

Pterional approach & Orbitozygomatic approach (craniotomy)

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References

1. Photo Atlas of Skull Base Dissection techniques and Operative Approaches
2. Atlas of Operative Microneurosurgery brain tumors
3. Microsurgical and Endoscopic Approache to the Skull Base
4. Operative Cranial Neurosurgical Anatomy
5. The craniotomy Atlas
6. 김영일 pf. PPT

Indication & position

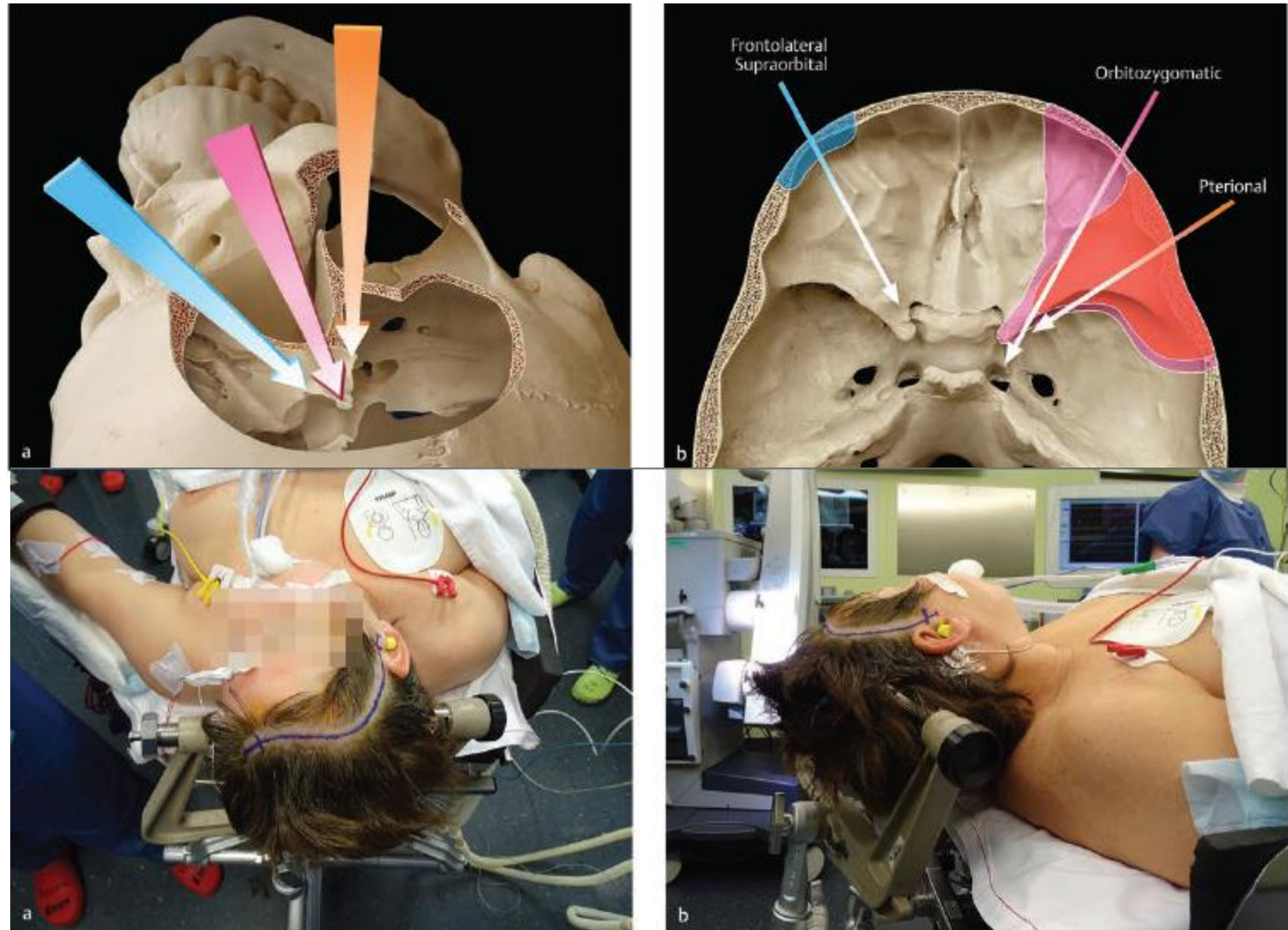
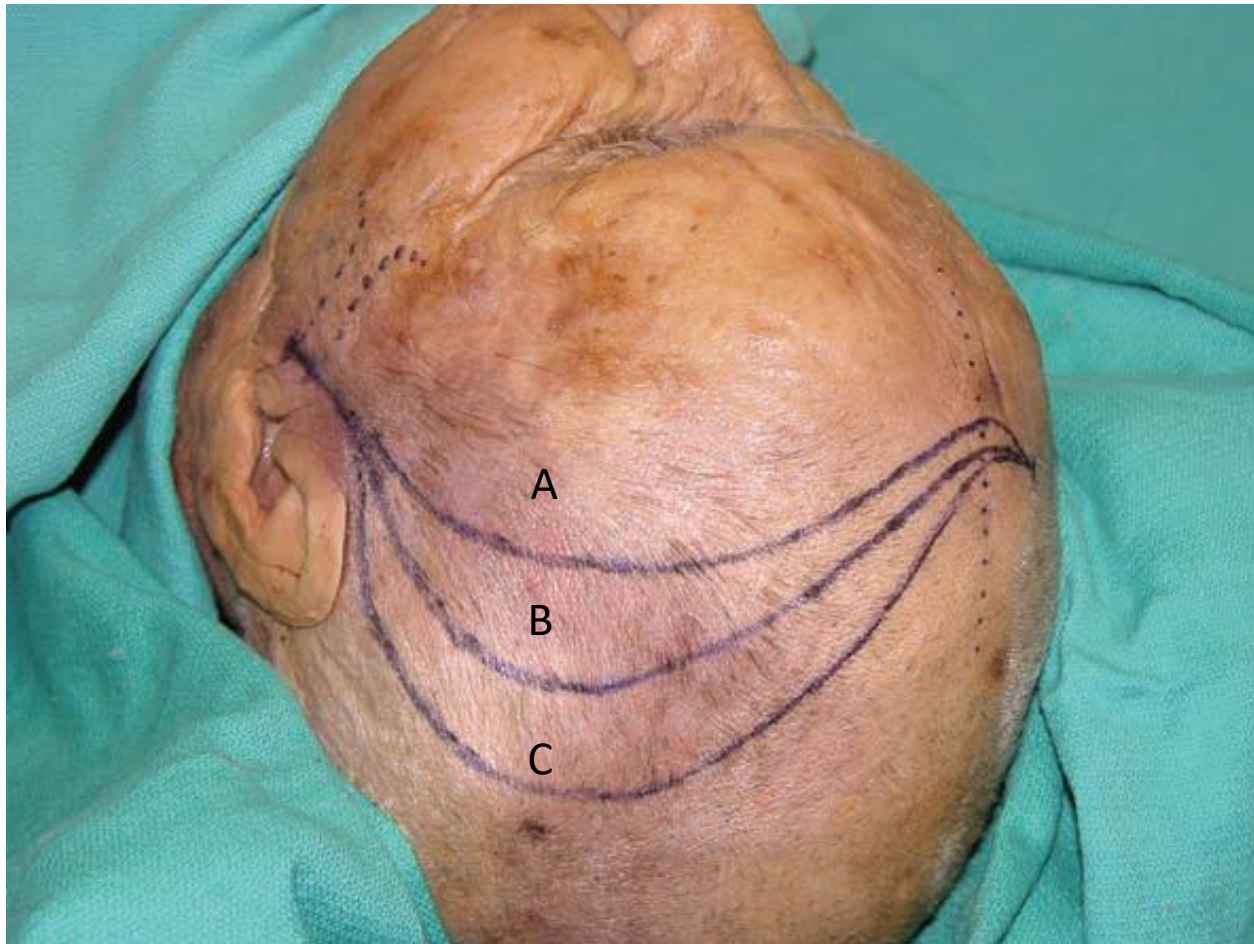


Fig. 6.4 (a, b) The two-piece orbitozygomatic approach. The head is turned 20–60° (most often 30–45°), depending on the surgical target, and tilted toward the floor to place the zygoma at the highest point.

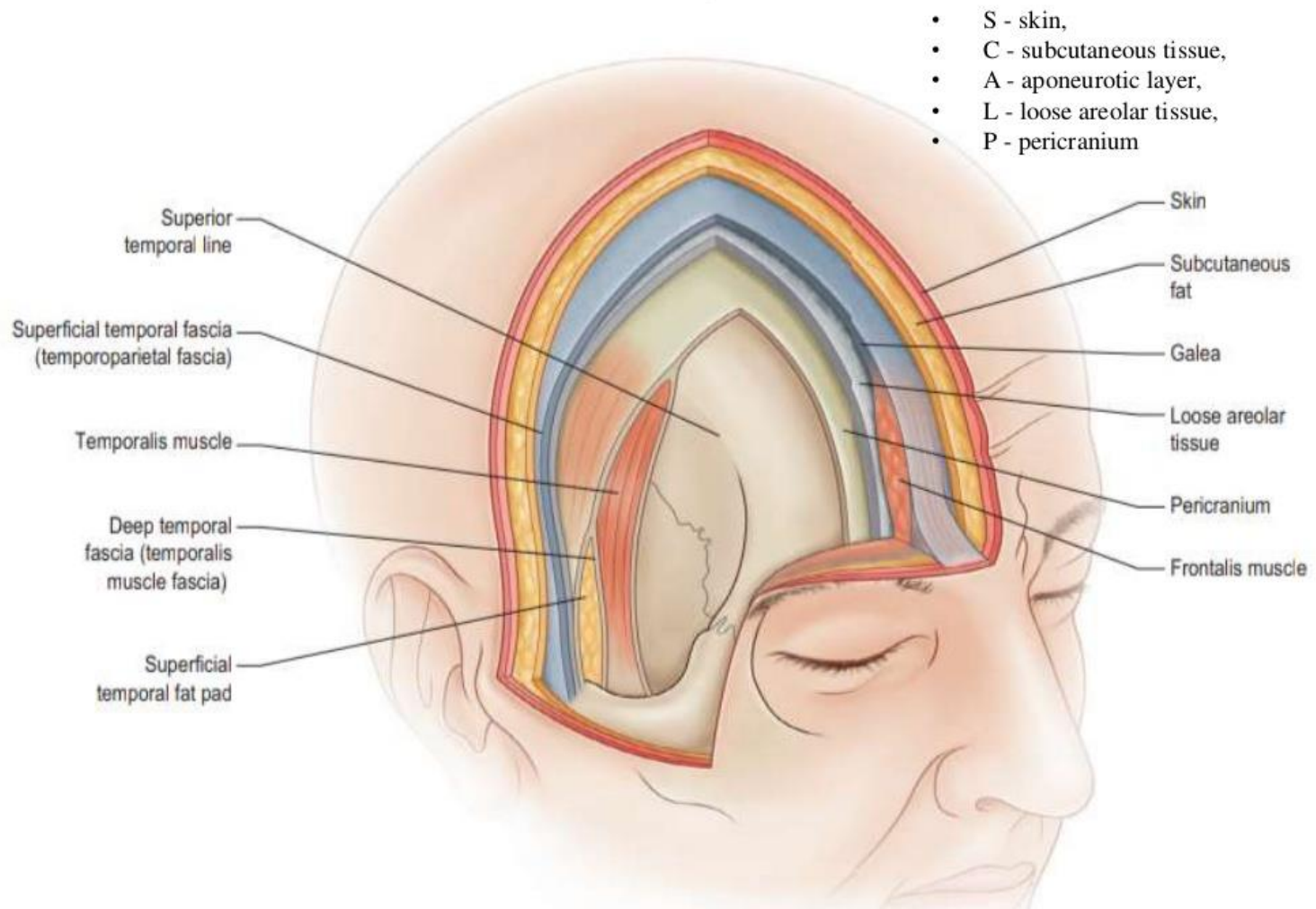
Step 1. Skin incision



- A: routine pterional
- B: large frontotemporal exposure
- C: extended frontotemporal, orbitobasal, middle fossa exposure

Step 1. Skin incision

Scalp



Step 2. Muscle dissection

Interfascial & Subfascial

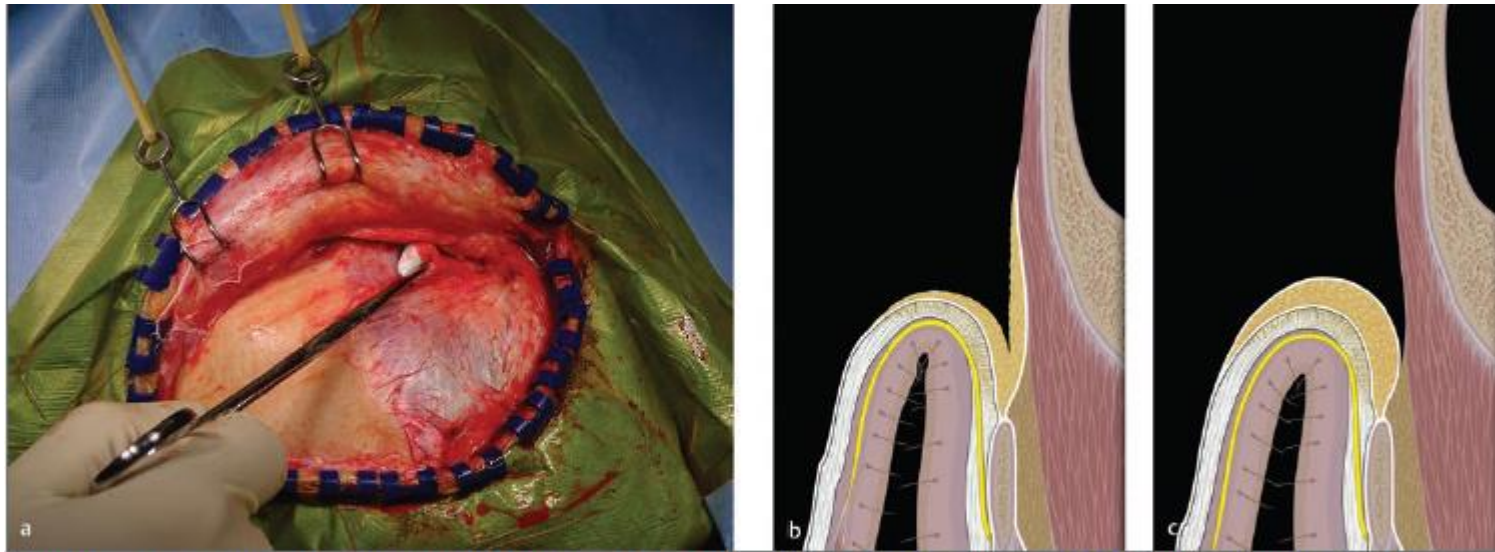
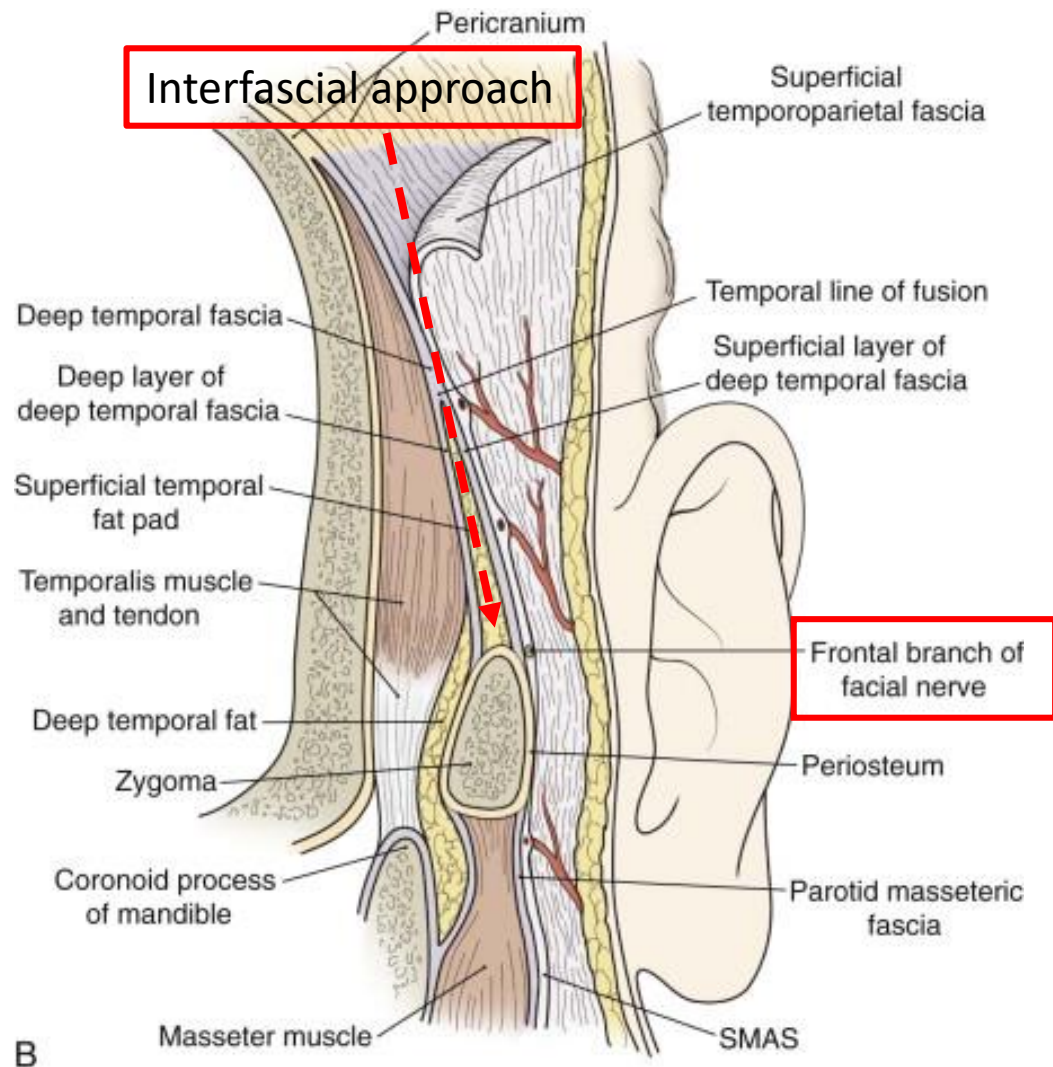


Fig. 6.6 (a–c) Initial skin flap preparation. After skin incision and placement of the scalp clips, an interfascial (b) or subfascial (c) dissection is performed (see Chapter 5.2.1, "Facial Nerve Anatomy and Protection," Fig. 5.19b, c) to remain underneath the branches of the facial nerve. Creating a combined musculocutaneous flap, as with the pterional craniotomy, is not possible because the orbital bar, the zygoma, and the zygomatic arch have to be exposed.

Step 2. Muscle dissection



Step 2: Interfascial dissection

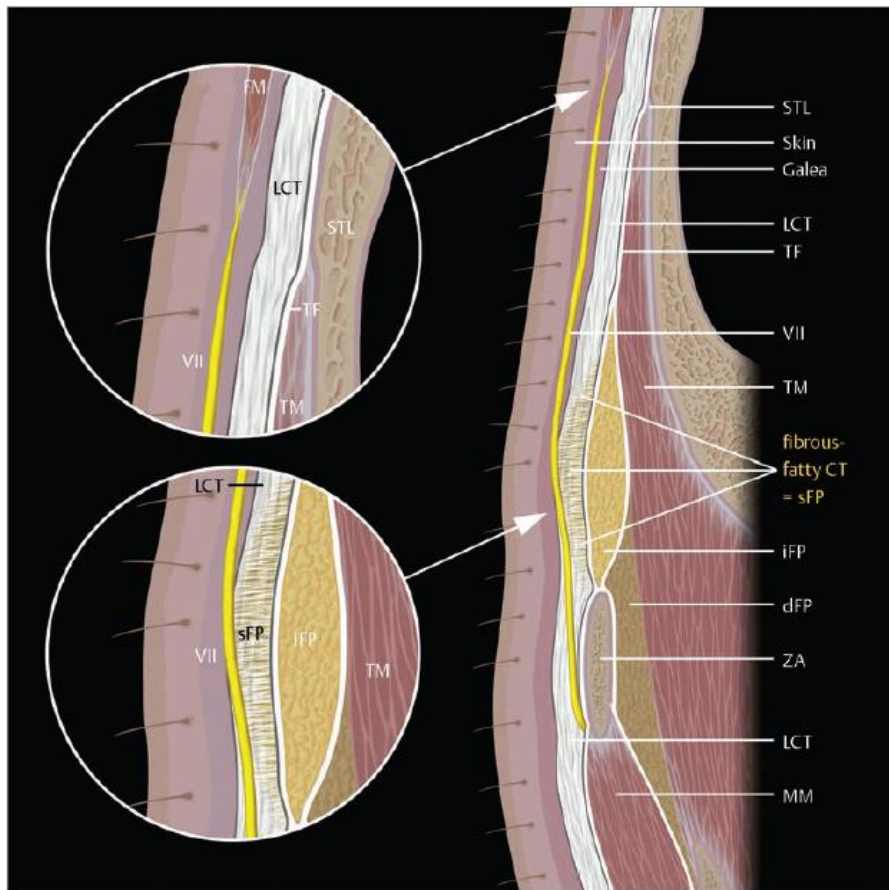


Fig. 5.15 Frontotemporal tissue layers.

dFP: deep fat pad;
FM: frontalis muscle;
iFP: interfascial fat pad;
LCT: loose connective tissue;
MM: masseter muscle;
sFP: suprafascial fat pad;
STL: superior temporal line;
TF: temporalis fascia;
VII: facial nerve;
ZA: zygomatic arch.

Step 2: Interfascial dissection

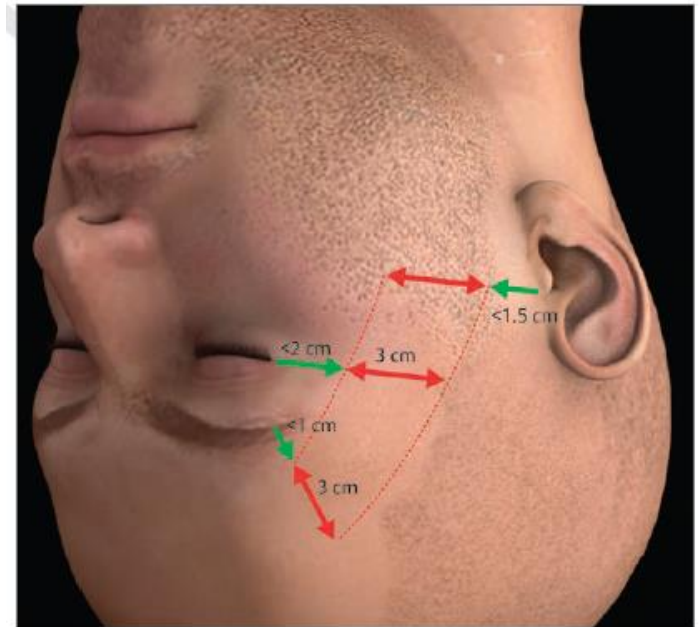


Fig. 5.18 Metric measurements for safe zones. Metric measurements for safe distances may also help to avoid the facial nerve.

Safe zones are:

1. At the level of the zygomatic arch: up to 1.5 cm anteriorly to the tragus.
2. At the level of the orbit: from the lateral cantus 2 cm laterally, parallel to the lid line.
3. At the level of the STL: from the middle of the eyebrow less than 1 cm above the eyebrow.
4. Posterior or superior to the danger zone corridor (see below).

Danger zones are:

1. At the level of the zygomatic arch: anteriorly to the safe 1.5 cm zone.
2. At the level of the orbit: a corridor of 3 cm posterior to the safe zone.
3. At the level of the STL: a corridor of 3 cm posterosuperior to the safe zone.

Step 2: Interfascial dissection

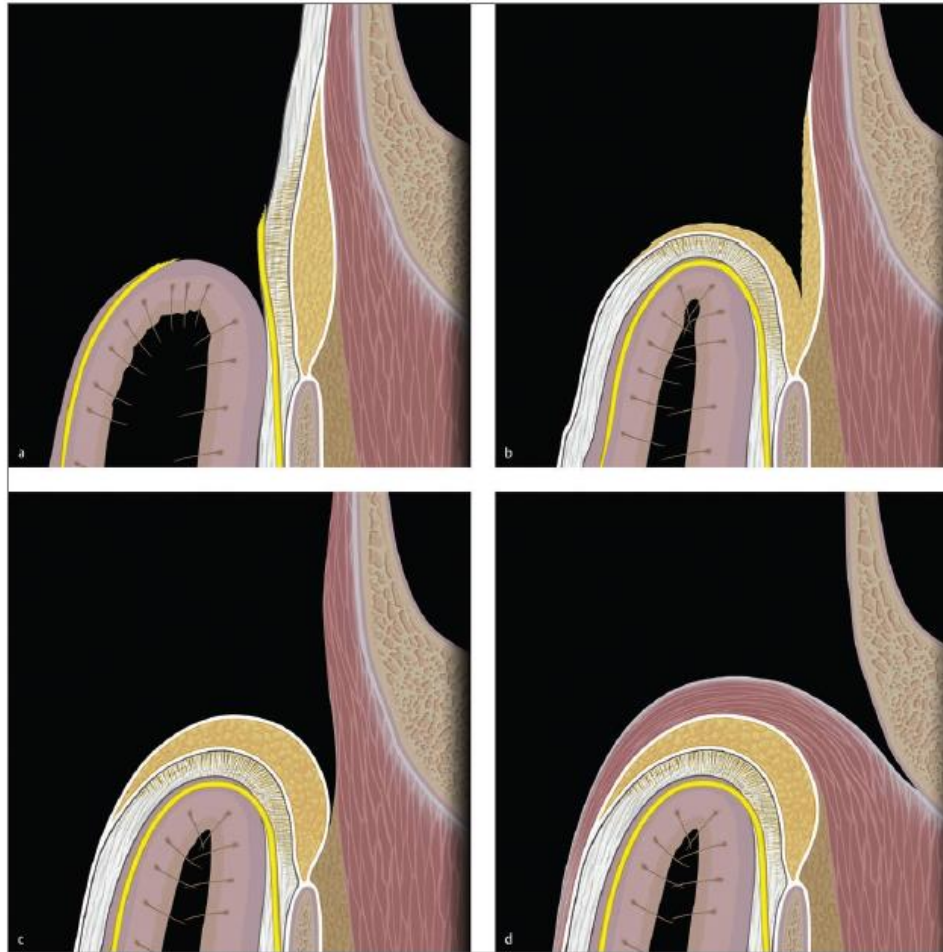
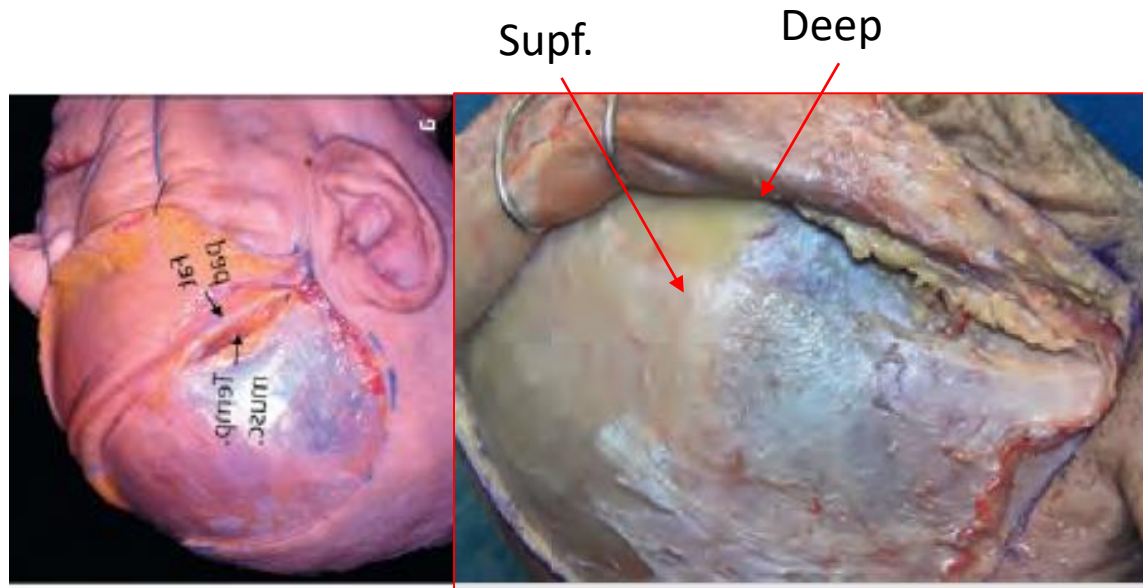
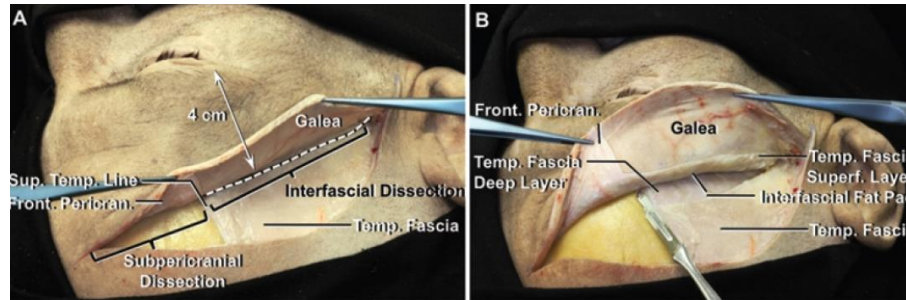


Fig. 5.19 (a–d) Techniques for facial nerve preservation. If the galea is separated from the temporalis muscle down to the zygoma without using a facial nerve preservation technique, the nerve is injured (a top left). There are three surgical techniques for facial nerve preservation: (b, top right) interfascial flap (for orbitocranial or orbitozygomatic approaches) and (c, bottom left) subfascial flap (for orbitocranial or orbitozygomatic approaches), and (d, bottom right) combined myocutaneous flap (for pterional craniotomy).

Step 2: Interfascial dissection



Step 2: Interfascial dissection

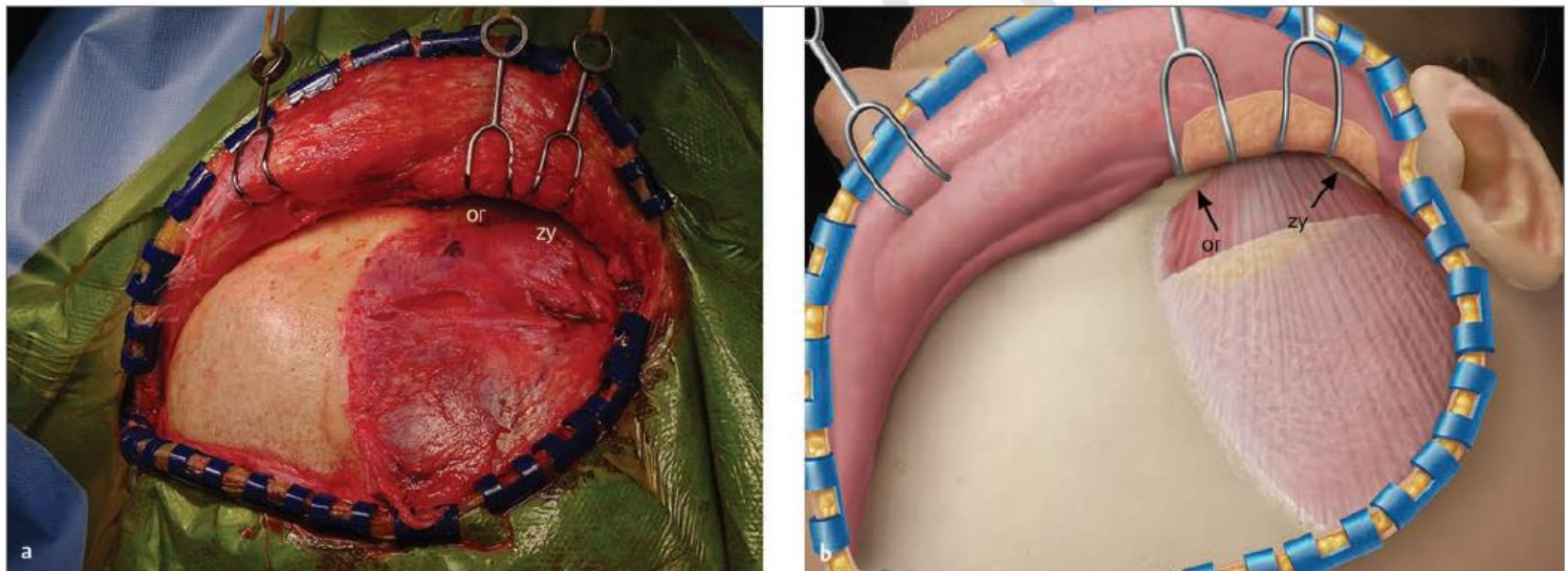


Fig. 6.7 (a, b) Detachment of the temporalis fascia from the orbital rim and zygoma. The deep layer of the temporalis fascia is followed to the attachment at the orbital rim and the zygoma. Both the deep and the superficial layer of the temporalis fascia attach to the orbital rim and the zygoma. This attachment is detached and these layers are lifted toward the galea to expose the orbital rim and/or the zygoma (zy) using fish hooks.

Step 2: Interfascial dissection

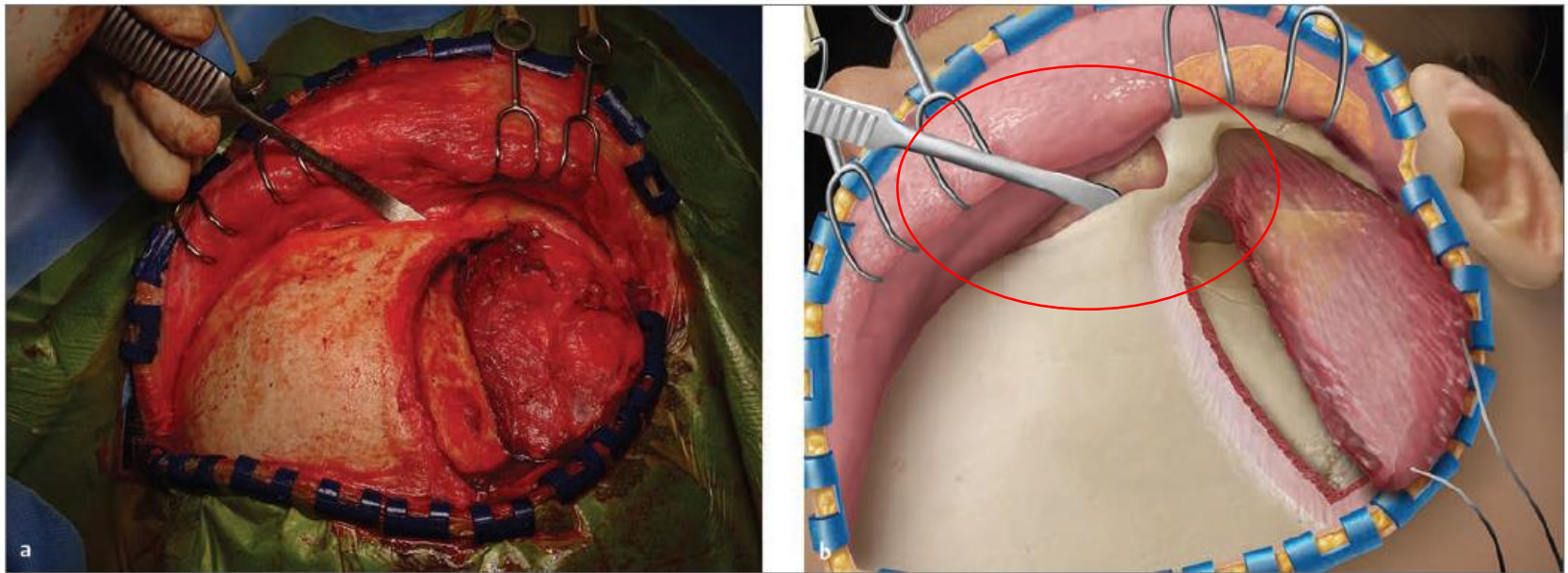
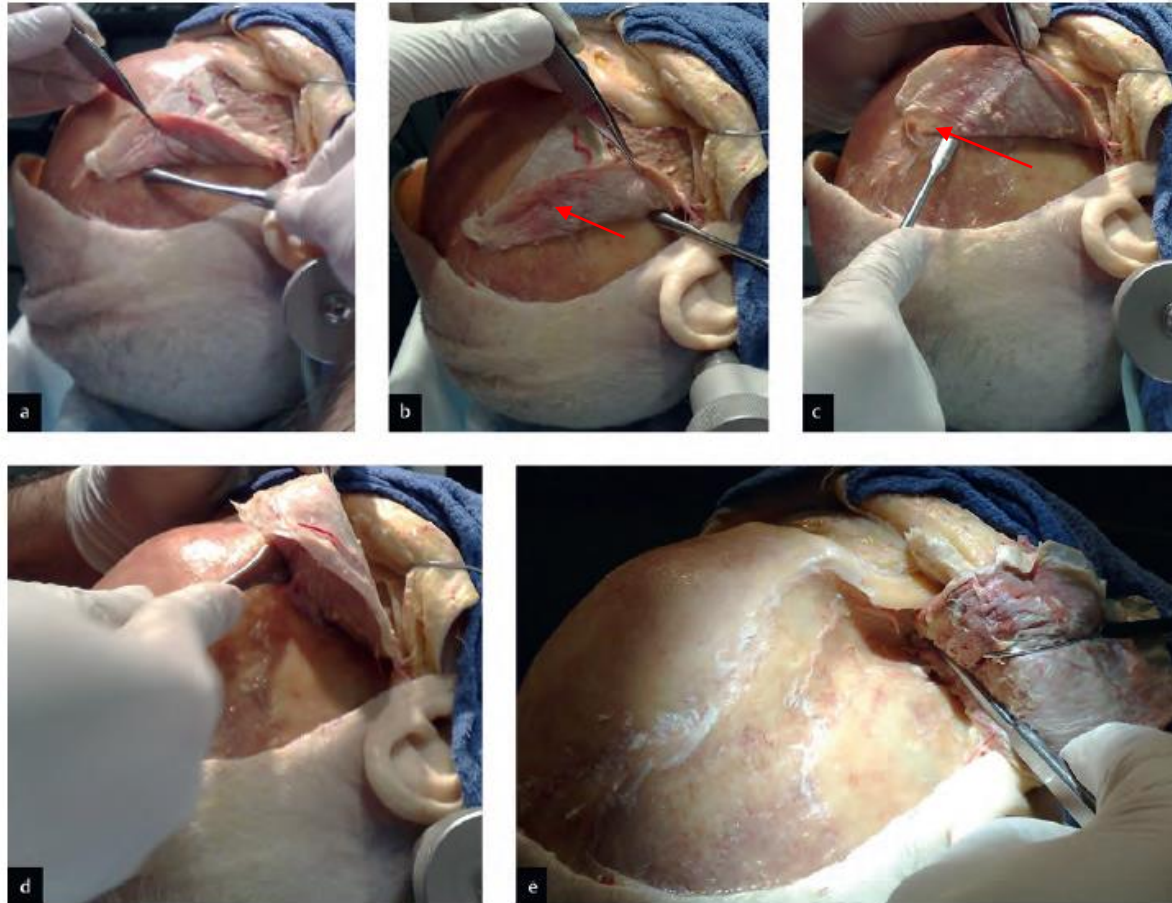


Fig. 6.9 (a, b) Detachment of the periorbita. The periorbita is detached from the intraorbital bone to prepare for the bone cuts. Usually, the detachment extends from the medial edge of the planned craniotomy to the base of the lateral orbital bar, i.e., beyond the frontozygomatic suture until the inferior orbital fissure can be palpated from the inside of the orbit. If the supraorbital nerve is fixed in a supraorbital foramen, the foramen is opened under the microscope using a chisel or a 2–3-mm drill.

Step 2: Interfascial dissection



Step 2: Interfascial dissection

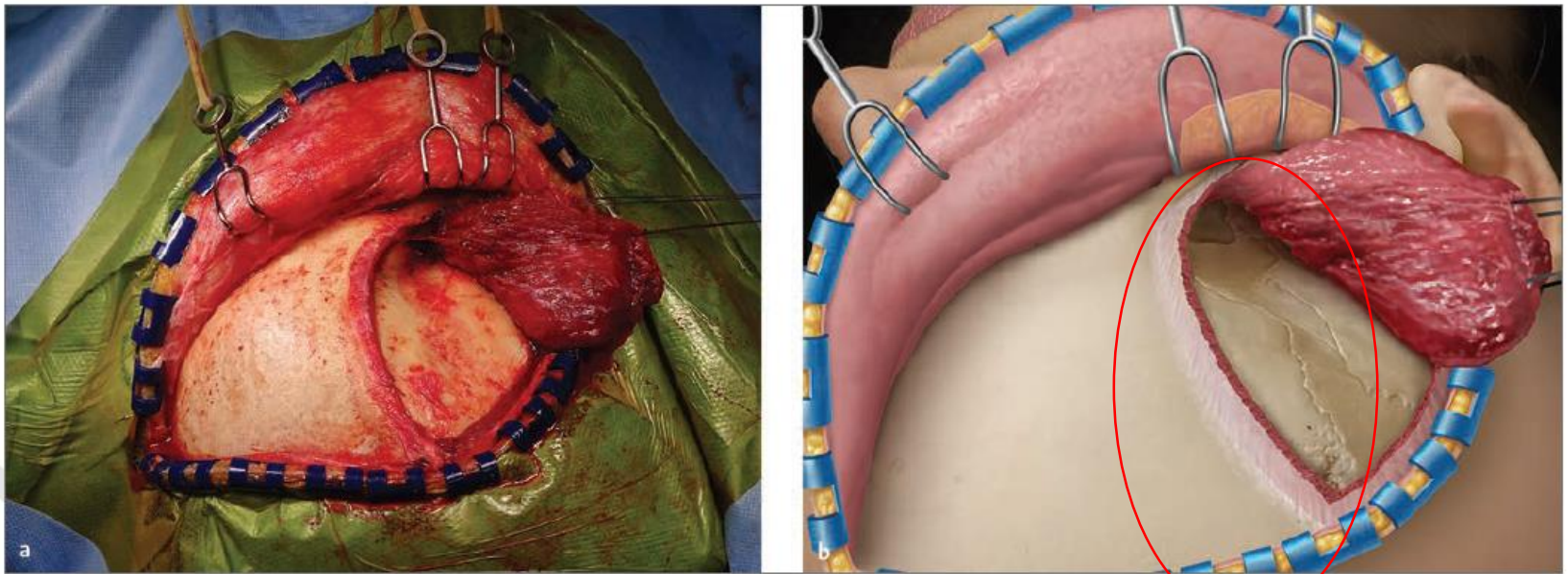


Fig. 6.8 (a, b) Detachment of the temporalis muscle. The muscle is cut from the superior temporal line leaving a 1-cm cuff for resuturing the muscle at the end of surgery. This improves cosmesis by preventing the muscle from slipping down or retracting. This maneuver is not necessary when a combined musculocutaneous flap is lifted during a pterional craniotomy. The superficial and the deep temporal fascia are detached from the orbital rim and the zygoma and these structures are exposed.

Step 3. Bone work

Orbitozygomatic Craniotomy: One Piece or Two Pieces?

See ► Fig. 6.2.

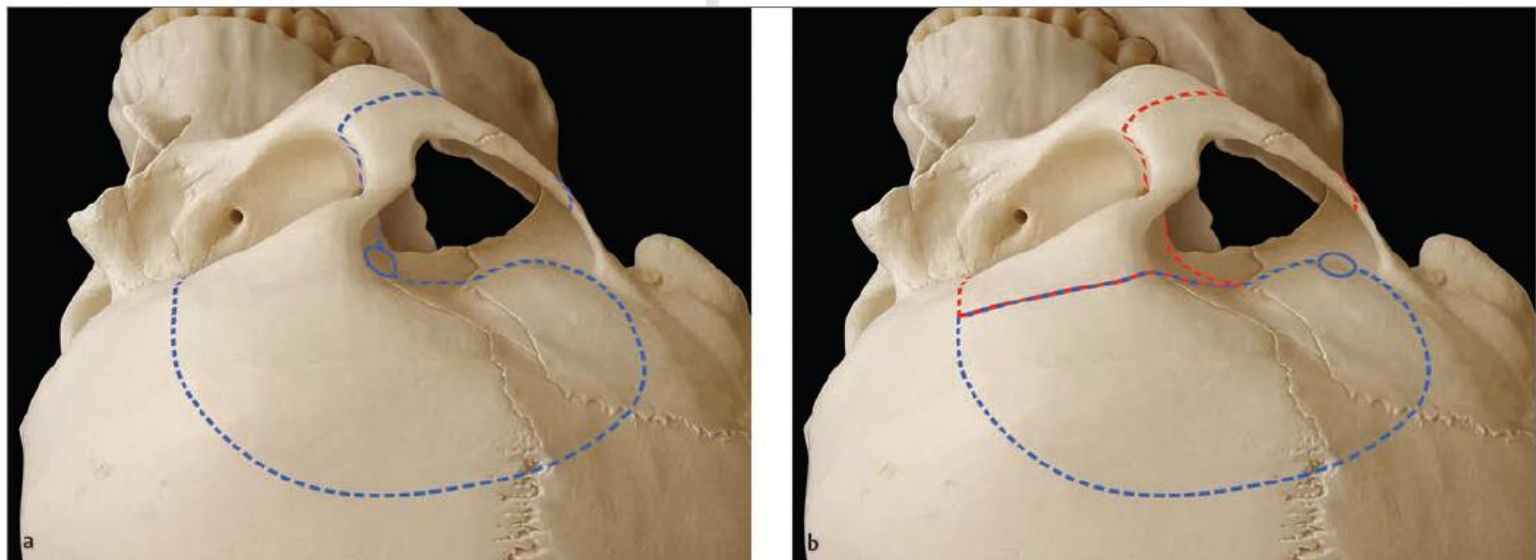
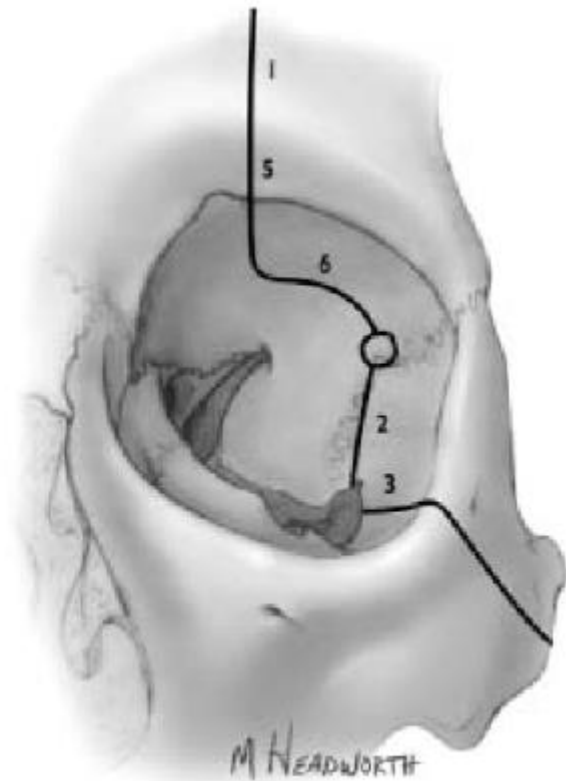
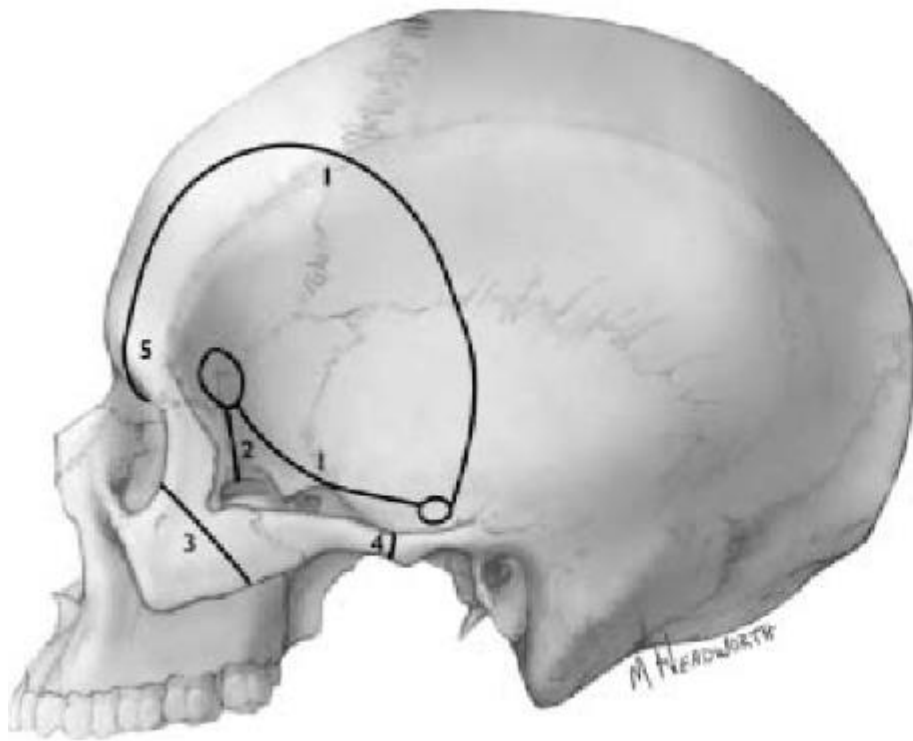


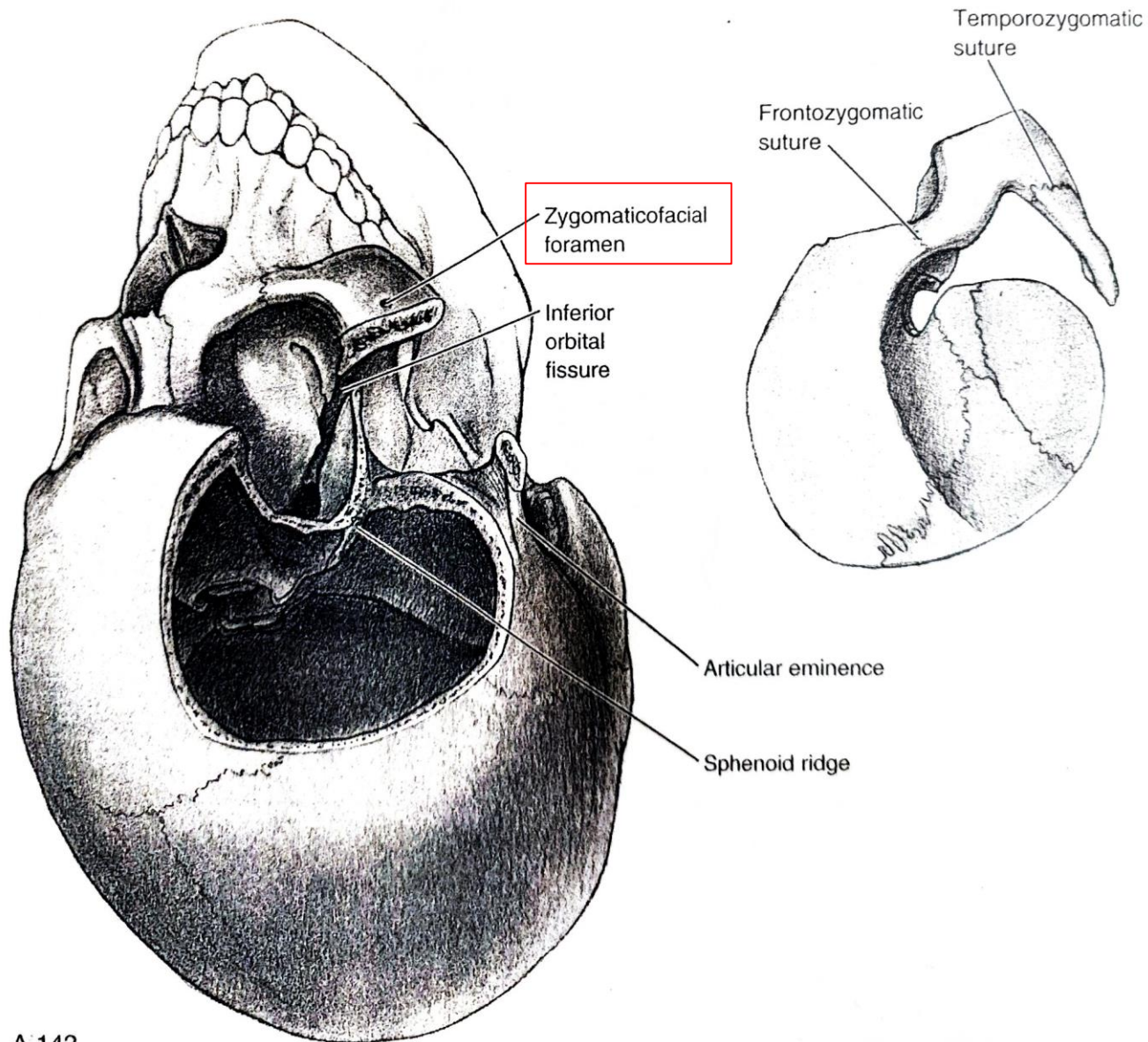
Fig. 6.2 (a, b) One- versus two-piece OZ. The craniotomy can be carried out in one piece (a) or in two pieces, when a pterional craniotomy is performed before removal of the orbitozygomatic bar (b). The two-piece OZ gives a better view and is less traumatic, because the dura can be mobilized and the bony cuts can be made under direct visual control.

Step 3. Bone work

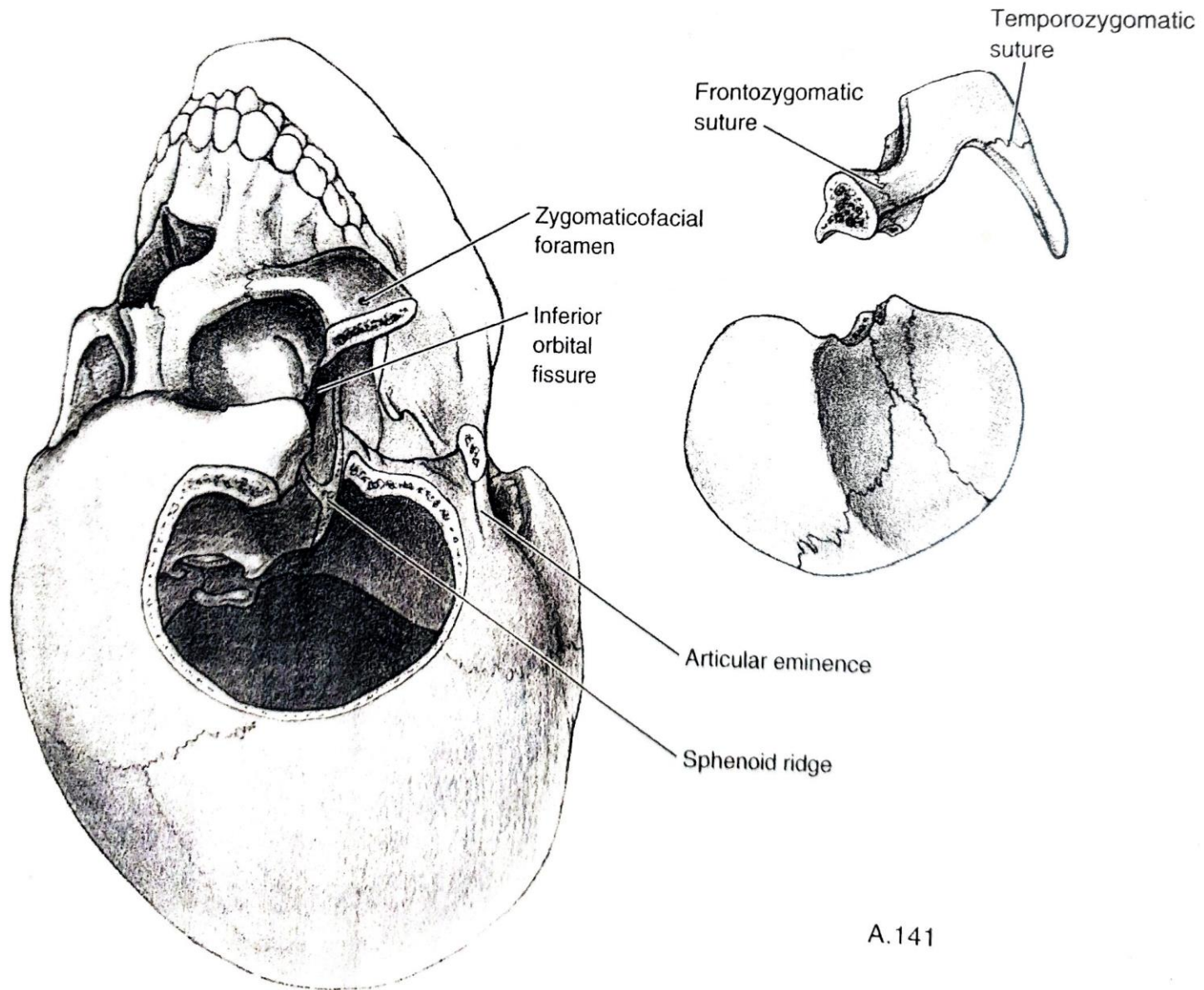
One piece



One piece

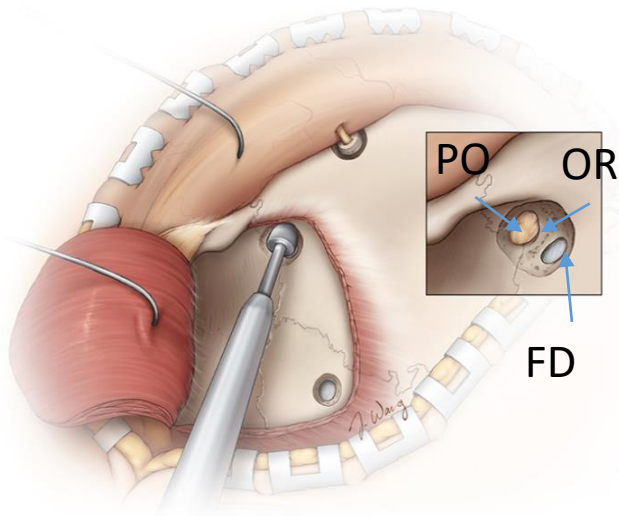
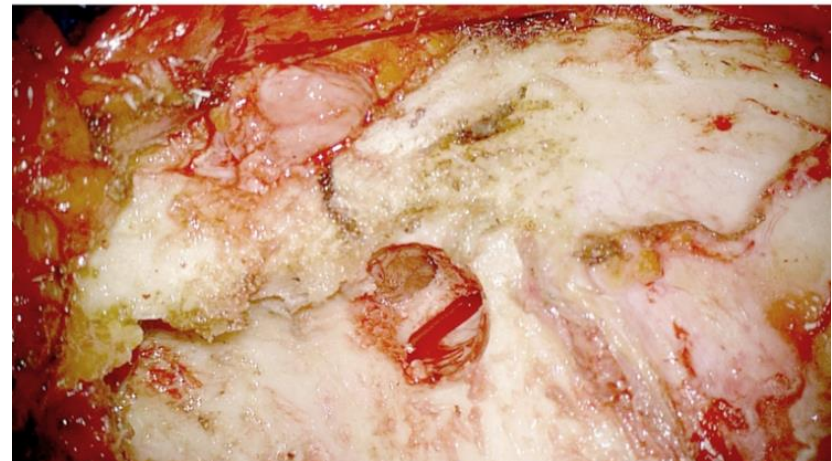
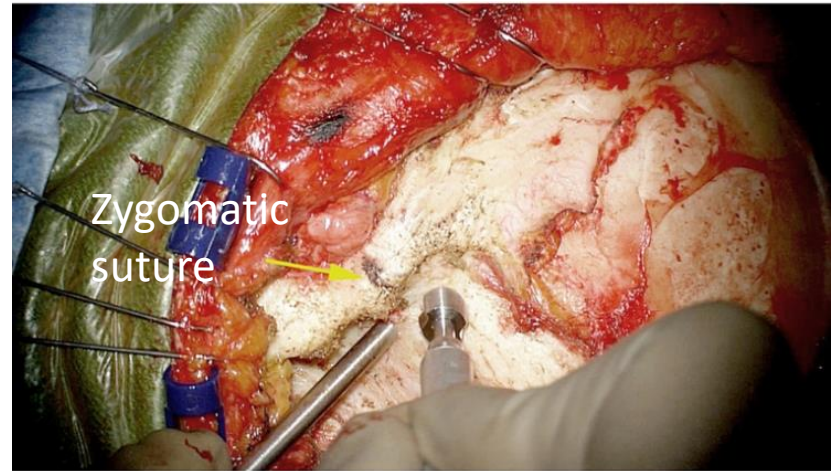


Two piece



Step 3. Bone work

McCarty keyhole



PO: periorbital, FD: frontal dural,
OR: orbital roof

Keyhole is made about 7mm superior and
5mm posterior to the zygomatic suture

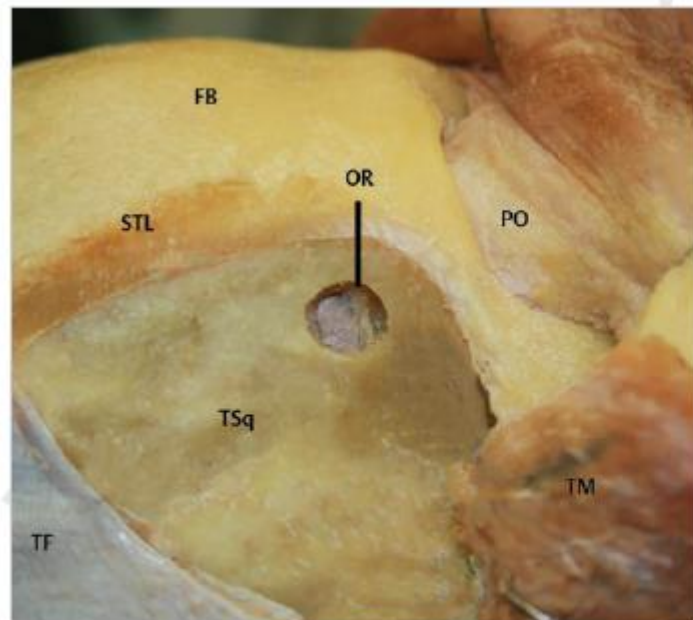


Fig. 6.15 McCarthy hole.

Abbreviations: FB = frontal bone; OR = orbital roof; PO = periorbit; STL = superior temporal line; TF = temporal fascia; TM = temporal muscle; TSq = temporal squama.

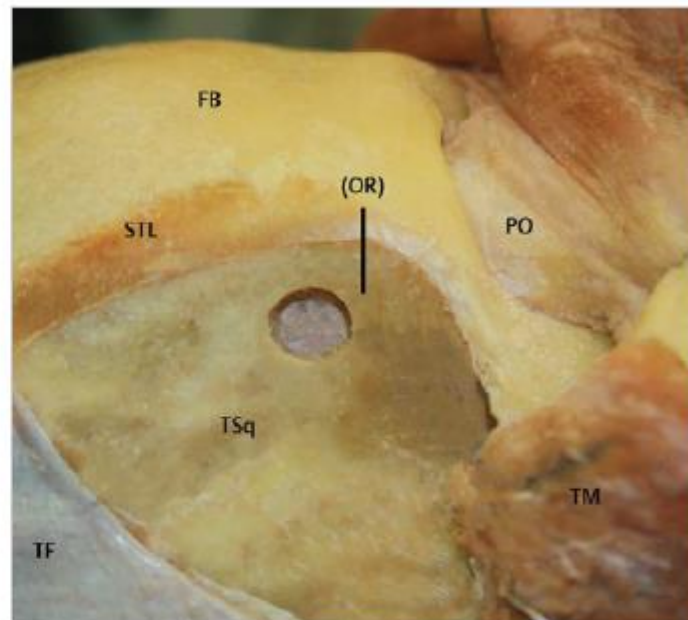


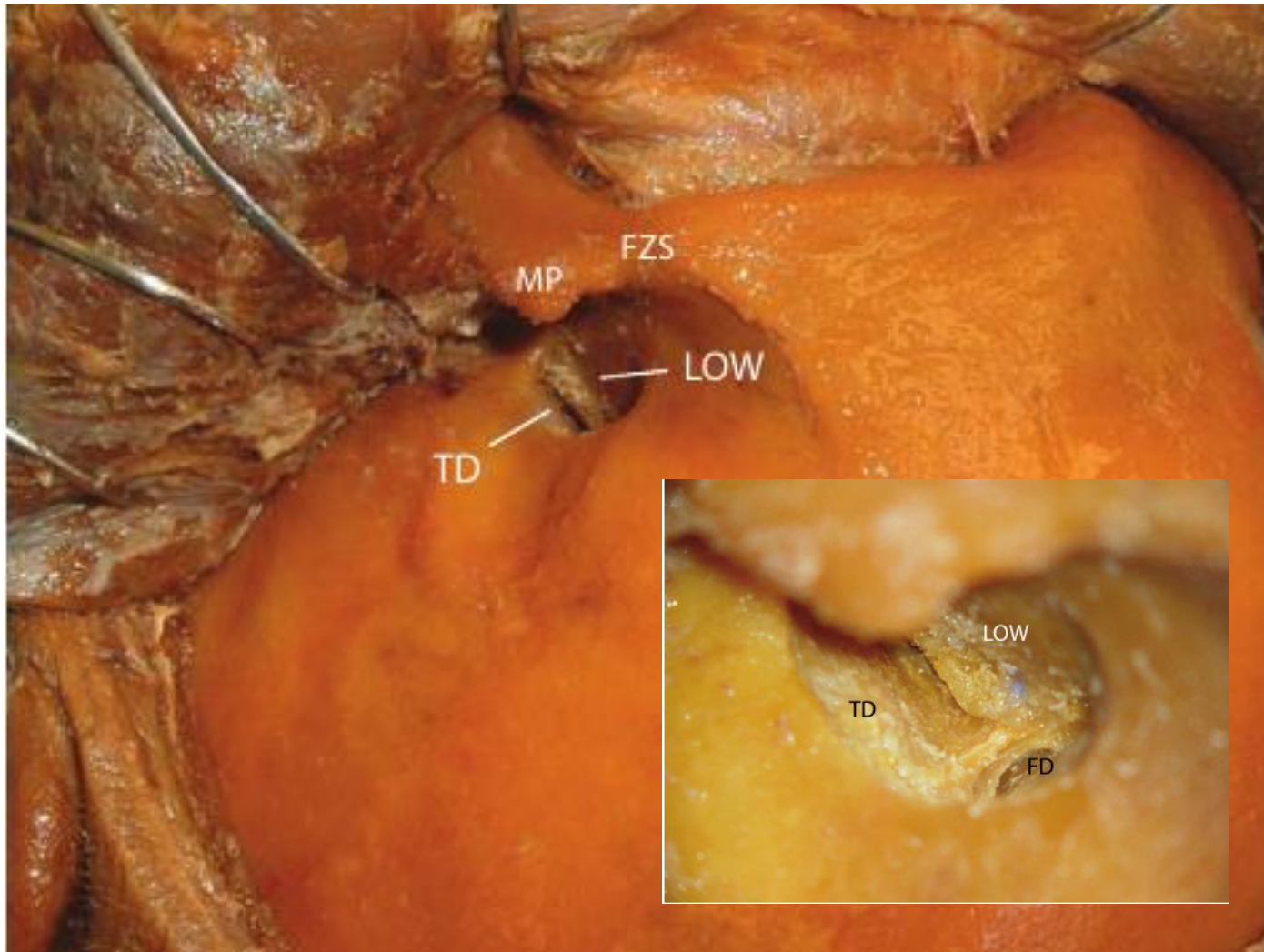
Fig. 6.16 Dandy hole.

Abbreviations: FB = frontal bone; (OR) = projection of orbital roof; PO = periorbit; STL = superior temporal line; TF = temporal fascia; TM = temporal muscle; TSq = temporal squama.

• Types of pterional holes

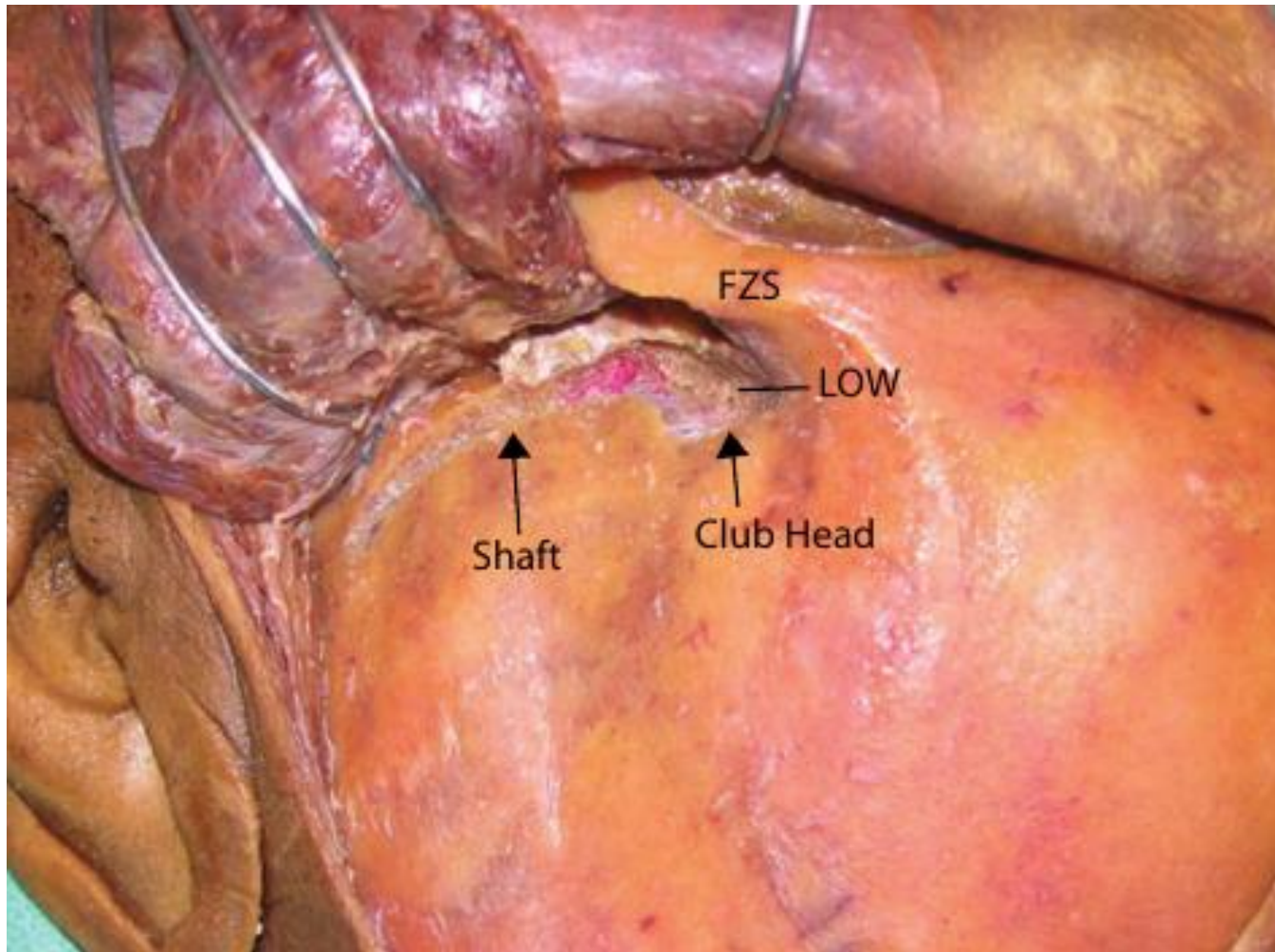
- **McCarty burr hole** is used to expose at the same time the anterior cranial fossa and the orbit. It is located 1 cm behind the fronto-zygomatic suture and along the fronto-sphenoidal suture.
- **Dandy burr hole** is generally used for standard pterional craniotomy. It is placed just above the fronto-sphenoidal suture, below the superior temporal line and posteriorly to the fronto-zygomatic suture.

Step 3. “Golf club” drilling (frontoorbital detachment)

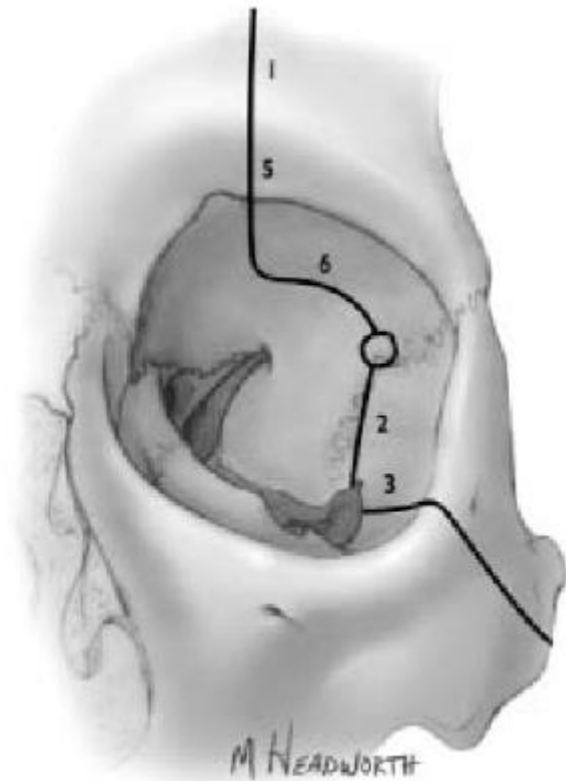
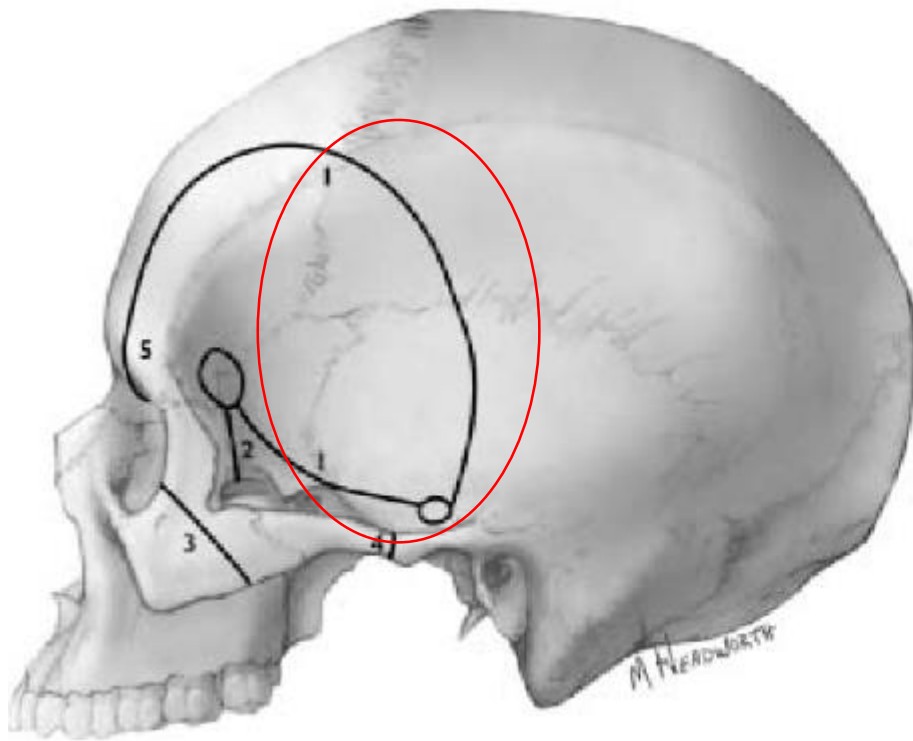


- MP: marginal process
- FZS: frontozygomatic suture
- LOW: lateral orbital wall
- TD: Temporal dura
- FD: frontal dura

Step 3. “Golf club” drilling (drilling the subtemporal groove)



Step 4. One piece Craniotomy



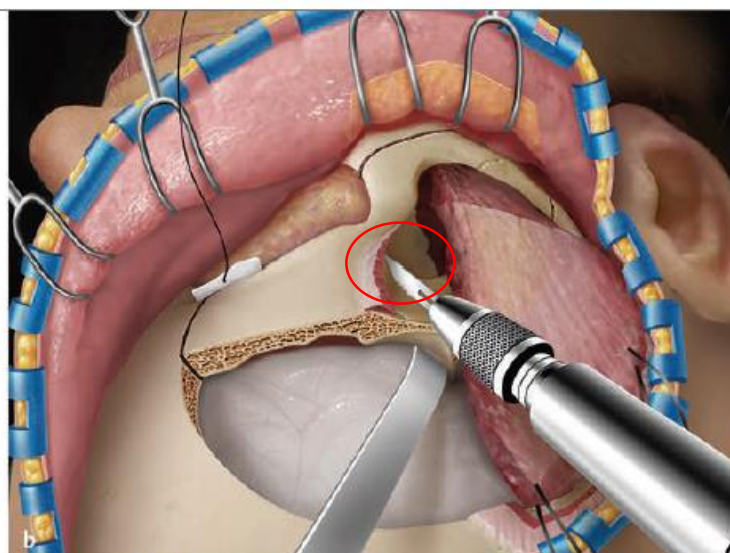
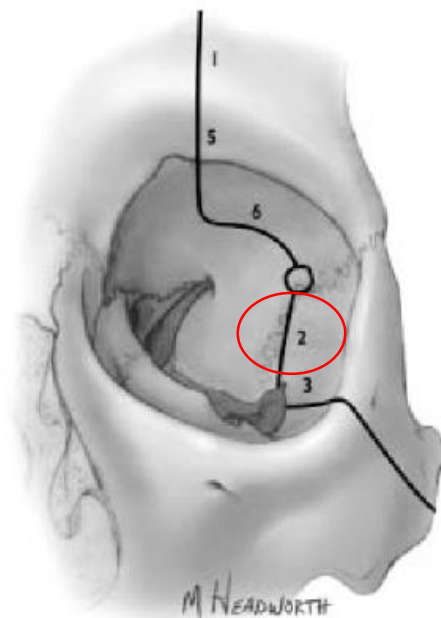
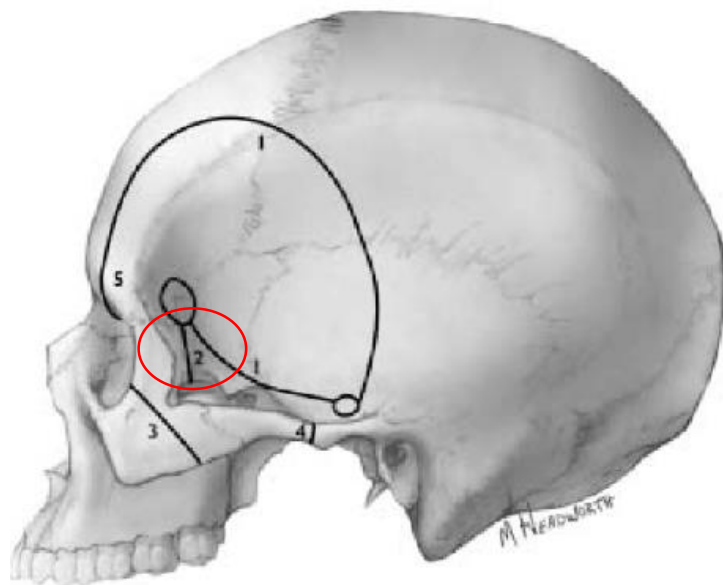


Fig. 6.16 (a, b) Cut 5: inferior sphenoidal cut. The lateral end of the inferior orbital fissure is palpated from outside in the infratemporal fossa and the oscillating saw is inserted. The cut is directed slightly posteriorly to reach the middle fossa approximately 1 cm below the sphenoid ridge. The cut is performed from the outside to the inside. The detached dura is retracted to visualize the entry of the tip of the saw into the middle fossa. It cuts the outer part of the sphenoid in the middle fossa, but not the inner part.

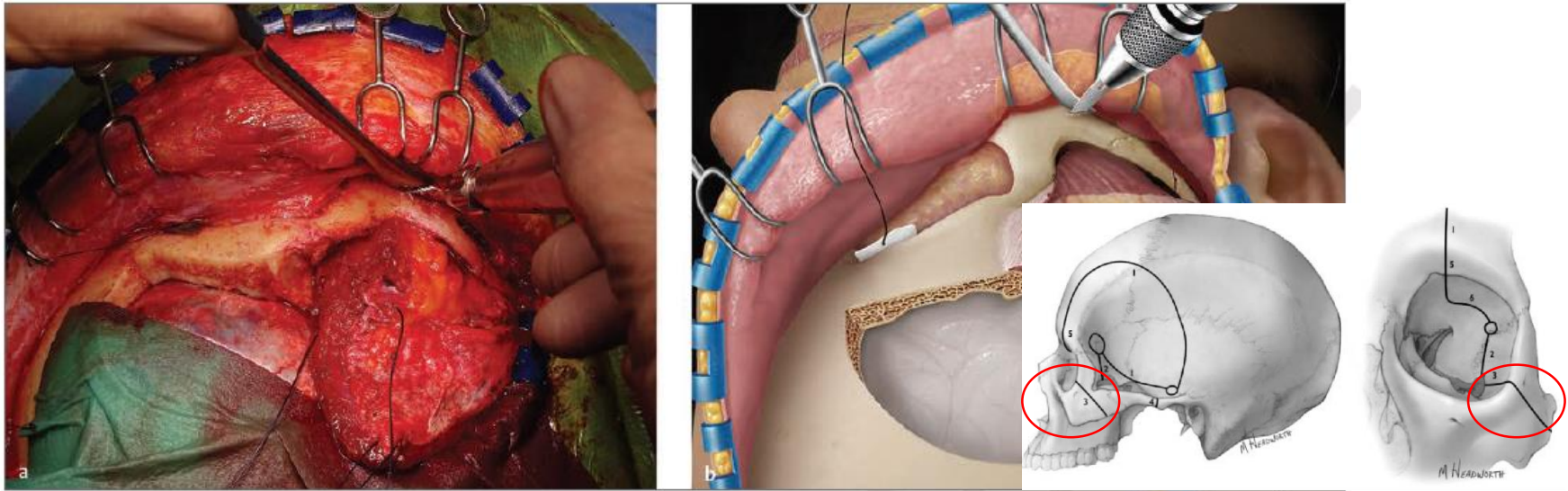


Fig. 6.13 (a, b) Cut 2: the zygoma. The second cut is performed across the zygoma starting at the lateral border below the zygomatic arch and directed toward the inferior orbital fissure, which has already been located by intraorbital palpation. The cut stops in the middle of the zygoma.

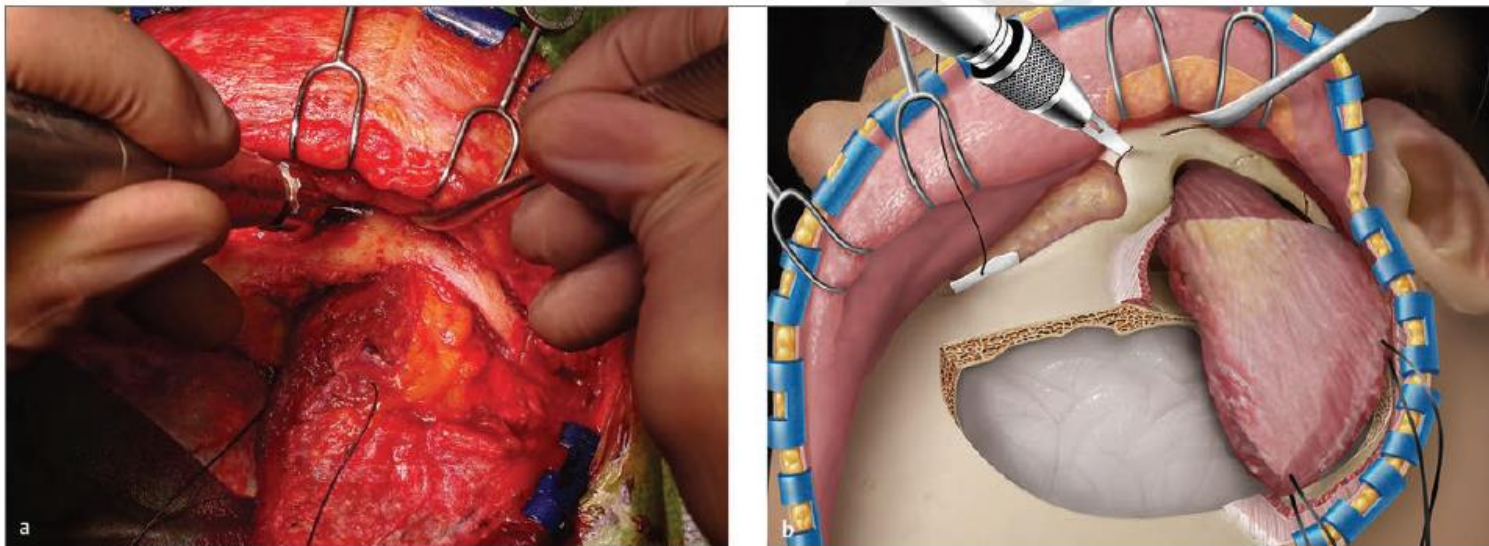


Fig. 6.14 (a, b) Cut 3: completing the cut of the zygoma. The inferior orbital fissure is palpated from intraorbital and the oscillating saw is inserted. The cut of the zygoma is now completed from a medial to lateral direction.

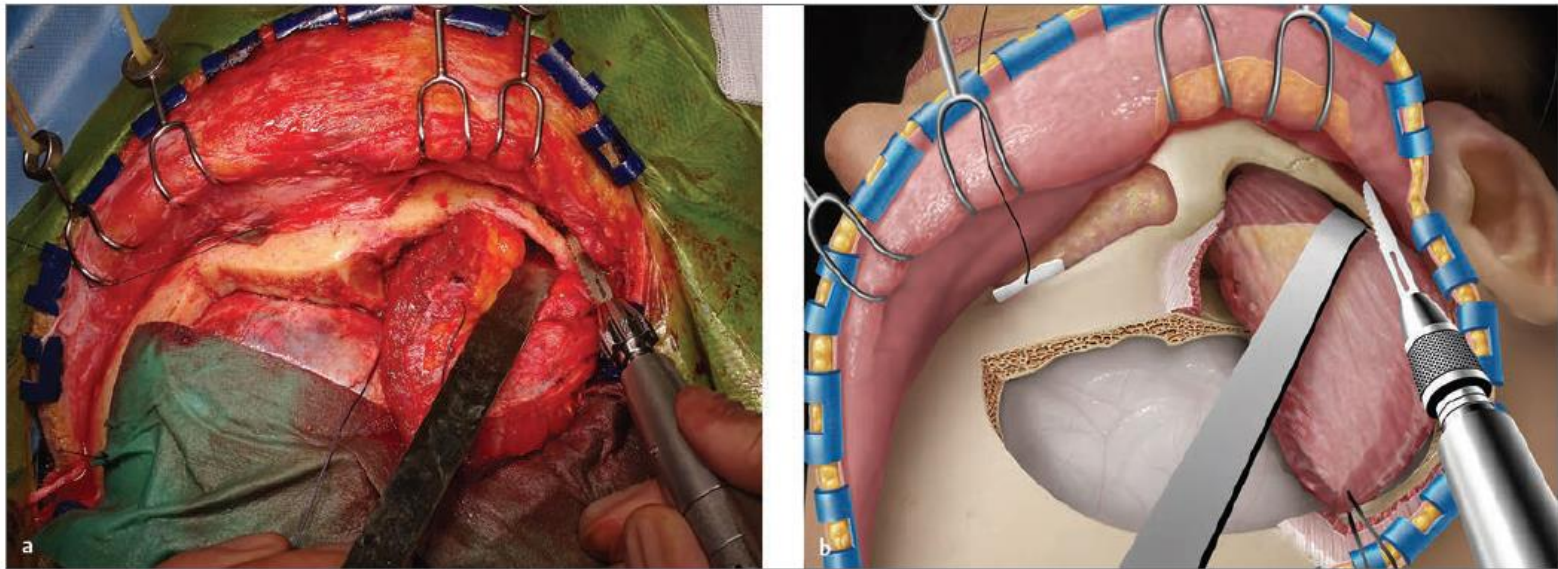
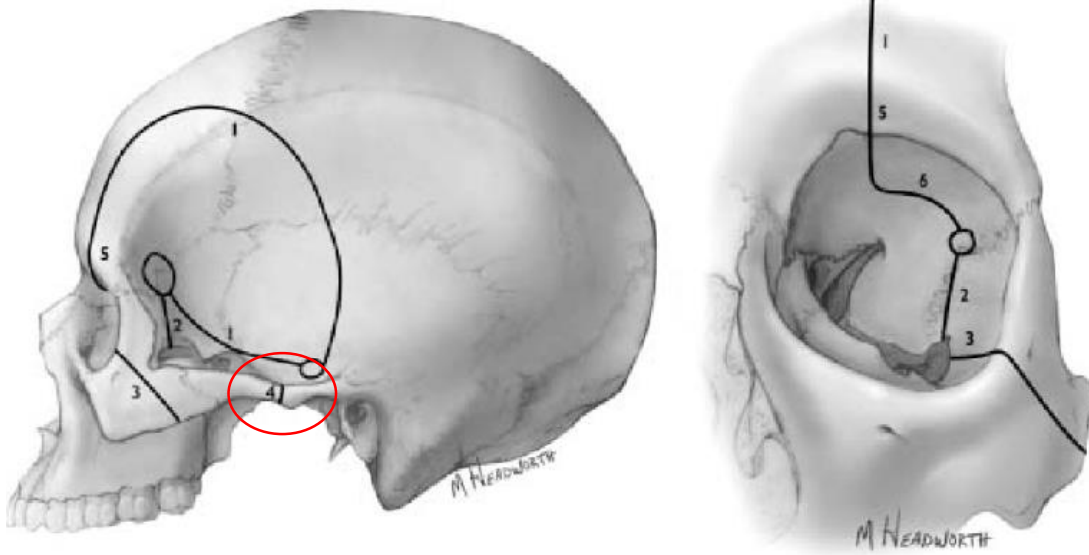


Fig. 6.12 (a, b) Cut 1: zygomatic arch. The masseter muscle is detached from the inferior border of the zygomatic arch. The cut at the zygomatic arch is made at the posterior end in a slightly oblique direction. The idea is to lock the arch into this configuration when the masseter pulls the arch downward after surgery.

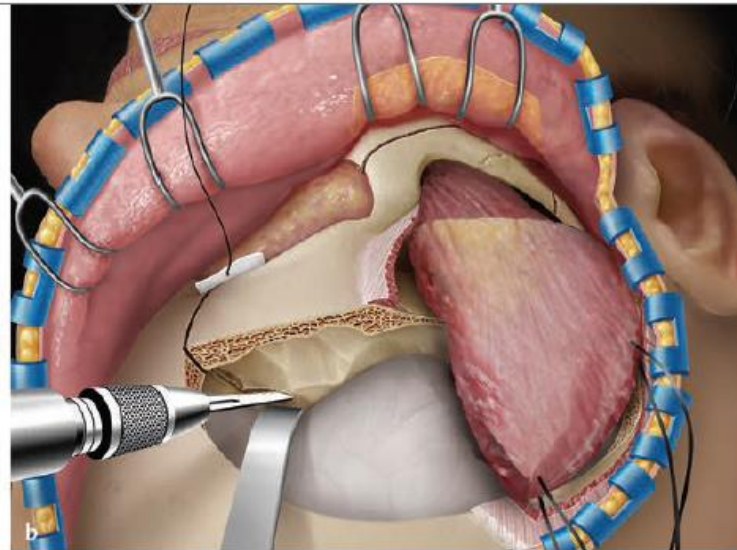
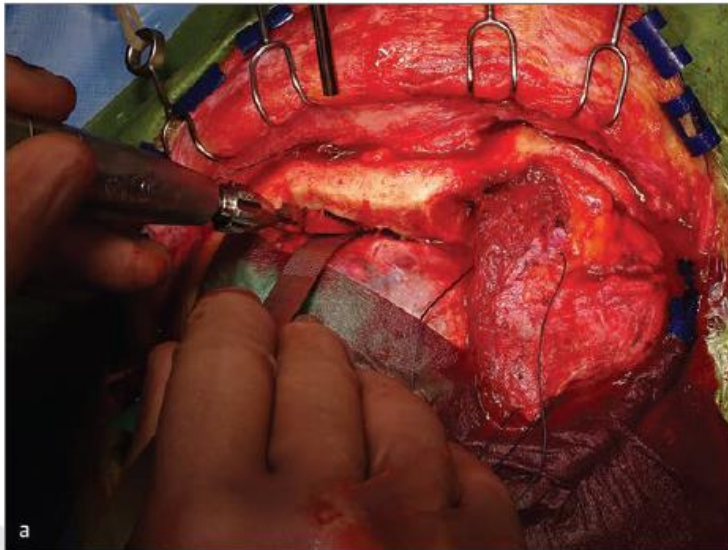
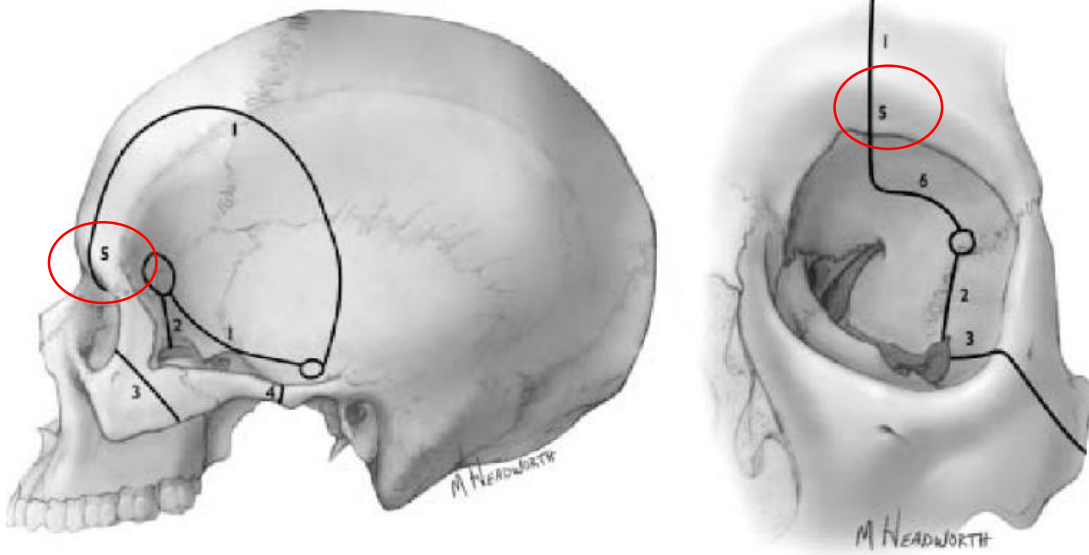
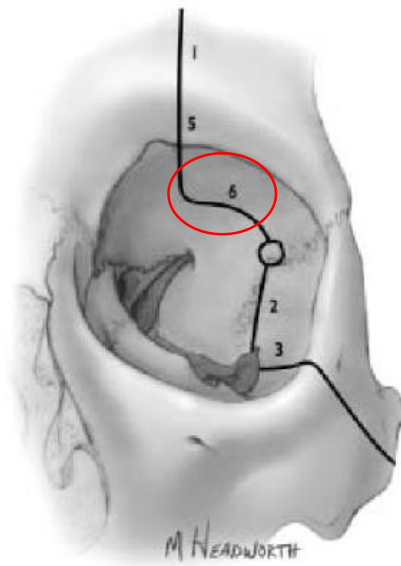
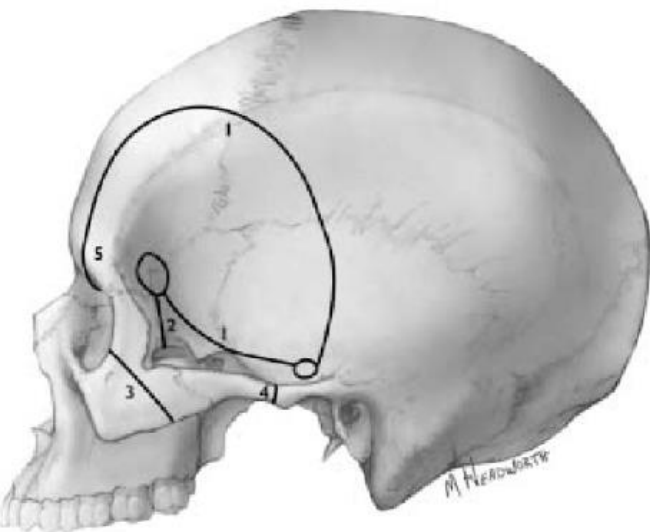
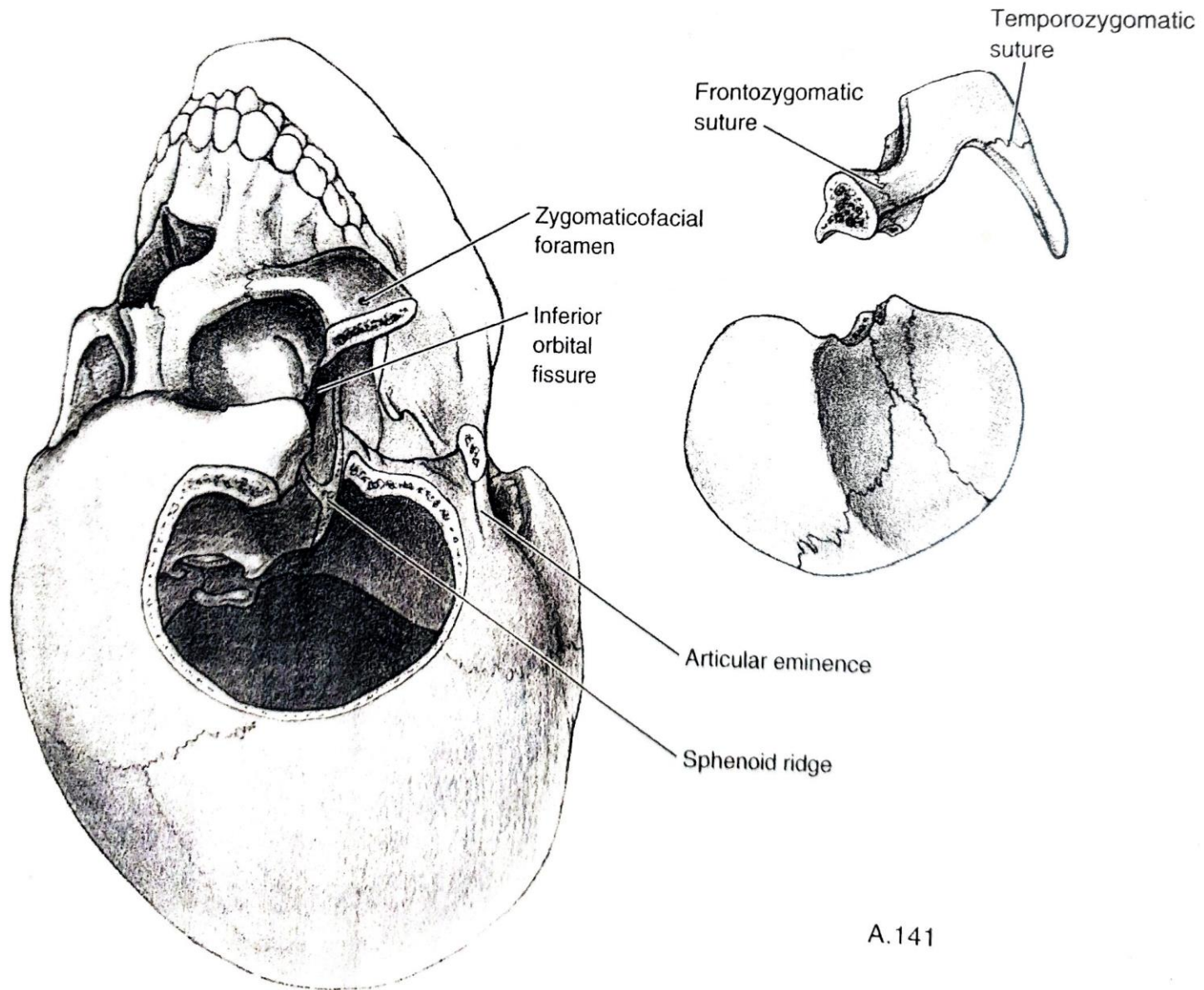


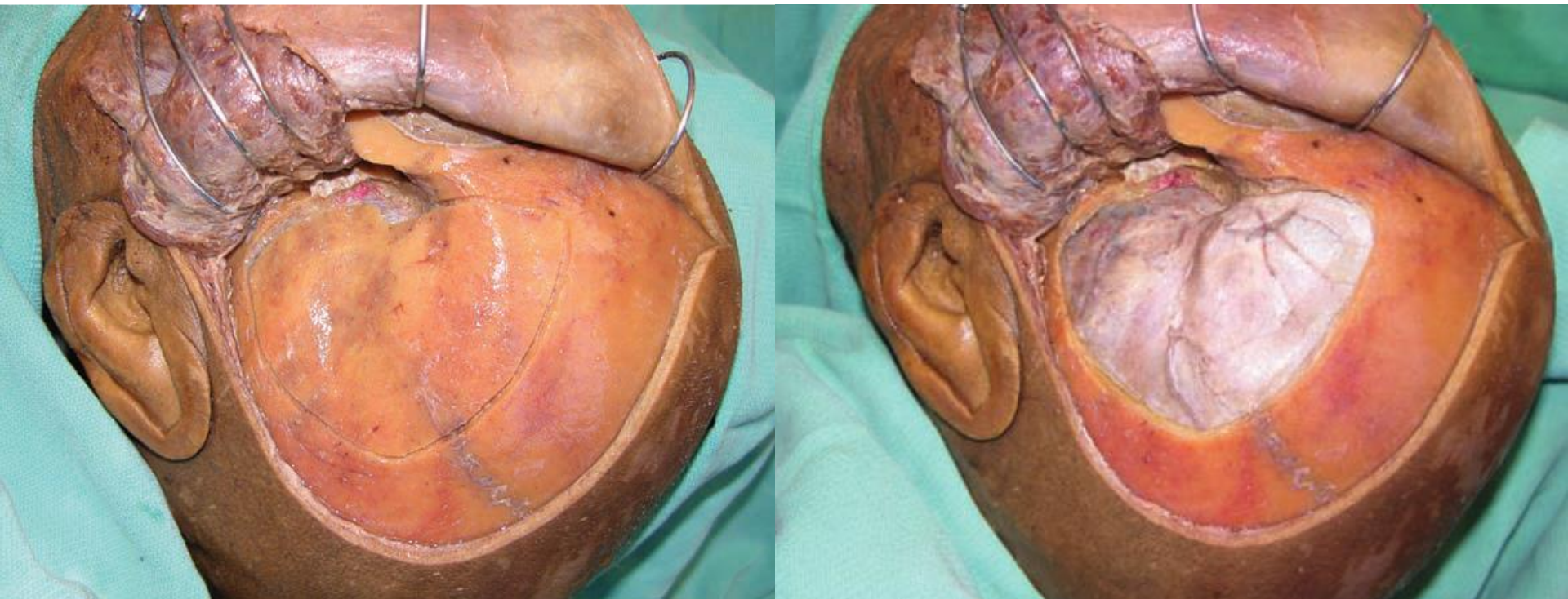
Fig. 6.15 (a, b) Cut 4: orbital roof. The periorbita is detached further toward the upper and lateral edge of the superior orbital fissure. A pad is placed between the periorbita and the bone to protect the periorbita. The dura is also detached and the cut is performed at the medial border of the craniotomy, approximately at the level of the supraorbital foramen toward the upper and lateral edge of the superior orbital fissure.



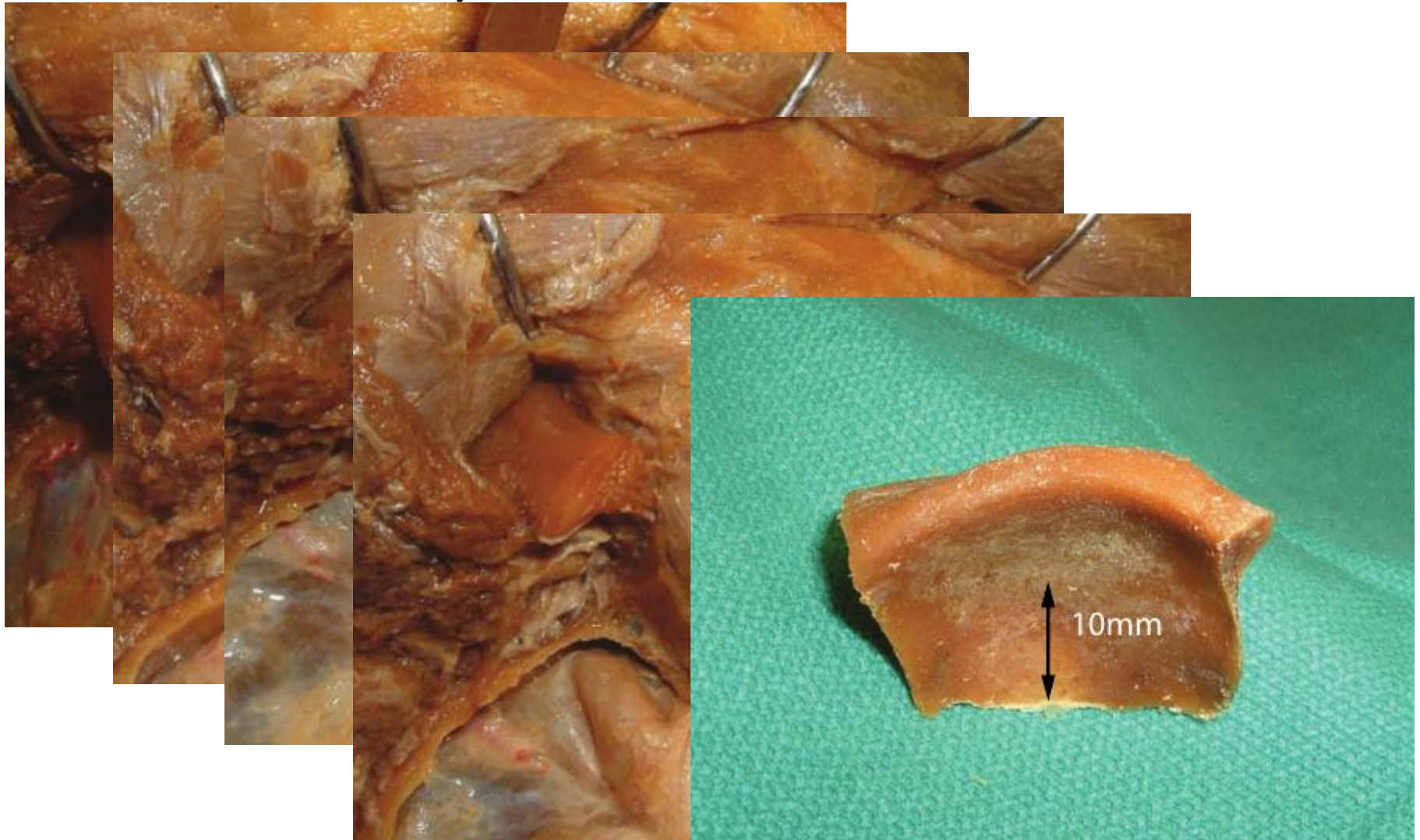
Two piece



Step 5. Two piece craniotomy



Step 5A. Limited supraorbital bar osteotomy



Step 5B. Extended orbitozygomatic osteotomy (two-piece)

