MASTOIDECTOMY RECONSTRUCTION

Historical techniques
AUTOGRAFT BONE TECHNIQUE
Late 1970s

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Bone shaving used for open cavity reconstruction. Chiselled bone curled like wood shavings in younger patients, but bone becomes brittle and tends to shatter in older cases.
Bone shaving technique, Lt ear. The mastoid or squamous temporal periosteum is exposed and the graft outline delineated.
A wide bone chisel is used to elevate a thick shaving of cortical bone that curls out progressively as the graft is harvested.
Detail of the graft showing the curvature that aids the adaptation to the curve of the EAC site.
Second demonstration, Lt ear. Exposure of the squamous pericranium site.

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Detail of the previous frame showing the outline of the graft on the squamous temporal. Note the MTA, anteriorly.
Elevation of the curved bone shaving off the temporal bone.
EAC bone graft, showing the curvature achieved by the progressive chiselling. The graft is shaped by nibbling forceps to fit the site.
Siting the bone graft. A groove is cut into the superior EAC to stabilise the fitted graft in situ.
Detail of the superior retention groove.
Graft in final position, sealing the EAC wall defect. Precise shaping, sizing and placement is difficult and essential, given the limited amount of donor material and its consistency.
Long term view of a bone graft in situ. Mild mid graft resorption, partly due to the limited vascularity of the overlying flaps used at the time.
Long term bone graft resorption. Much of the superficial graft has resorbed with advancing cavity reformation.
Canal wall dissolution 20 years after a cortical bone canal wall reconstruction. Extensive mid and superficial graft resorption has occurred, with squamous epithelial invagination into the reforming cavity.
Advanced EAC wall necrosis, post-aural operative view. Total dissolution of the mid canal, opening into the mastoid.
Substantial resorption of a Rt canal wall graft. Post-aural surgical view showing the wall defect. The drum lies anteriorly, obscured.
Detail of the previous case, showing the EAC defect and adjacent aditus. Poor vasculature and devitalised organic material are an inadvisable combination.
PROPLAST
Teflon-Carbon
Proplast posterior wall reconstruction, ca 1977. Proplast was one of the earliest biomaterials proposed for otological use, but the imperfect biocompatibility, porous structure and poor vascular cover were an unhappy combination.
Proplast was easily cut and fashioned. Above is a canal wall section with supporting blocks. Late 1970’s.
Proplast fashioned as a thin canal wall sheet. Almost all cases failed within relatively short periods. The Teflon-carbon matrix was also noted to fail in TMJ implants.
Proplast reconstruction: canal wall sheet supported by a Y-strut.
Proplast attic reconstruction, overlain with homograft cartilage. Removed several years later.
Mastoidectomy reconstruction with a Proplast sheet and a thick Palva pinna based flap overlay, 4 years post-operative.
Proplast in situ 12/12 after initially successful mastoidectomy reconstruction. Infection and dehiscence were commonplace.
CARTILAGE
Early Heermann wall reconstruction using autograft cartilage.
Homograft cartilage mastoidectomy reconstruction (Smyth, 1972). Septal cartilage preserved in alcohol or Cialit. A foil template was used to shape the material.
Shaping homograft septal cartilage with a template. The cartilage obtained was straight and stiff, requiring supplementary sections to create a curved EAC.
Mastoidectomy reconstruction after homograft cartilage repair. The main sheet has filled the major wall defect, with supplementary pieces in the attic.
Homograft cartilage wall reconstruction, with an autograft cartilage disc overlying a polyethylene PORP in the postero-superior mesotympanum. Early 1980’s.
Homograft cartilage reconstruction, supplemented with an autograft cartilage semicircular attic disc. A polyethylene PORP is present: the retaining cartilage cap suture is just visible under the upper drum.
Early resorption of attic homograft cartilage, 4 years after mastoidectomy reconstruction.
Soft tissue resorption around a homograft cartilage reconstruction (mid 1980’s). An early Oval-Top prosthesis is evident posterior to the handle of the malleus.
Homograft cartilage reconstruction. Long term irregular tissue resorption is creating an uneven EAC lumen and potential retraction pockets.
Resorbing homograft cartilage in the attic, forming a retraction pocket, several years after surgery. An Oval-Top prototype is present.
Case of the previous frame, a decade later. Advancing slow cartilage necrosis, overlying myringitis and keratin accumulation.
Post homograft cartilage reconstruction. Advancing cartilage necrosis and diffuse myringitis secondary to chronic ischaemia of the site.
Soft tissue resorption after homograft cartilage wall repair. The cartilage remains in situ, but in the absence of a vascular flap the soft tissues have slowly thinned out.
Homograft cartilage, removed from a surgical site 12/12 later. The cartilage matrix remains but the cells are dead. Gradual dissolution will progress.
Cartilage repair of a high ridge open cavity. A homograft sheet fills the mastoid defect, and an autograft cartilage semicircular disc has been used in the attic.

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Canal repair using autograft cartilage. Carefully planned and removed, the cymba conchae can supply sufficient cartilage to repair small to medium open cavity defects.
Autograft cartilage repair of the EAC wall in a larger cavity. The conchal bowl graft was insufficient to seal off the entire extent; cavity reformation is occurring over the graft top.

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Ceravital ceramic wall repair implant (bottom right). This ceramic was troubled by unpredictable dissolution, and being used before optimal vascular flap development, also suffered recurrent dehiscence of the canal wall skin (ca. 1983).