Pinna-based periosteal flap (Popper 1935, Palva 1961). Popper’s design was periosteal; Palva’s incorporated the superficial tissues also, for obliteration purposes.
Anteriorly based Popper periosteal flap, Rt ear. These flaps are comprised of relatively avascular mastoid periosteum, without major supply vessels.
Palva flap, mastoid surgery, Rt ear. The Palva pattern incorporates the post-auricular muscle and soft tissue in addition to the Popper periosteum, to increase bulk during obliteration procedures.
Plan of the middle temporal flap that derives vascular supply from the combined superficial and deep temporal arteries, plus the post-auricular (if not previously sectioned).
Middle temporal flap (MTF) series 1, Rt ear. The post-auricular mastoid tissues are below, right. The temporalis has been elevated revealing the middle temporal artery (MTA) and accompanying dual veins in the squamous temporal pericranium.
Greater detail of the previous frame. The artery is fine and difficult to visualise, but the “railway line” of the veins is evident. These vary from vertical to nearly horizontal.
The outline of the flap is cut on to bone as long as possible with a #15 blade. The anterior border begins 1 cm above the zygomatic root, avoiding the MTA as it emerges at this point.
The flap is elevated by fine retrograde strokes of a tympanoplasty first incision knife and rolls up like a carpet. The MTA sulcus is seen as a vertical line.
Completed elevation of the squamous pericranial upper half of the MTF. This part is vascular and will fold into the EAC in a mastoid reconstruction case, forming the vascular stroma of the new canal.
Detail of the unfolded MTF. Note the relatively avascular mastoid tissues, right, as compared to the vascular squamous section, left.

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The MTF is elevated and reflected forwards, secured with forceps to permit access to the mastoid, avoiding flap trauma.
Entry into the mastoid cavity from behind, during mastoidectomy reconstruction. The cavity will be cleared of disease preparatory to EAC wall repair.
Exposure of the cavity lining prior to clearance and EAC wall repair.
The MTF, turned into the mastoid cavity to line the new EAC. The flap needs length to reach the anterior attic as considerable contraction occurs upon elevation.

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MTF creation, series 2, Rt ear. Preliminary flap exposure. The temporalis fascia has been divided along the supra-mastoid crest and the temporalis muscle elevated.
Detail of the squamous pericranium, showing the MTA and accompanying vessels passing posterosuperiorly.
Detail of the MTA vessels. These are surrounded by a web of vessels creating a very vascular tissue layer. Uncommonly, the MTA cannot be identified, but this does not affect the efficacy of the flap.
High detail of the artery, its veins and the vascular web of the pericranium.
Progressive MTF elevation, showing the arterial sulcus in the temporal bone above.
Elevation of the pericranial section of the MTF. Attachment to the bone is tenuous; elevation is simple. Create the flap 5cm above the crest and 5cm to the rear of the EAC.
Similar view. A Langenbeck retractor aids visualisation, but the upper flap elevation is done by blind dissection.
Completion of the flap down to the crest. The anterior edge should not cross the zygomatic root, as the MTA emerges from the infra-temporal fossa just above the EAC.
Progressive elevation of the thicker mastoid periosteum, this part of the MTF used to obliterate the mastoid tip cells.
Completion of the MTF elevation and initial entry into the mastoid cavity, preparatory to clearance and EAC recreation.
Plan of a Wing flap. This is an oversize MTF pattern deriving supply from the MTA and the post-auricular. The pattern may be fascia or pericranium (cavity lining role) or full thickness as an obliterating flap.
A wing flap teased out to full extent, showing the dimensions of flap for lining a cavity or other roles.
Post-aural approach to the mastoid after elevation of a wing flap. The tissues are held forwards by artery clips to permit mastoid exenteration without flap trauma.