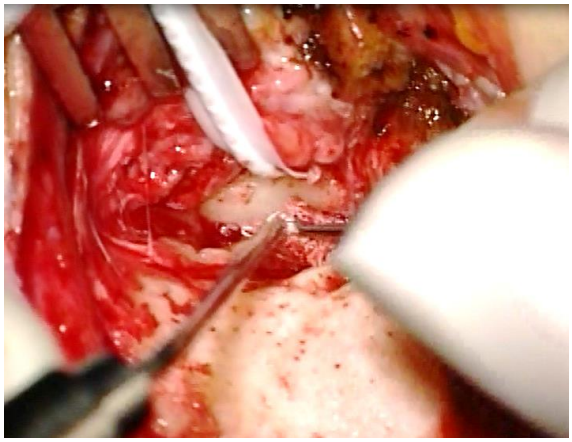


Figure 36: Elevating canal skin with Fisch microraspatory and adrenaline gauze

- Cover the skin with Gelfoam pledgets soaked in corticosporin
- Suture the retroauricular incision with 3-0 Vicryl and 4-0 Prolene

Videos

Exostosis surgery: Endaural approach
http://youtu.be/IpCR8hPCyiA
Exostosis surgery: Retroauricular approach
http://youtu.be/nkSq6w9uhmY

Author

Loren Britto M.D.
Fisch Instrument Microsurgical Fellow
Lucerne Canton Hospital, Switzerland
lorenbritto@uol.com.br

Senior Author

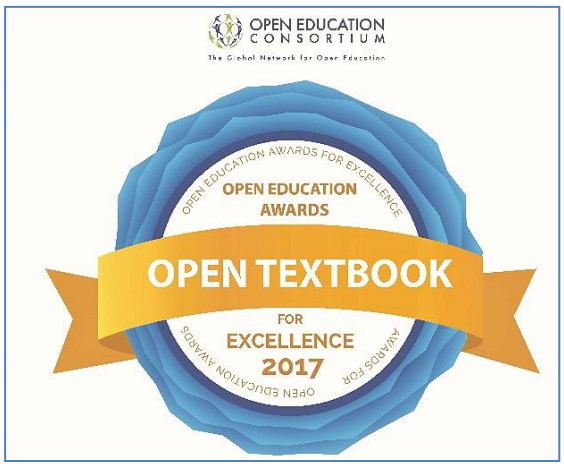
Thomas Linder, M.D.
Professor, Chairman and Head of
Department of Otorhinolaryngology,
Head, Neck and Facial Plastic Surgery
Lucerne Canton Hospital, Switzerland
thomas.linder@ksl.ch

Editor

Johan Fagan MBChB, FCS(ORL), MMed
Professor and Chairman
Division of Otolaryngology
University of Cape Town
Cape Town, South Africa
johannes.fagan@uct.ac.za

THE OPEN ACCESS ATLAS OF OTOLARYNGOLOGY, HEAD & NECK OPERATIVE SURGERY
www.entdev.uct.ac.za

The Open Access Atlas of Otolaryngology, Head & Neck Operative Surgery by Johan Fagan (Editor) johannes.fagan@uct.ac.za is licensed under a Creative Commons Attribution - Non-Commercial 3.0 Unported License


OPEN EDUCATION
CONSORTIUM
The Global Network for Open Education
OPEN EDUCATION AWARDS FOR EXCELLENCE
OPEN EDUCATION
AWARDS
OPEN TEXTBOOK
FOR
EXCELLENCE
2017
OPEN EDUCATION AWARDS FOR EXCELLENCE