MIDDLE EAR VASCULAR FLAPS
Design Principles
Arterial supply to the peri-auricular tissues. Reliable flap design should be based on these vessels to prevent ischaemia and consequent atrophy or necrosis.
Essential patterns of past flap design: 1 Antero-superior based, 2 Inferiorly based, 3 Postero-superiorly based, 4 Pinna-based.
HISTORICAL FLAPS
1 Preysing, 2 Mosher, 3 Kisch, 4 Popper, 5 Meurman, Ojala, 6 Vincenzo, 7 Charland, 8 Beales, 9 Palva, 10 Farrior, 11 Guilford, 12 Turner, 13 Simmons, 14 Lenis, 15 Black.


Pinna-based flap (Popper, Palva). A popular, simple design but lacking a demonstrable arterial supply.
Inferiorly based flap pattern (Meurman and Ojala, 1949). Poor vascular supply, especially the tissues superior to the supra-mastoid crest. Few vessels cross this plane.
Lenis temporal fascia flap 1988. Supplied from inferiorly by the superficial temporal.
Hong Kong temporalis fascia flap (van Hasselt, Lui, 1991). Superficial temporal supply.
Postero-superior pattern (Turner 1966) Supply from the diffuse pericranial vascular web, but without demonstrable major supply vessels.
Antero-superiorly based flap (Kisch 1928), deriving supply from the superficial temporal.
Temporal bone demonstrating the course of the middle temporal artery (Gray’s Anatomy). This emerges on the upper border of the zygoma, immediately above the EAC.
Plan of the middle temporal flap (from 1991). The flap has two parts: a superior pericranial half that utilises the middle temporal artery as an axial vessel, and a lower mastoid periosteum section of lesser vascularity.
Alternate MTF designs (1996): a continual design (Lt) and a pattern using a separate Popper element (abandoned). If the mastoid tissue is damaged/sectioned, the upper pericranial section can be used independently.
Use of the MTF, folded medially to line the EAC during mastoidectomy reconstruction. The tip becomes sited in the anterior attic, the posterior border along the VII ridge.
EAC reconstruction using an MTF: a. A strip of Allevyn stabilises the drum repair; b. skin flaps cover the strip; c. the MTF covers the skin flaps from behind; d. the titanium supporting sheet is positioned. Canal packing is then completed trans-canal.
Wing Flap (Black 1998). The design may use temporalis fascia, squamous pericranium (cavity lining roles) or combined fascia-muscle-pericranium (obliteration role).

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Comparison of the Popper/Palva pinna-based flap vs. wing flap. The former transects the major vascular supply. The latter uses the MTA (deeper tissue) and/or the superficial temporal (fascia layer), depending on the obliteration/cavity lining role required.