CHAPTER I I

Common Neurosurgical Techniques

Pterional Approach

Orbitozygomatic Osteotomy

Retrosigmoid Approach

Extradural Subtemporal Transzygomatic Approach

Endoscopic Endonasal Transsphenoidal Approach

Far Lateral Approach

Anterior Cervical Discectomy

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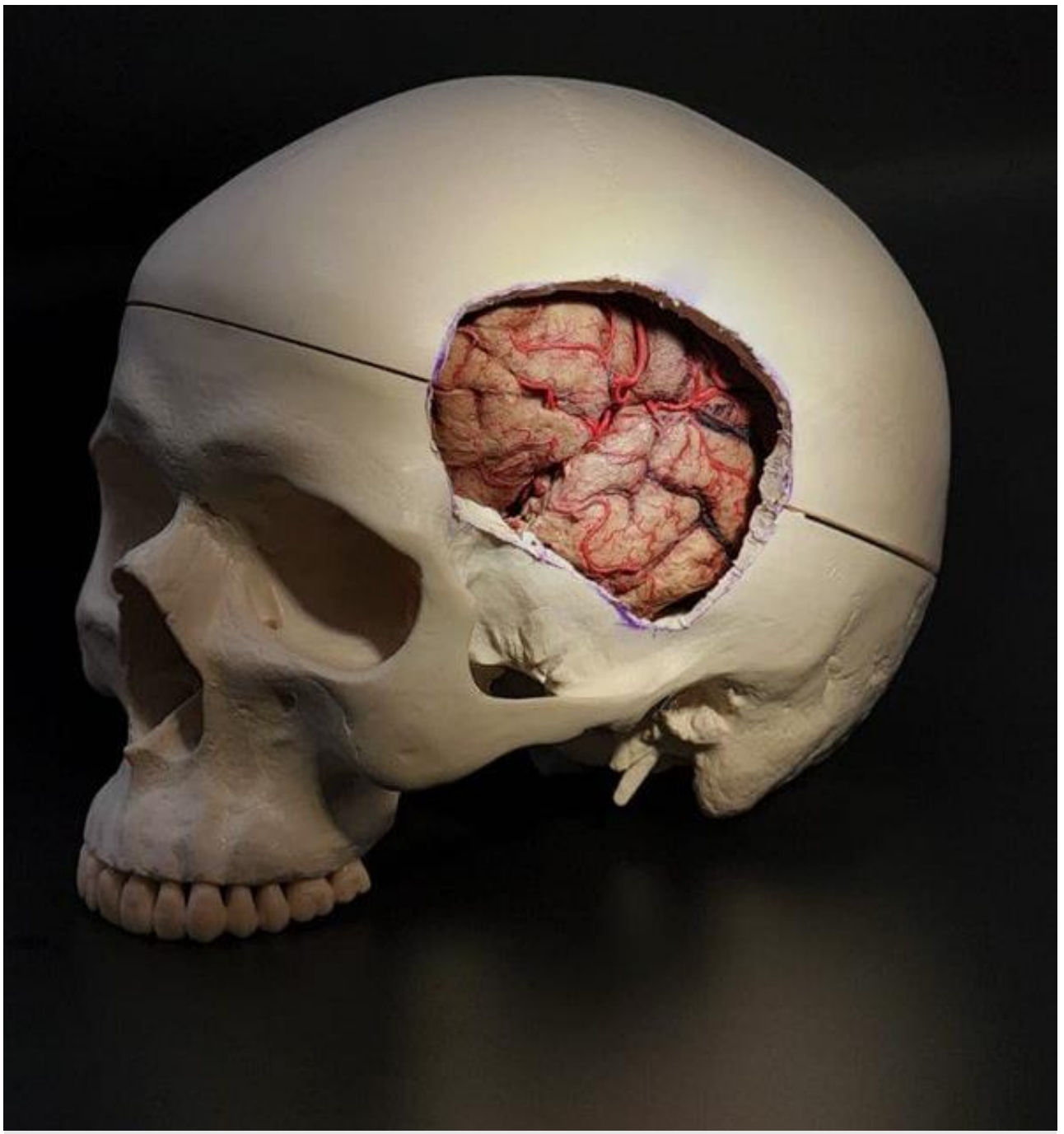
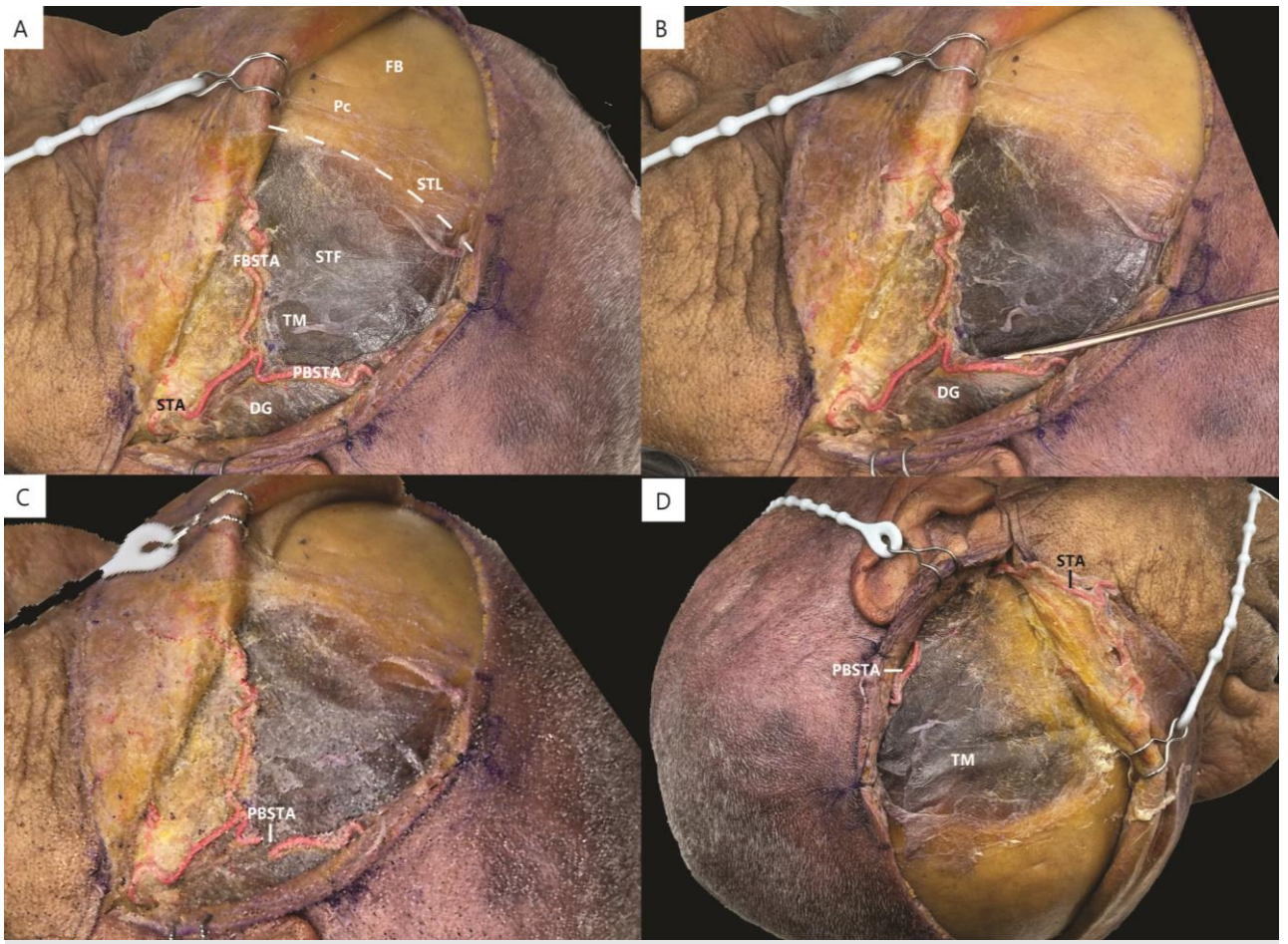


Pterional craniotomy exposure

Pterional skin incision (variations)

Starting less than one 1 cm from the tragus, crossing the temporal region to the superior temporal line, it then curves anteriomedialy and ends at the midline behind the hair line.



Dissection and preservation of the superficial temporal artery

A- Exposure of the superficial temporal artery frontal and posterior branches. .

B- Exposure of the deep gelea containing superifical temporal artery

C- Cutting the parietal branch of the superficial temporal artery.

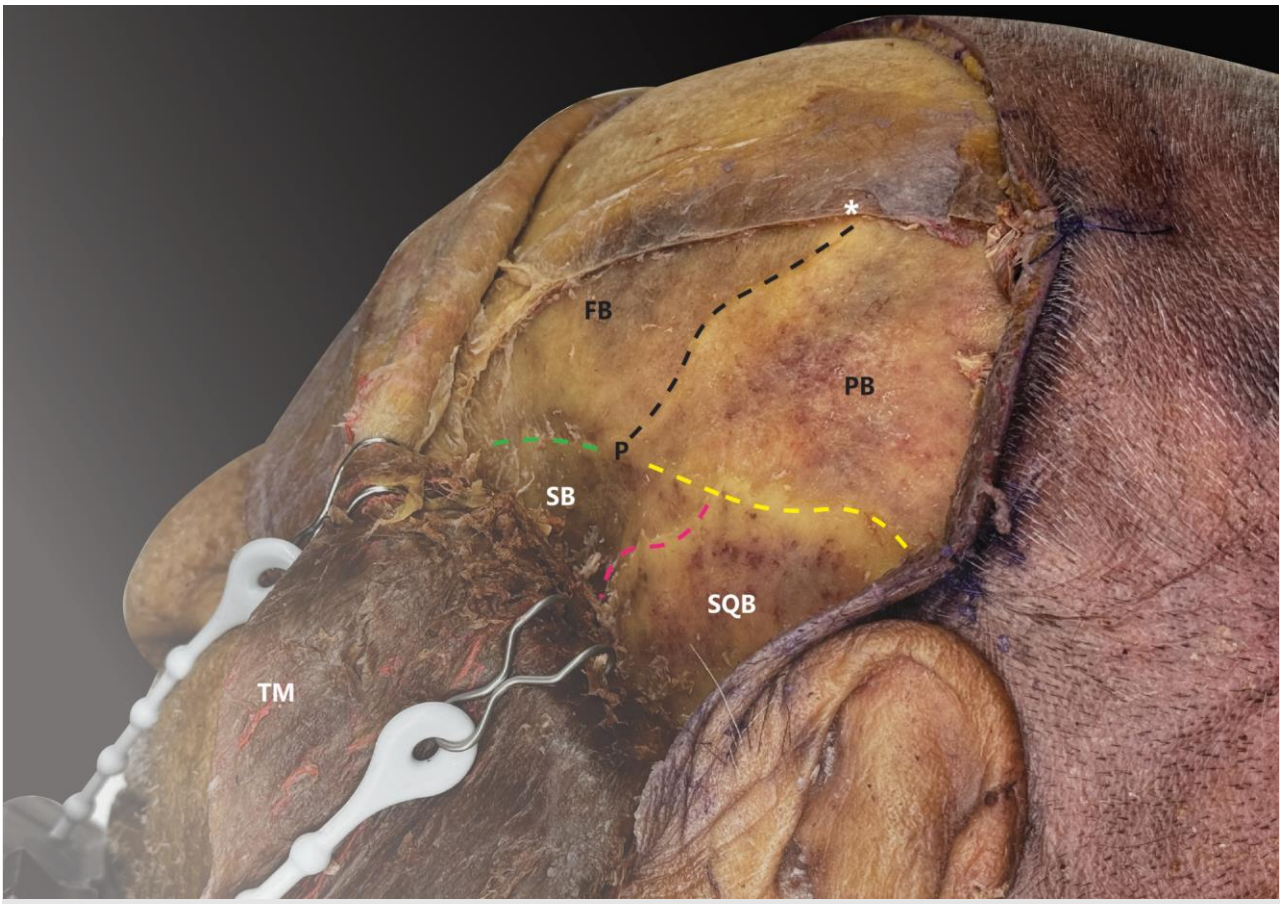
D- The superficial temporal artery was reflected anterior with the skin after it is being released from its posterior (Parietal branch)

FB = frontal bone
PBSTA = parietal branch of superficial temporal artery
STA = superficial temporal artery
STF = superficial temporal fascia
STL = superior temporal line
Pc = pericranium
TM = temporalis muscle
FBSTA = frontal branch of superficial temporal artery
DG = deep galea
PBSTA = parietal branch of superficial temporal artery

Demonstration of an interfacial dissection.

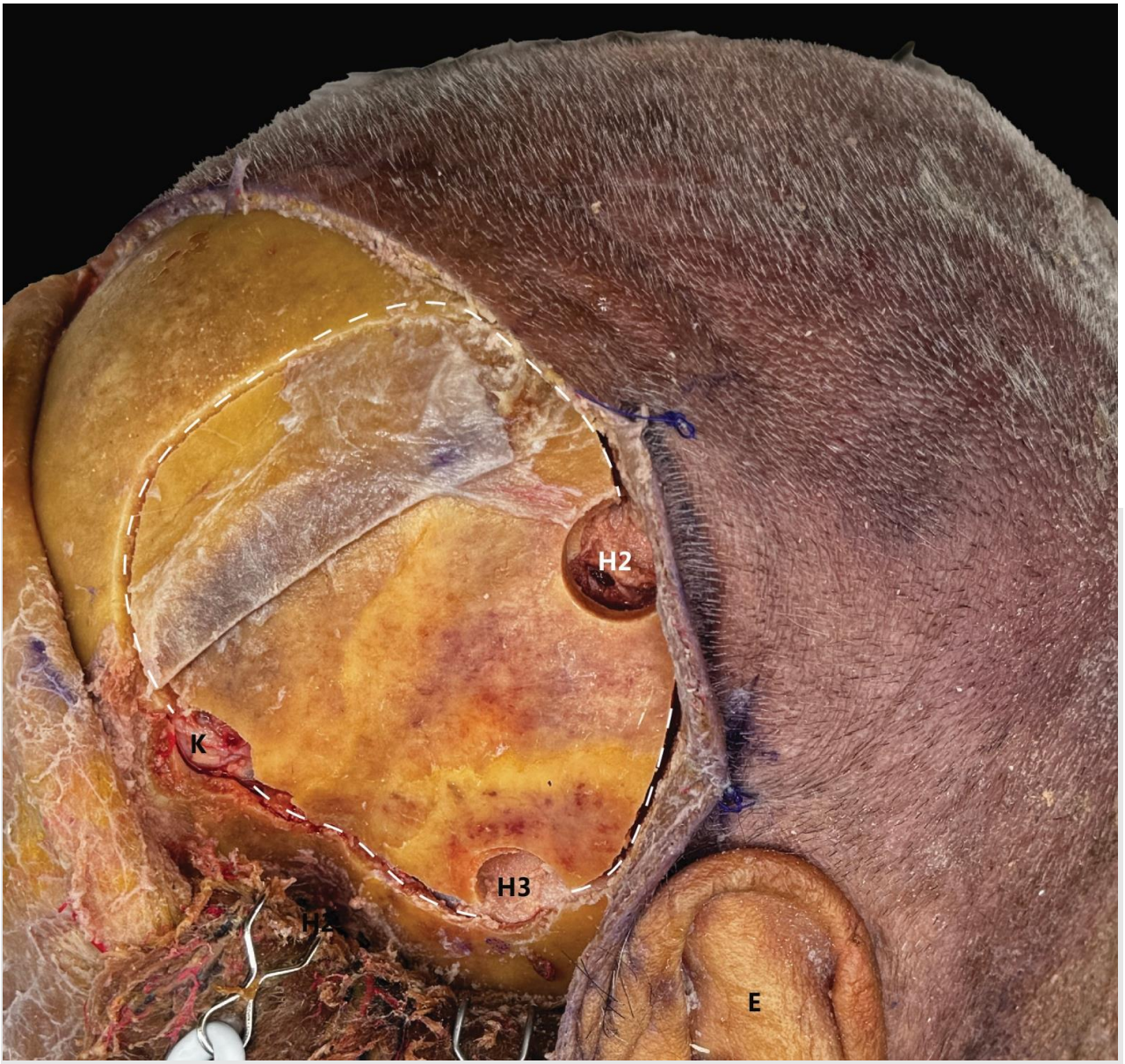
1. Identification of the temporal fat pad 1-2 cm superior to the zygomatic arch
2. An incision through the superficial temporal facia was made parallel to the zygomatic arch and directed posterior to anterior
3. the temporal fat pad was reflected anteriorly over the zygomatic arch.

SLDTF = superficial layer of deep temporal fascia
DLDTF = deep layer of deep temporal fascia
BF = buccal fat
STF = superficial temporal fascia
ZPFB = zygomatic process of frontal bone
PBSTA = parietal branch of superficial temporal artery
TFP = temporal fat pad



Temporalis muscle is detached starting form the zygomatic process anteriorly and over the superior temporal line, leaving a cuff over the superior temporal line (Asterisk).

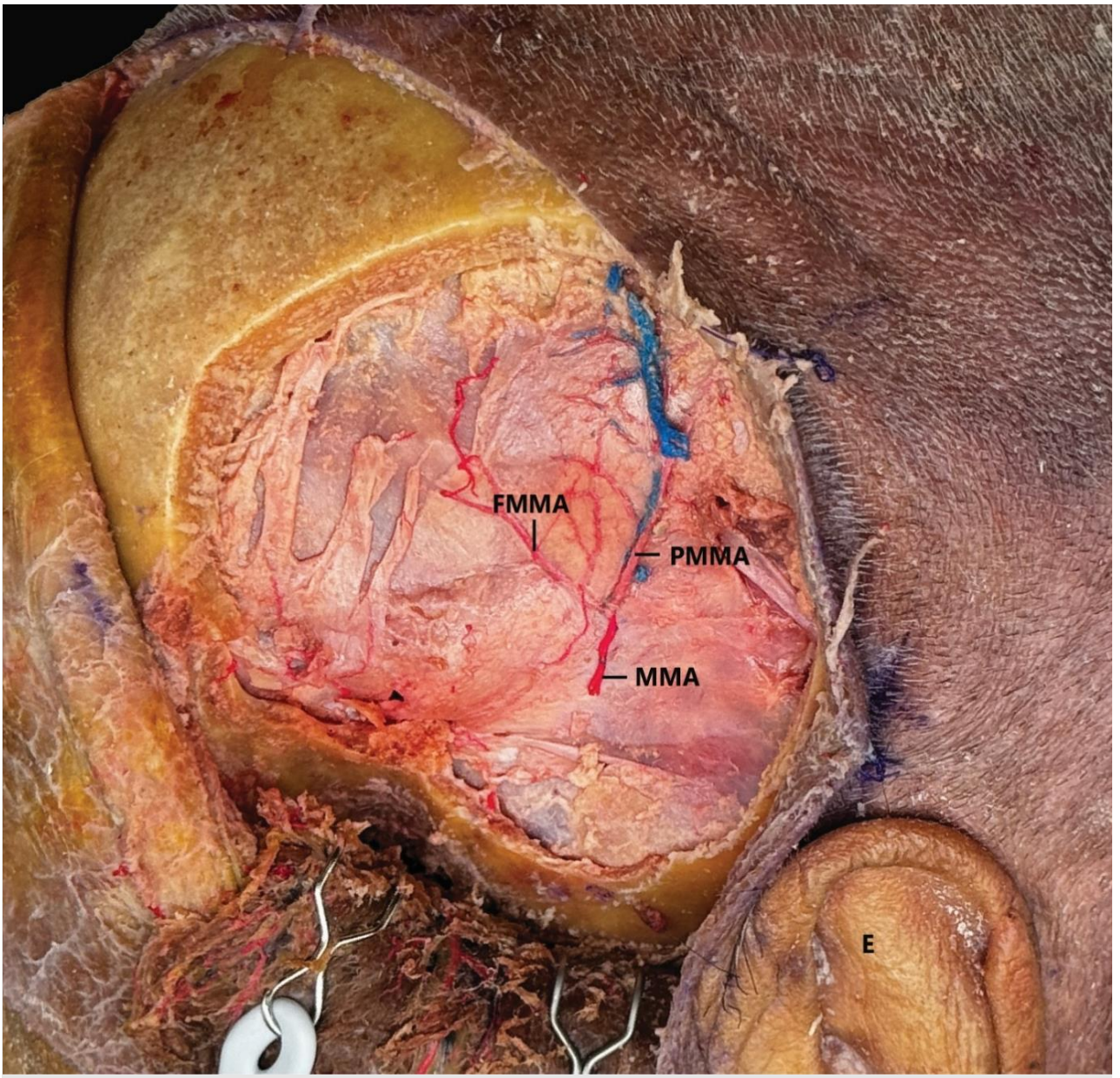
TM = temporalis muscle
SB = sphenoidal bone
FB = frontal bone
Black dashed line = coronal suture
St = stephanion
Yellow dashed line = squamoparietal suture
PB = parietal bone
Pink dashed line = squamous suture
SQB = squamosal part of the temporal bone
P = pterion



A standard pterional craniotomy (3 burr holes).

1. Keyhole superior to the frontozygomatic suture, above the anterior portion of the superior temporal line.
2. Second burr hole, over the posterior portion of the superior temporal line.
3. Third burr hole over the squamousal part of the temporal bone.

K= keyhole
H2 = second burr hole
H3 = third burr hole



Bone exposure and dura matter with MMA.

MMA = middle meningeal artery
PMMA = parietal branch of middle meningeal artery
FMMA = frontal branch of middle meningeal artery
DM = dura mater

Drilling of the sphenoid wing and expouser of the meningeal-orbital band

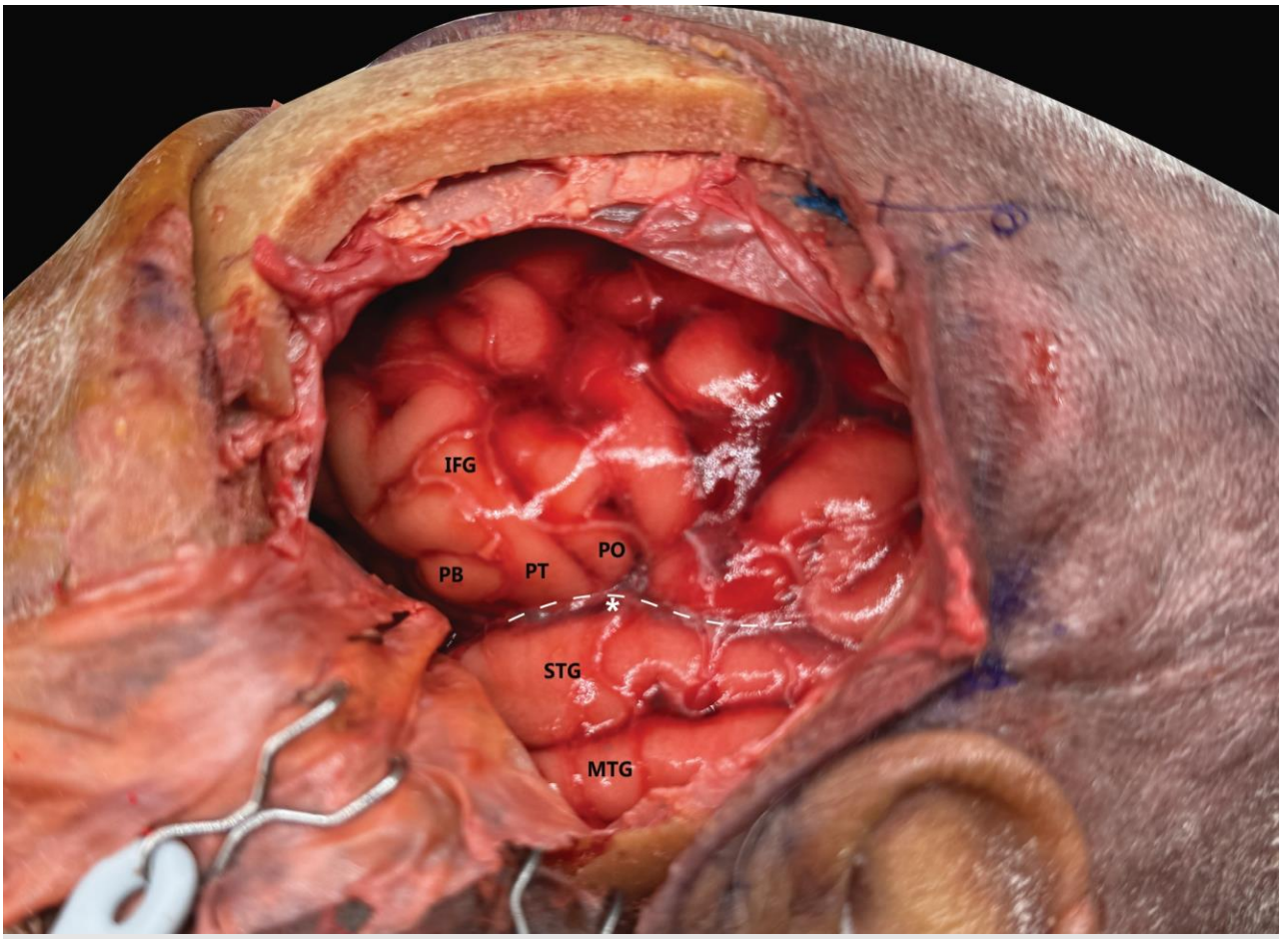
MCF = middle cranial fossa
MOB = meningeal-orbital band
SW = sphenoid wing
ACF = anterior cranial fossa

Durotomy

Demonstration of the curvilineal incision of the dura with an additional cut from the frontal burr hole to the lesser wing of the sphenoid, leaving two leaflets of the dura.

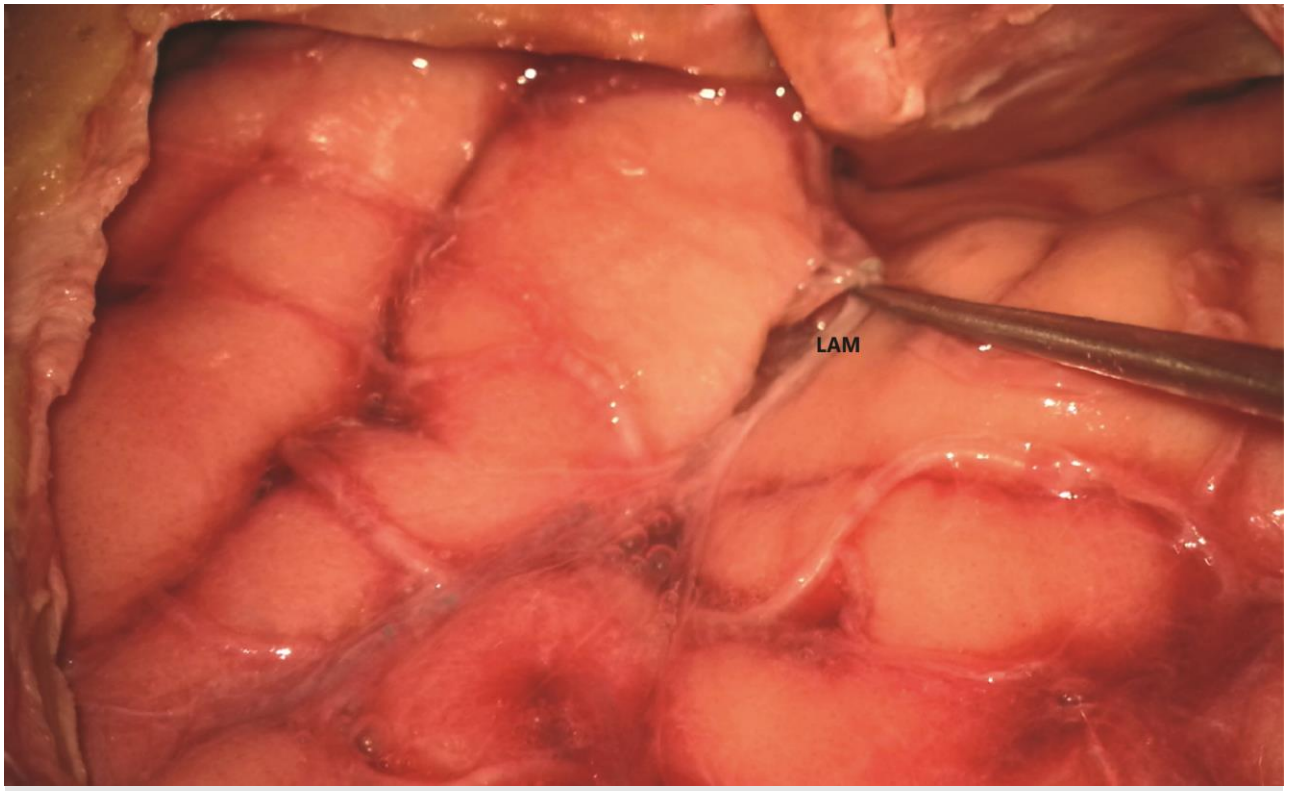
D = dura matter
A = arachnoid matter

Yellow dashed line = sylvian fissure
White dashed line = the dural incision

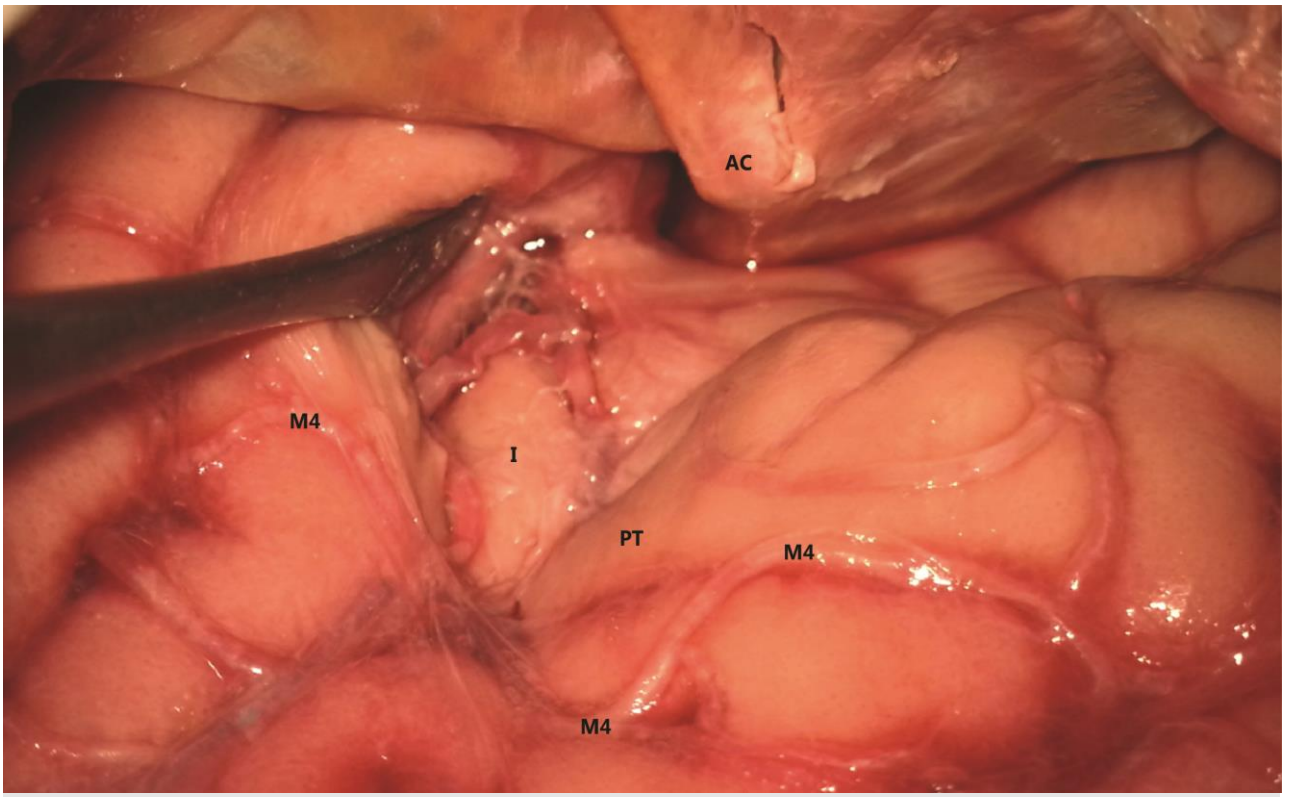


Intradural exposure of the pterional approach

PB = pars orbitalis
PT = pars triangularis
PO = pars opercularis
STG = superior temporal gyrus
MTG = middle temporal gyrus
IFG = inferior temporal gyrus
White dashed line = lateral membrane of the sylvian fissure
Asterisk = anterior sylvian point



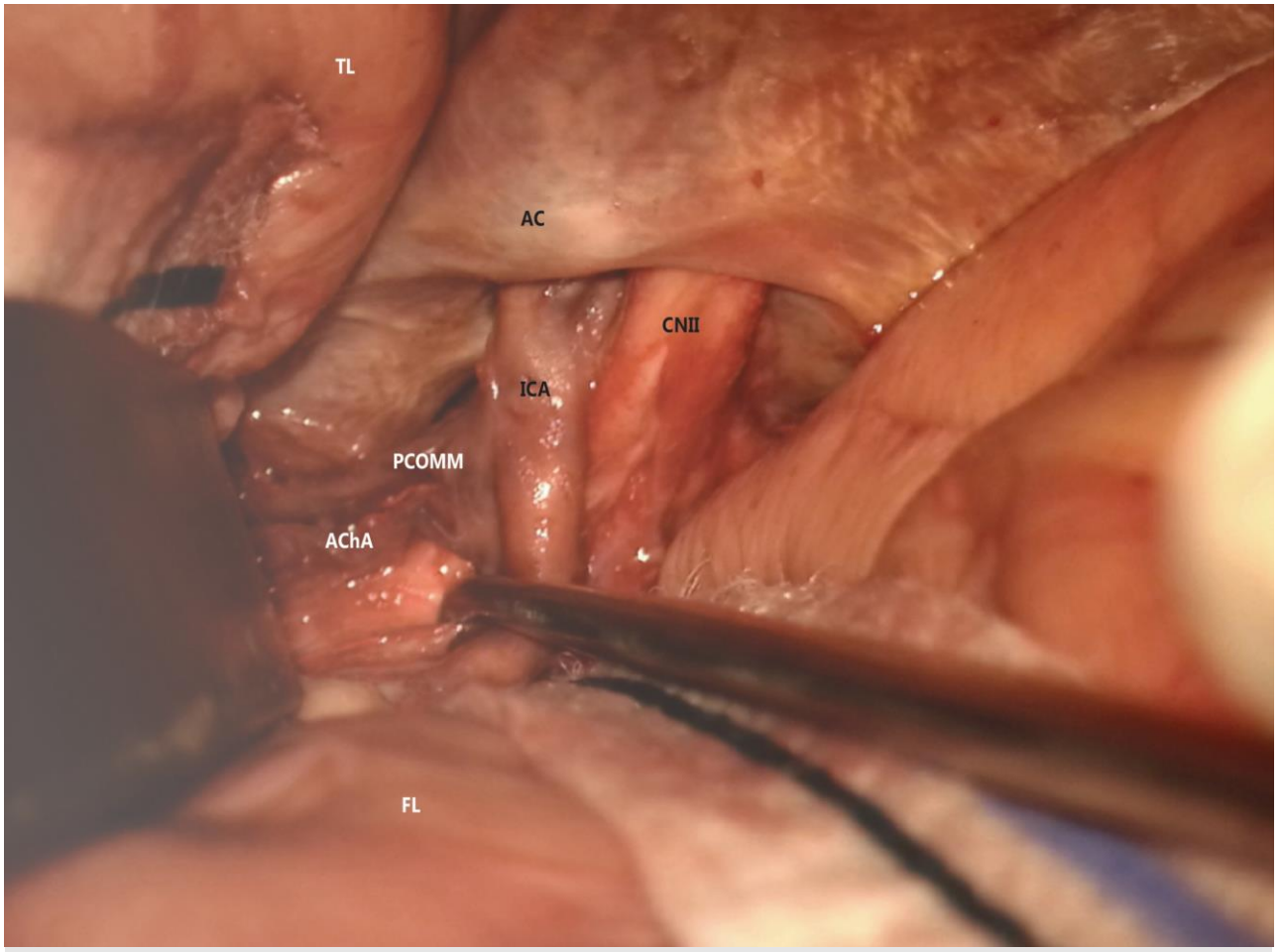
LAM = lateral arachnoid membrane, overlying the superficial compartment of the Sylvain fissure



Posterior-medial compartment/insular cleft of sylvain fissure. Intermediate slyvain membrane was dissected.

PT = pars triangularis
MCA = middle cerebral artery
I = insula

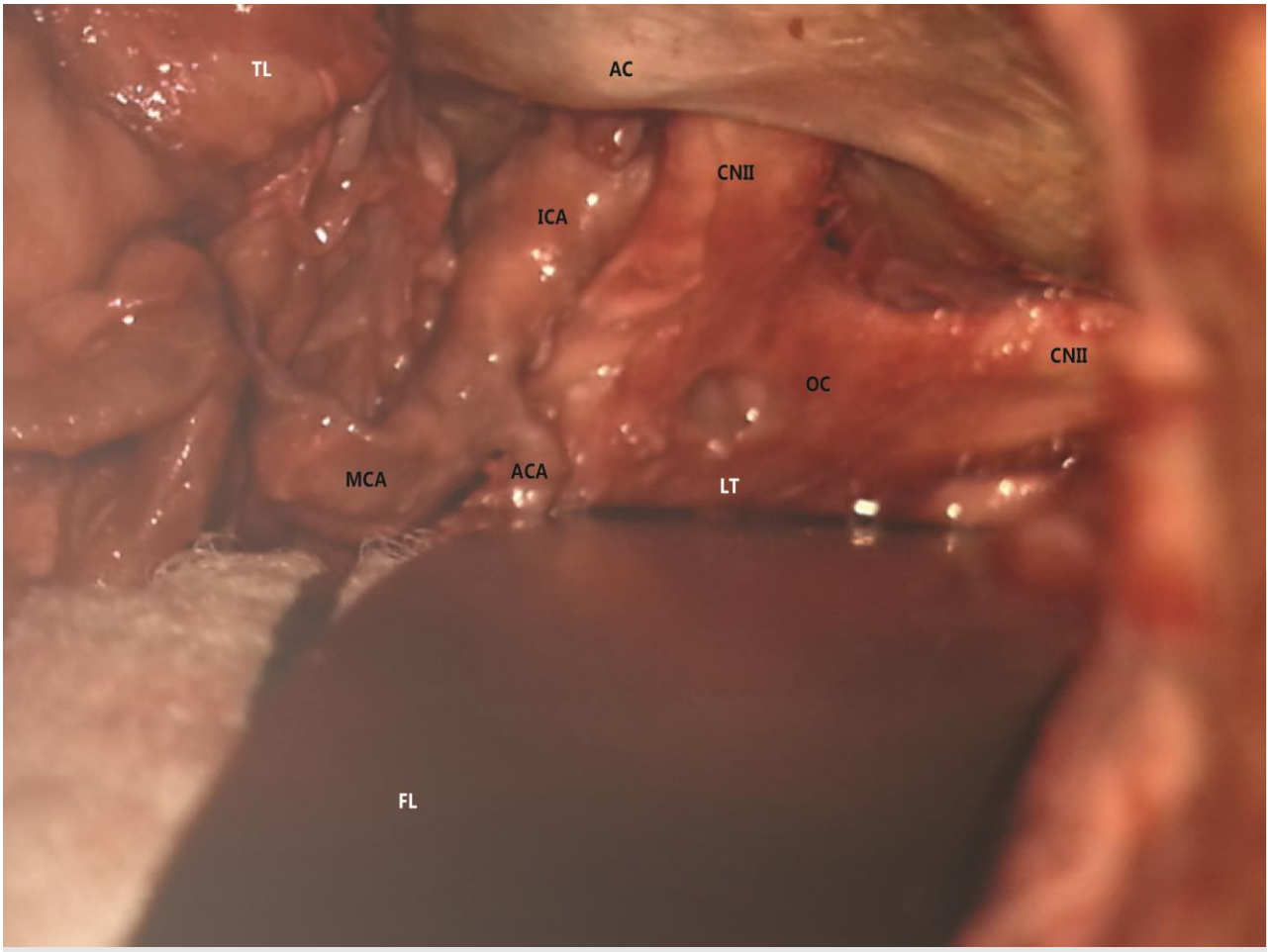
AC = anterior clinoid
M4 = cortical segment of middle cerebral artery



Sylvian dissection

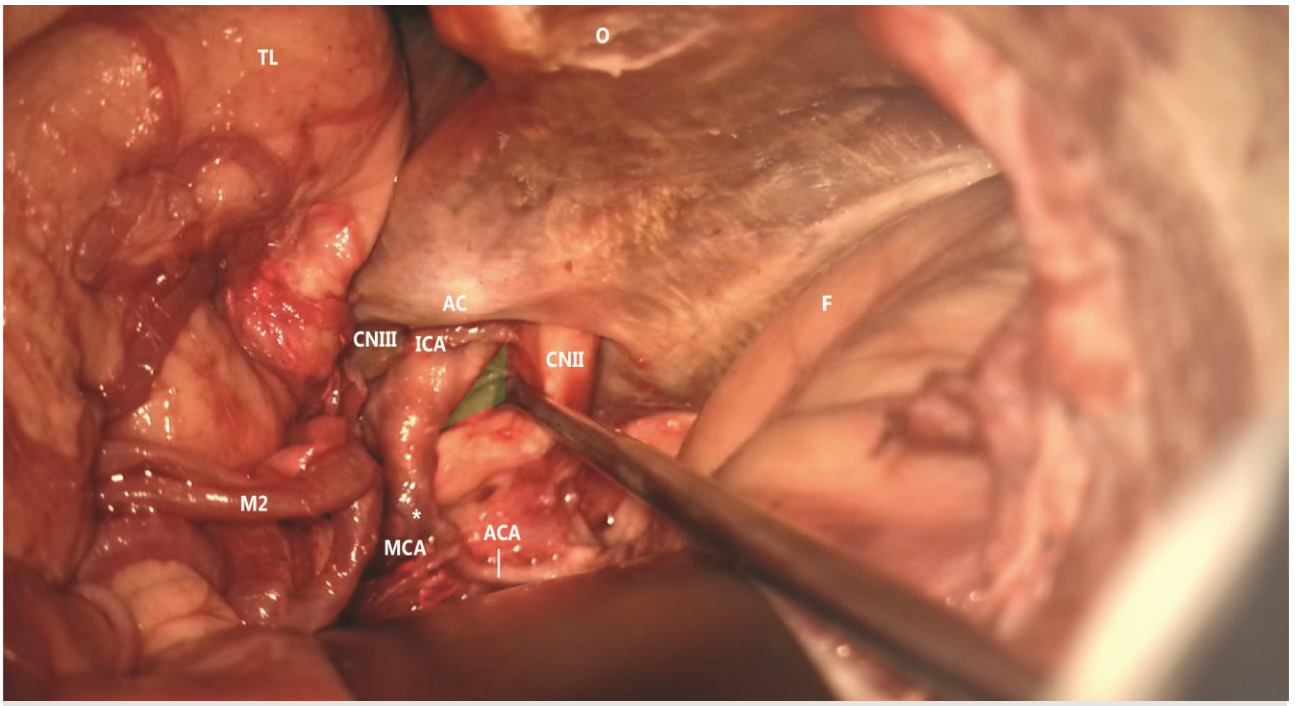
AChA =anterior choroidal artery
PCOMM = Posterior communicating artery
CN II = optic Nerve
AC = anterior clinoid

ICA = internal carotid artery
TL = temporal lobe
FL = frontal lobe



Sylvian dissection surgical view

CN II = optic nerve
AC = anterior clinoid
ICA = internal carotid artery
TL = temporal lobe
OC = optic chiasma
MCA = middle cerebral artery
ACA = anterior cerebral artery
ICA = internal cartiod artery
LT = laminated terminalis.



Sylvian dissection surgical view

ACA = anterior carotid artery
Asterisk = carotid bifurcation
TL = temporal lobe
O = orbit
M2 = insular segment
Green triangle = optoic-carotid tringle
CN II = optic nerve
CN III = oculomotor nerve
AC = anterior clinoid
ICA = internal carotid artery
MCA = middle cerebral artery

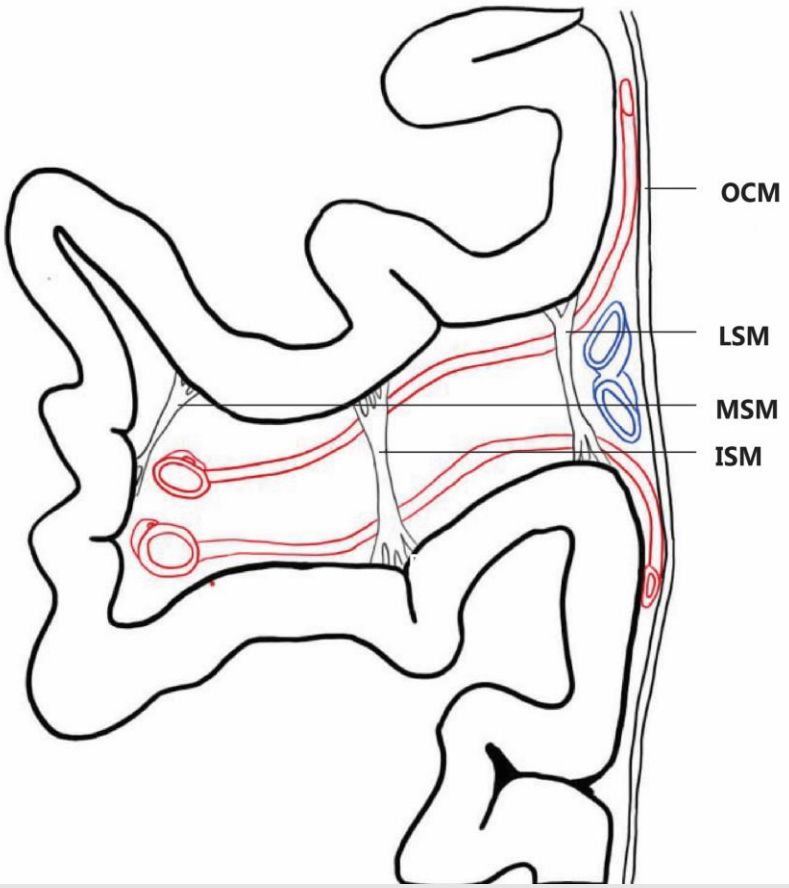
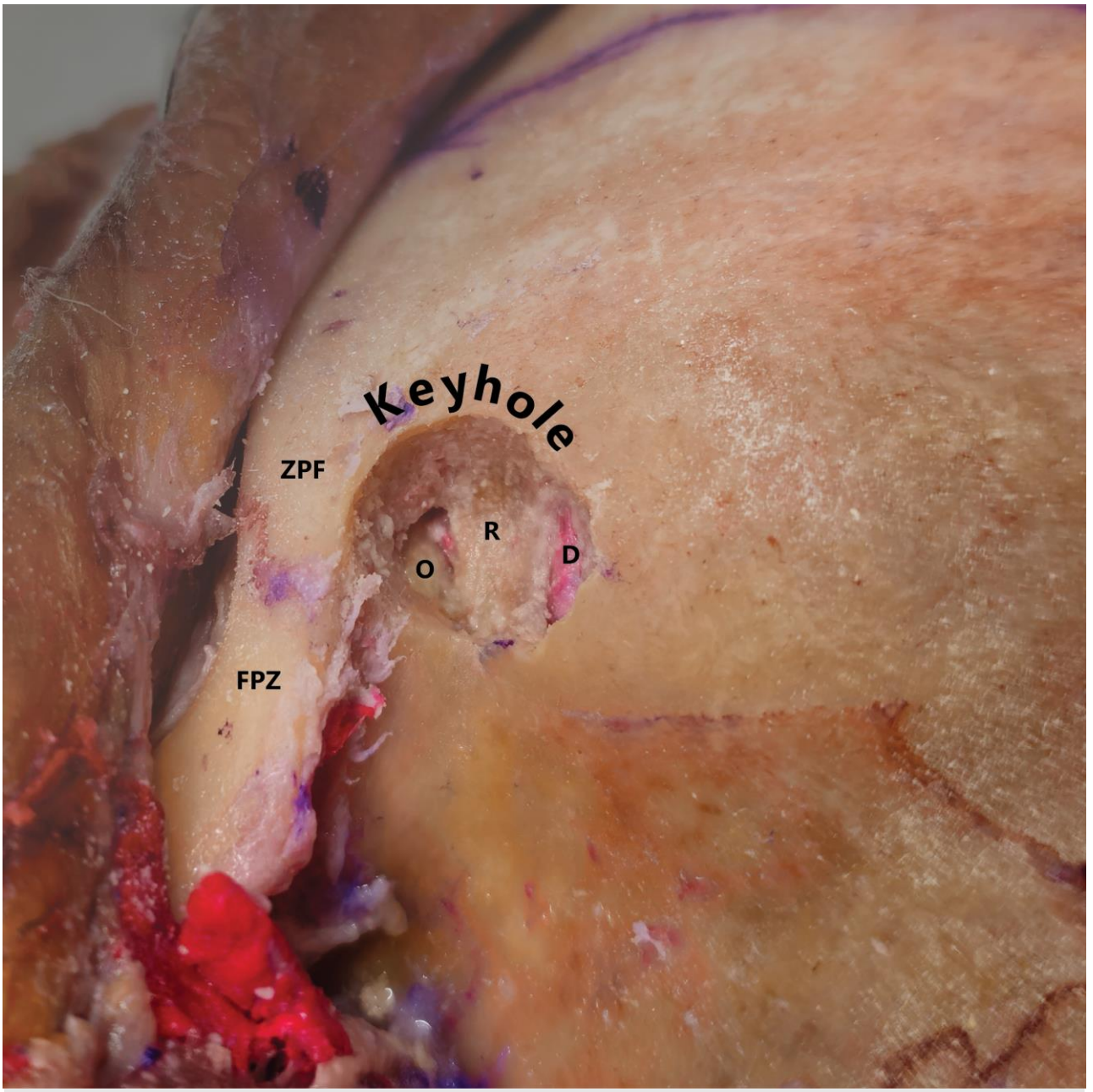


Illustration of slyvian membranes

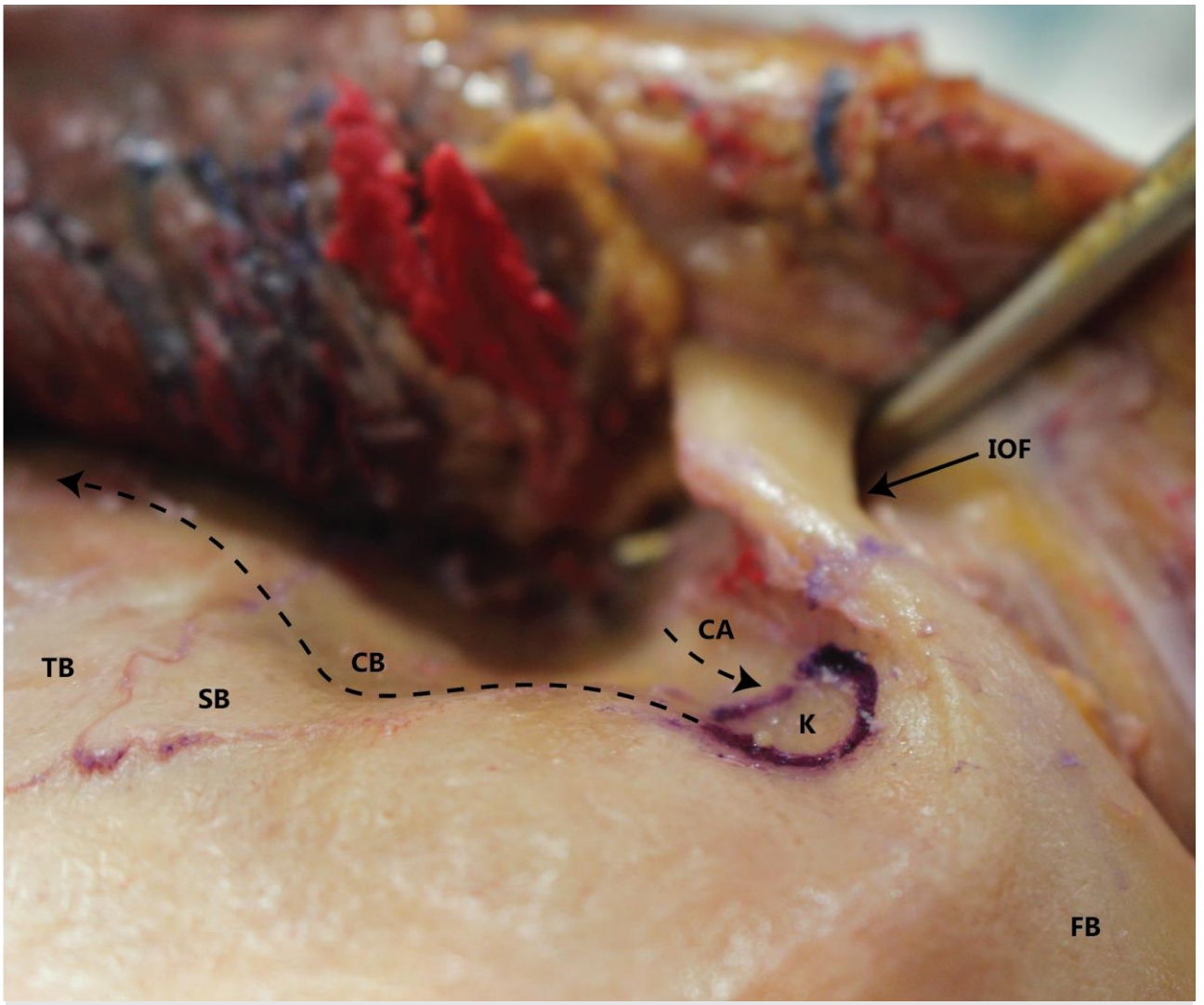
OCM = Outer arachnoid membrane
LSM = Lateral Sylvian membrane
ISM = Intermediate Sylvian membrane
MSM = Medial Sylvian membrane

LAM = lateral arachnoid membrane, overlying the superficial compartment of the Sylvain fissure



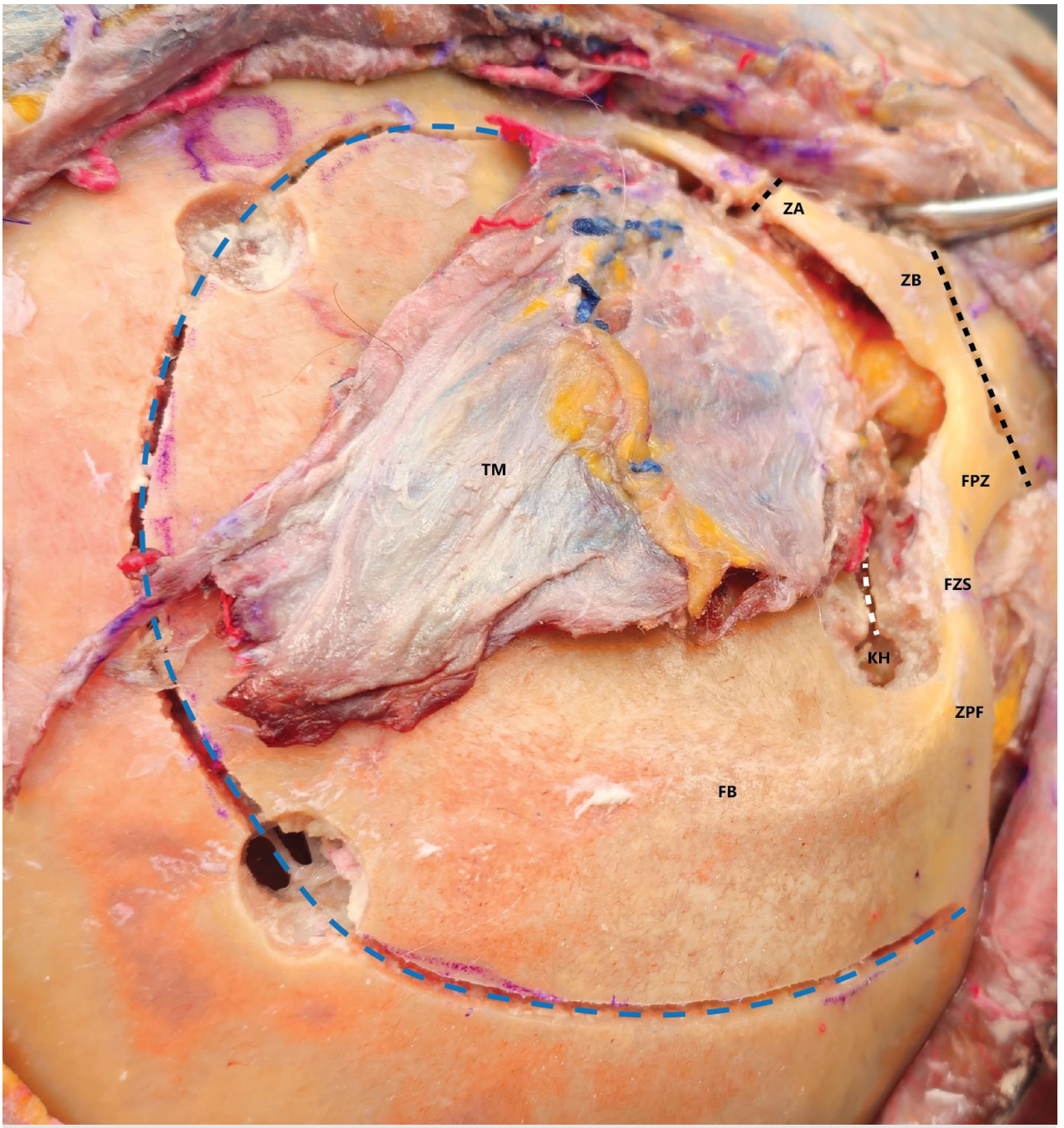
McCarty Keyhole

R = roof of orbit
O = orbit
D = frontal dura
ZPF = zygoma part of frontal bone
FPZ = frontal part of zygoma



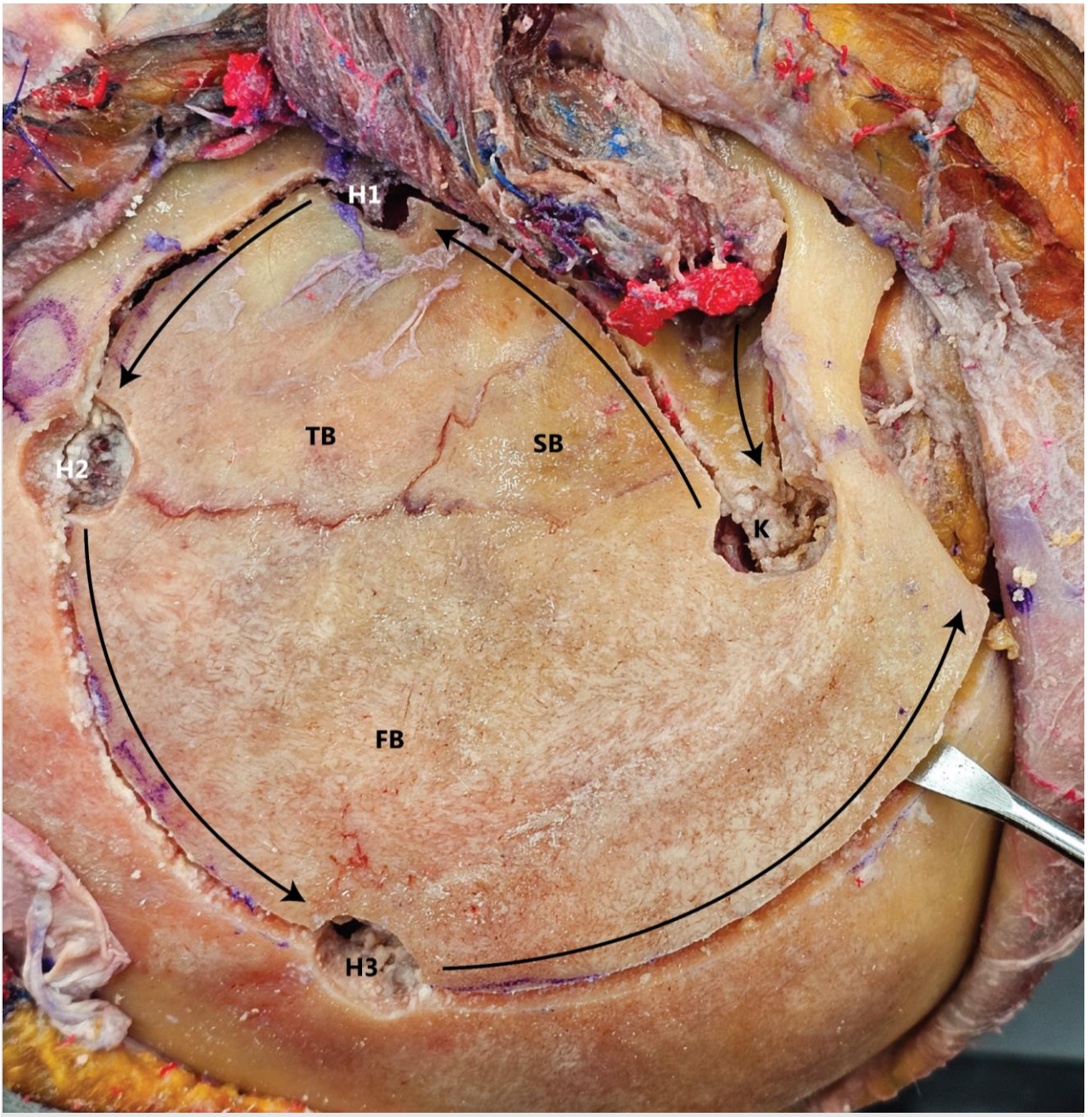
The orbitozygomatic osteotomy

K = MacCarty keyhole
CA = cut A from the inferior orbital fissure to MacCarty keyhole
CB = cut B from MacCarty keyhole to the next burr hole
IOF = inferior orbital fissure (orbital side)
FB = frontal bone
SB = sphenoid bone
TB = temporal bone



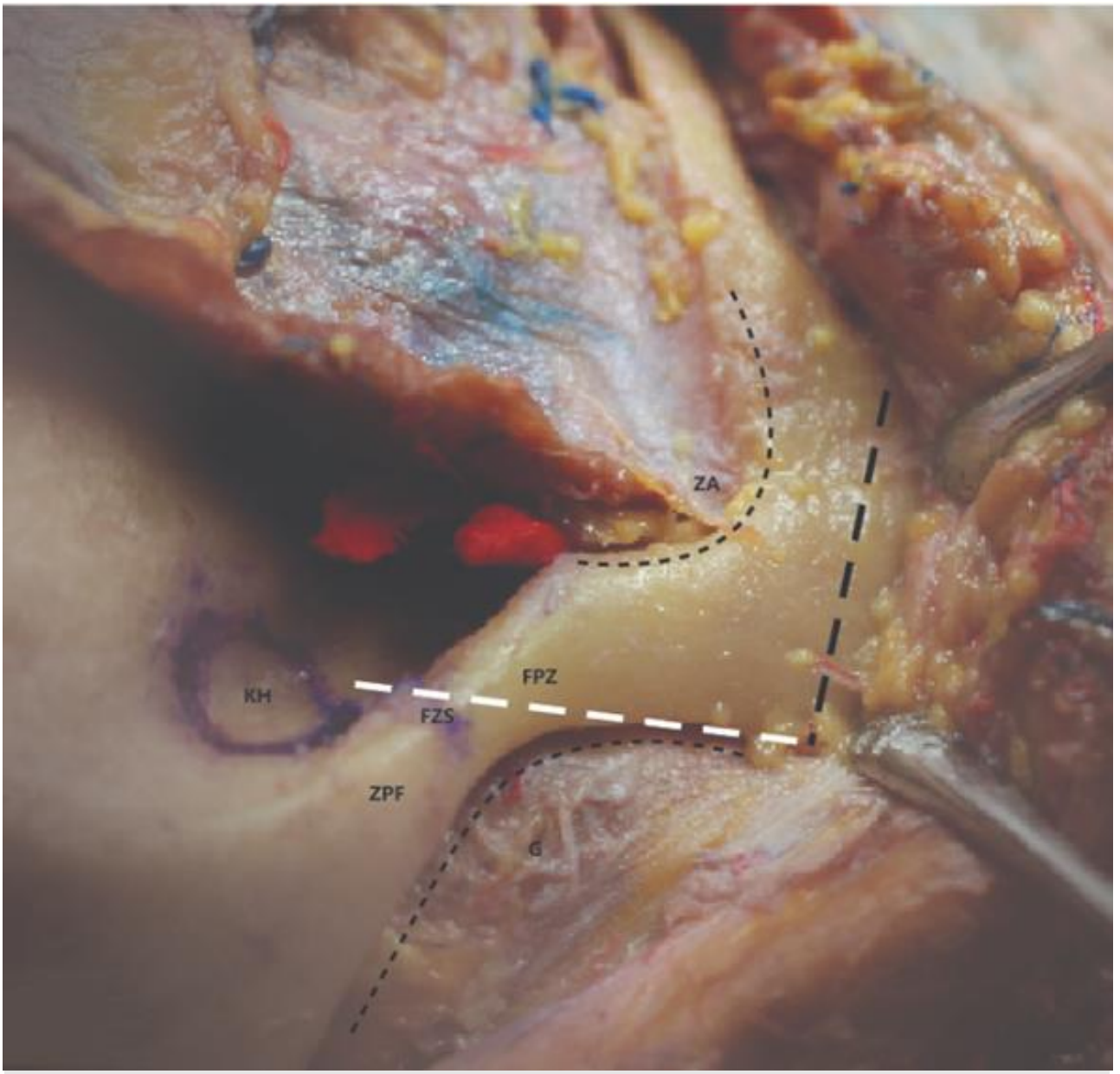
The orbitozygomatic osteotomy

ZPF = zygomatic process of the frontal bone
FPZ = frontal process of the zygomatic bone
FZS = frontozygomatic suture
FB = frontal bone
KH = keyhole
TM = temporalis bone
ZA = zygomatic arch
ZB=zygomatic bone



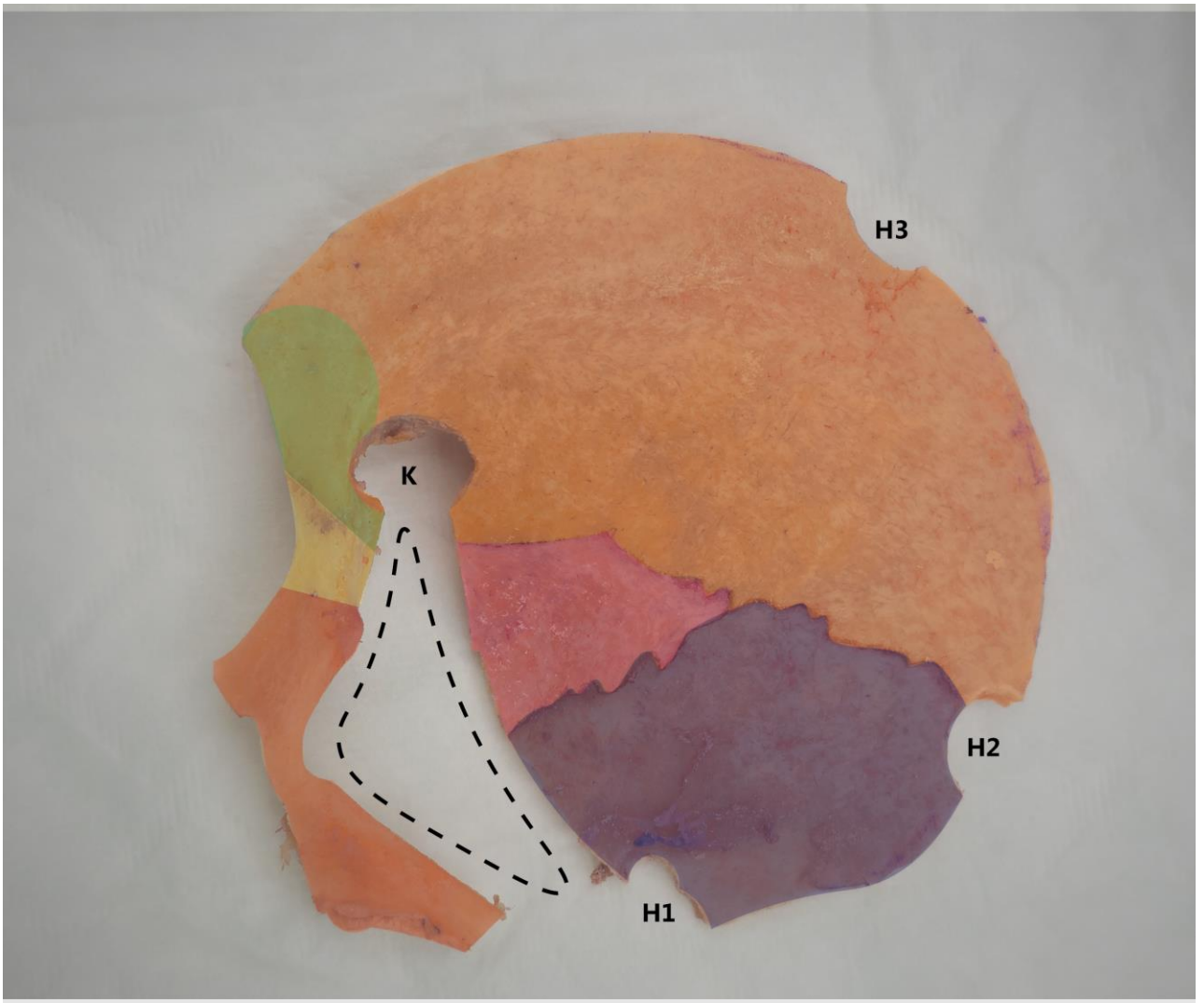
The orbitozygomatic osteotomy

K = MacCarty keyhole
FB = frontal bone
TB = temporal bone
SB = sphenoid bone
H1 = first burr hole located above the posterior root of the zygomatic bone
H2 = second burr hole on the temporal bone over the squamous suture
H3= third burr hole position anterior to the coronal suture



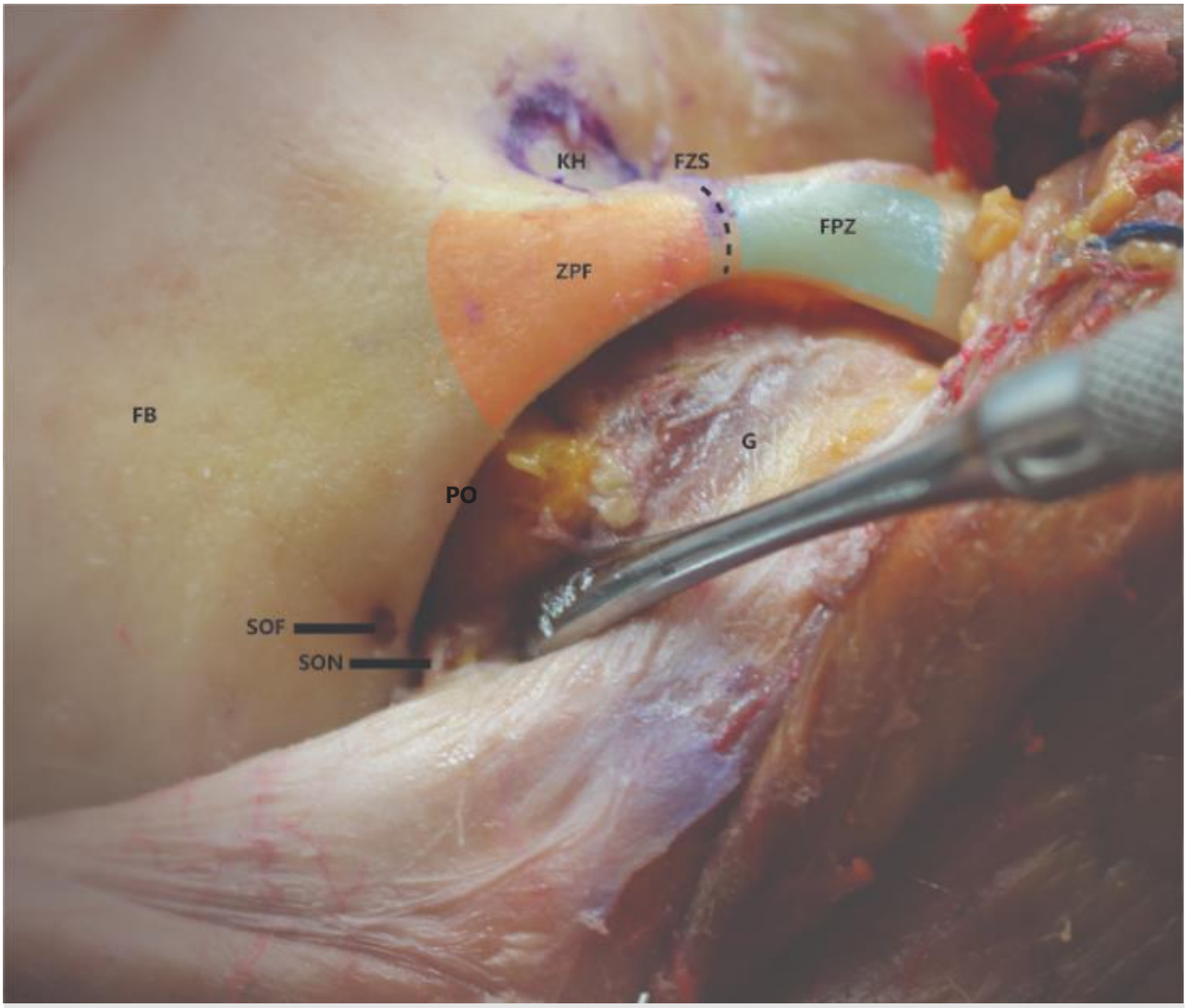
The orbitozygomatic osteotomy

KH = MacCart keyhole
ZPF = zygomatic process of the frontal bone
FPZ = frontal process of the zygomatic bone
FZS = frontozygomatic suture
G = globe
ZA = zygomatic arch



One piece orbitozygomatic osteotomy

Orange area = frontal bone
Green area = zygomatic process of the frontal bone
Yellow area = frontal process of the zygomatic bone
Red are = zygomatic arch
Purple area = temporal bone
Pink area = sphenoid bone

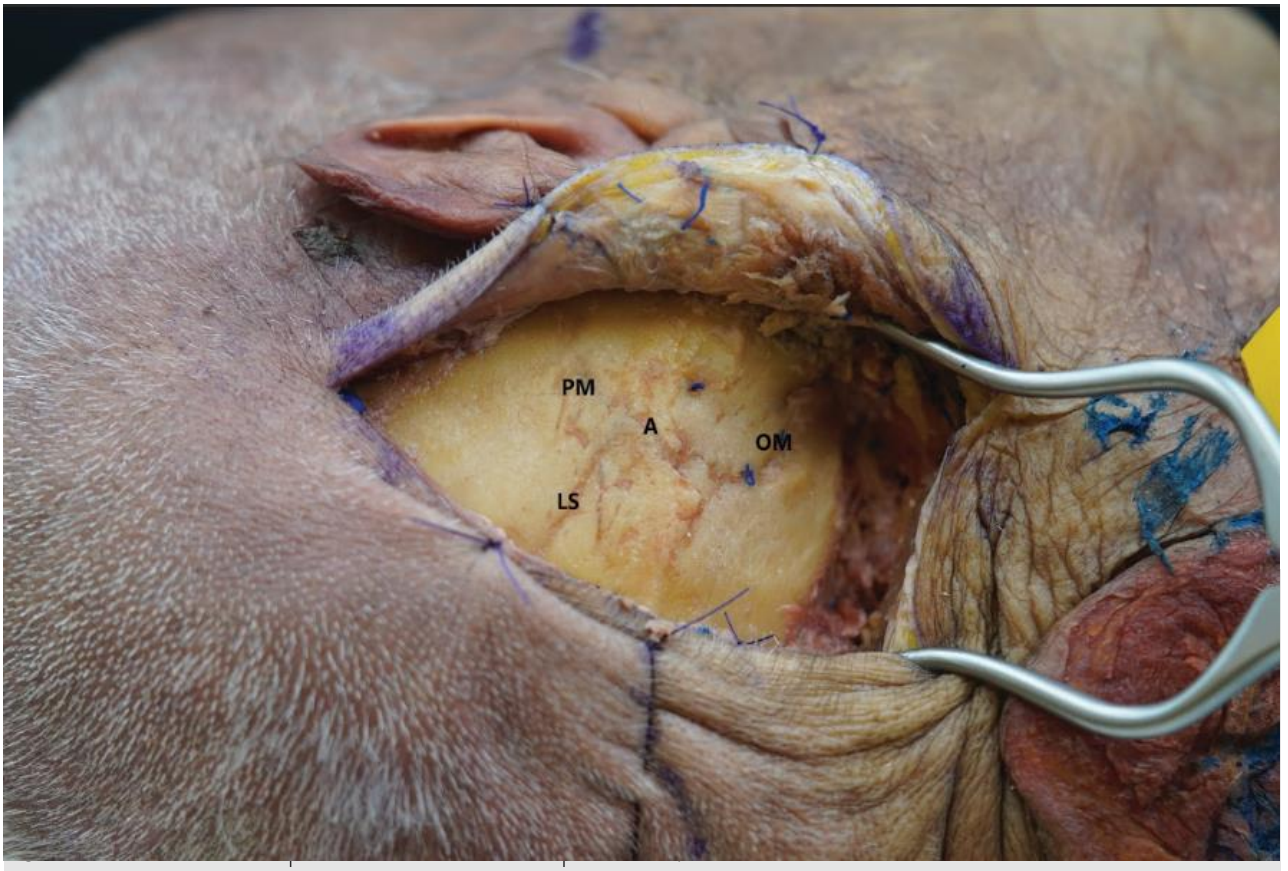


Supraorbital nerve (SON) was dislocated out of the supraorbital foramina (SOF).

FB = frontal bone
KH = keyhole
ZPF = zygomatic process of the frontal bone
FPZ = frontal process of the zygomatic bone
FZS = frontozygomatic suture
G = globe
PO = preorbital fasica

The skin incision is variable. Demonstrated here is a C-shaped incision two finger breadths from the junction of the pinna to the scalp. One third of the incision was located superior to the imaginary zygoma-nion (Z-line) and two thirds of the incision below it. The Z-line is an imaginary line to approximately the location of the transverse sinus. It extends from the root of the zygoma (RZ) to the inion (I). Another demonstrated line is starting posterior to the mastoid and extending superiorly. The intersection of the two lines is an approximation of the transverse sigmoid junction (TSJ).

SS = sigmoid sinus IL = incision line

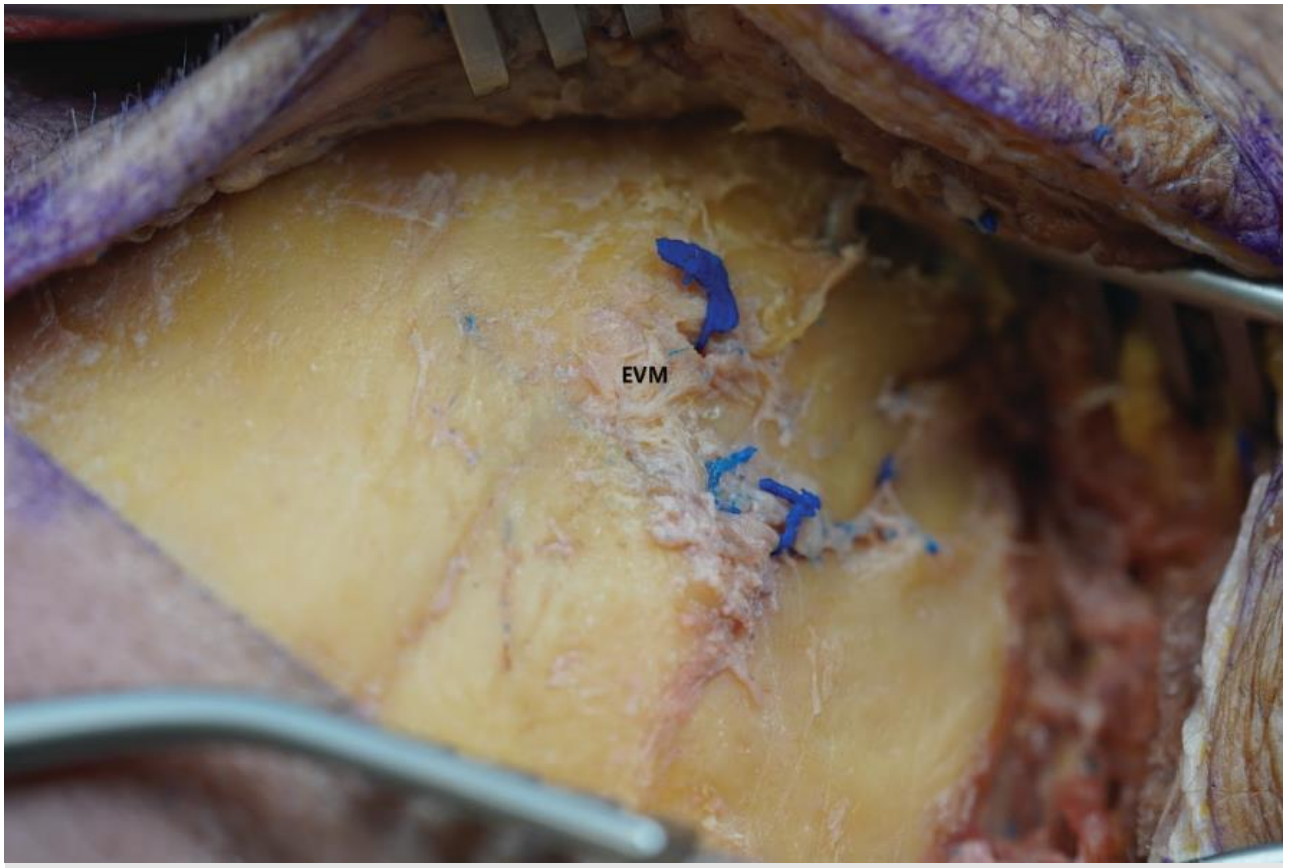


PM = pariatomastoid suture

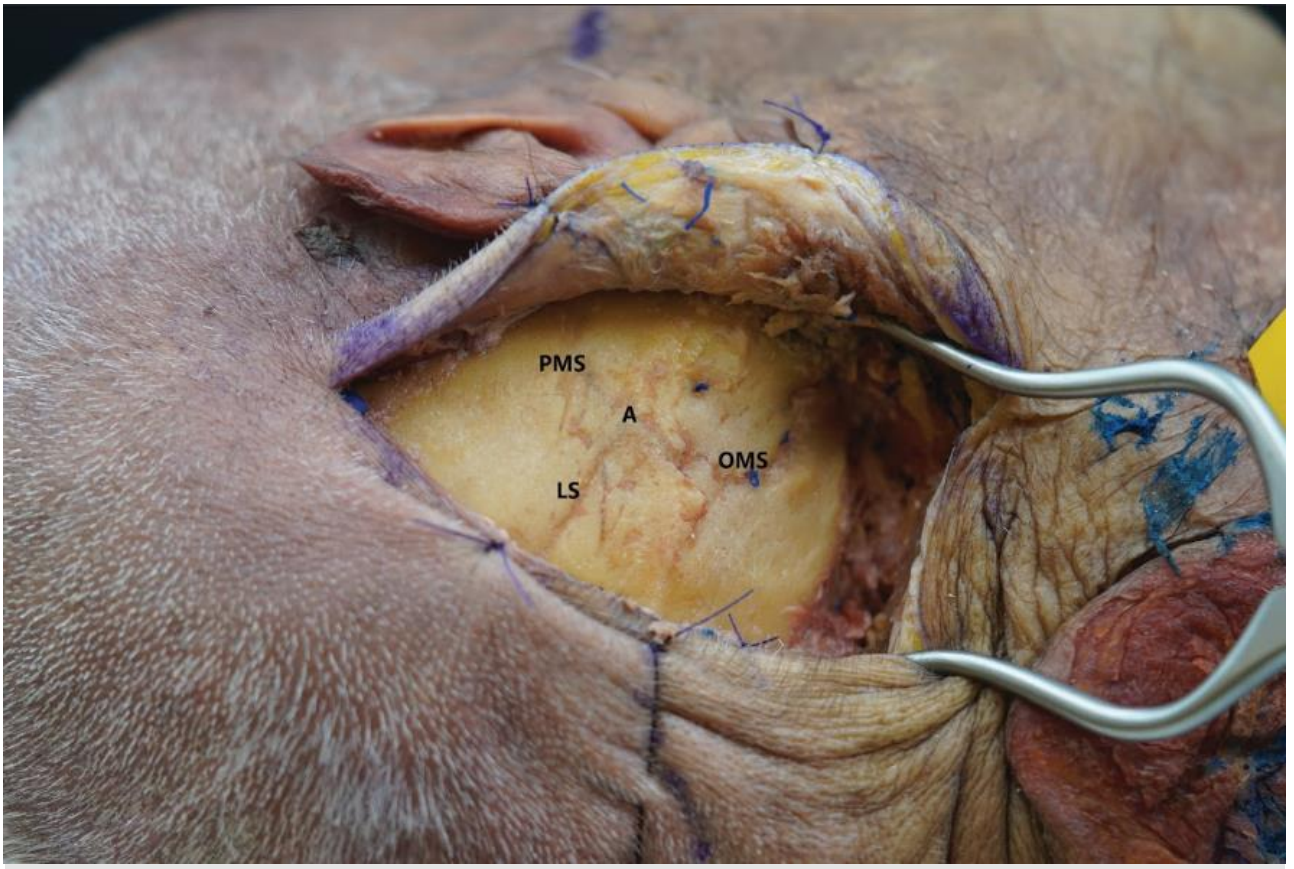
LS = lambdoid suture

OM = occipitomastoid suture

A = asterion



EMV = emissary vein of mastoid



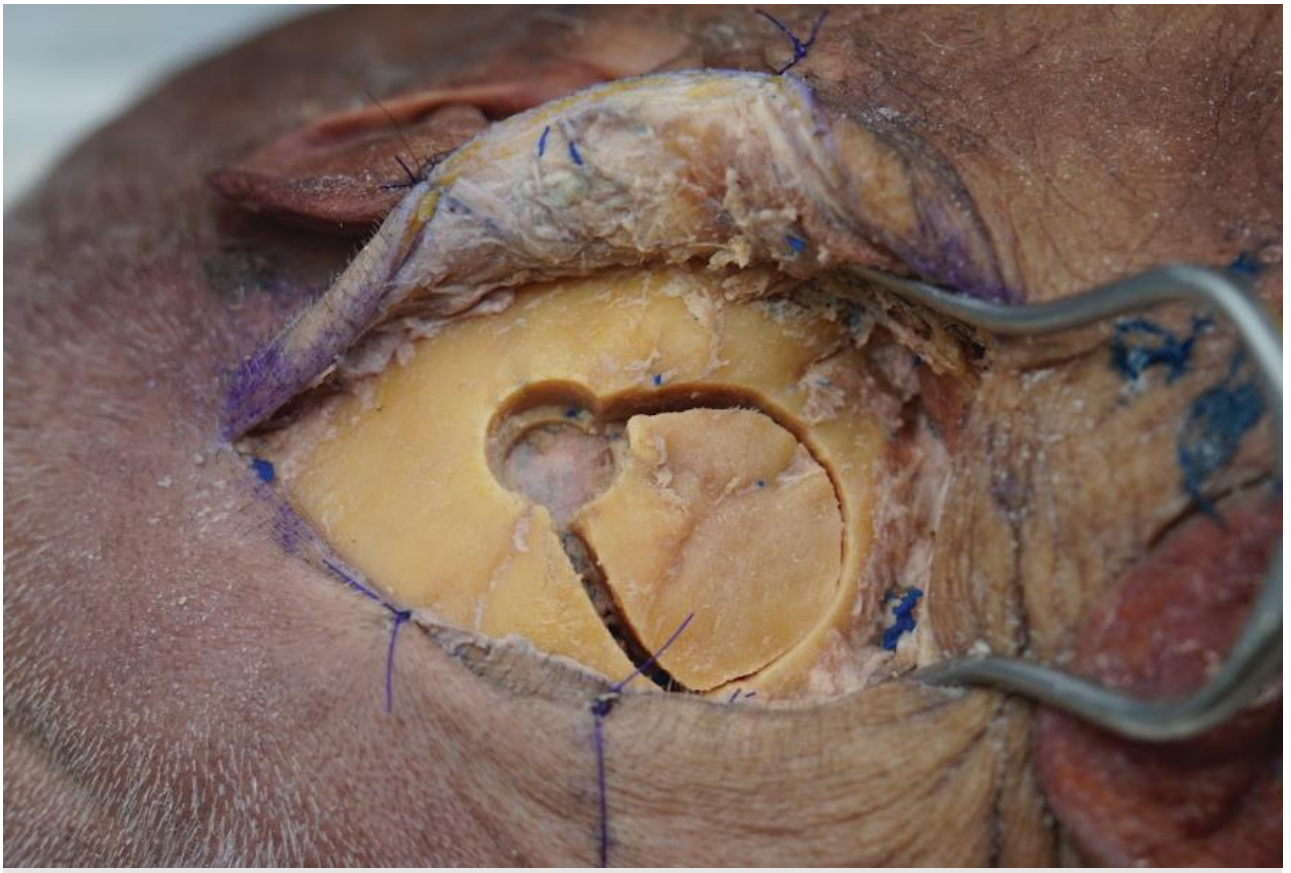
PMS = paraitomastoid suture

OMS = occipitomastoid suture

LS = lambdoid suture

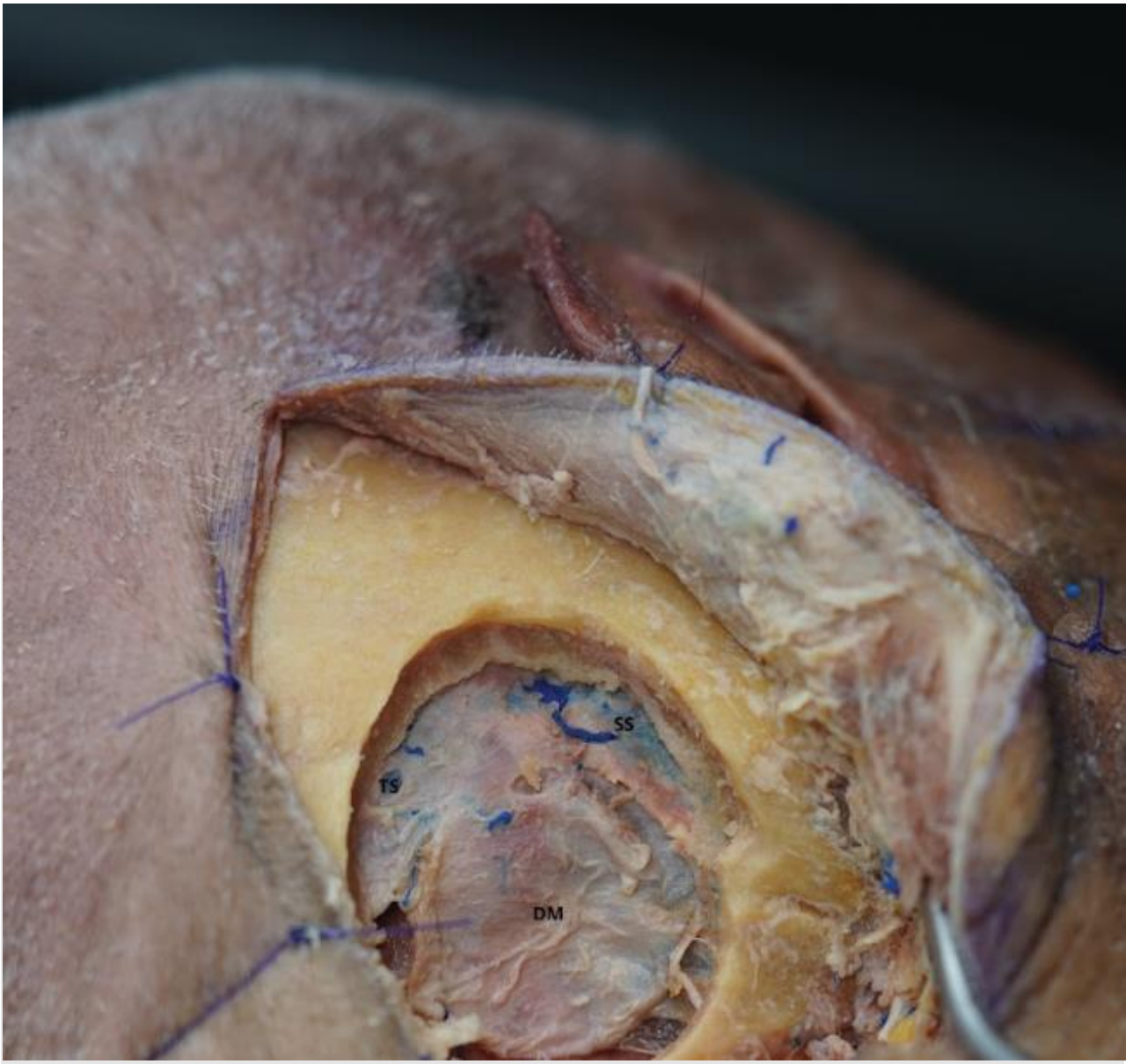
A = asterion

Burr hole was placed over the asterion.



Craniotomy for retrosigmoid approach.

Dura was incised in curvilinear pattern. An additional cut was made to reflect the dura leaflets over the sinuses.

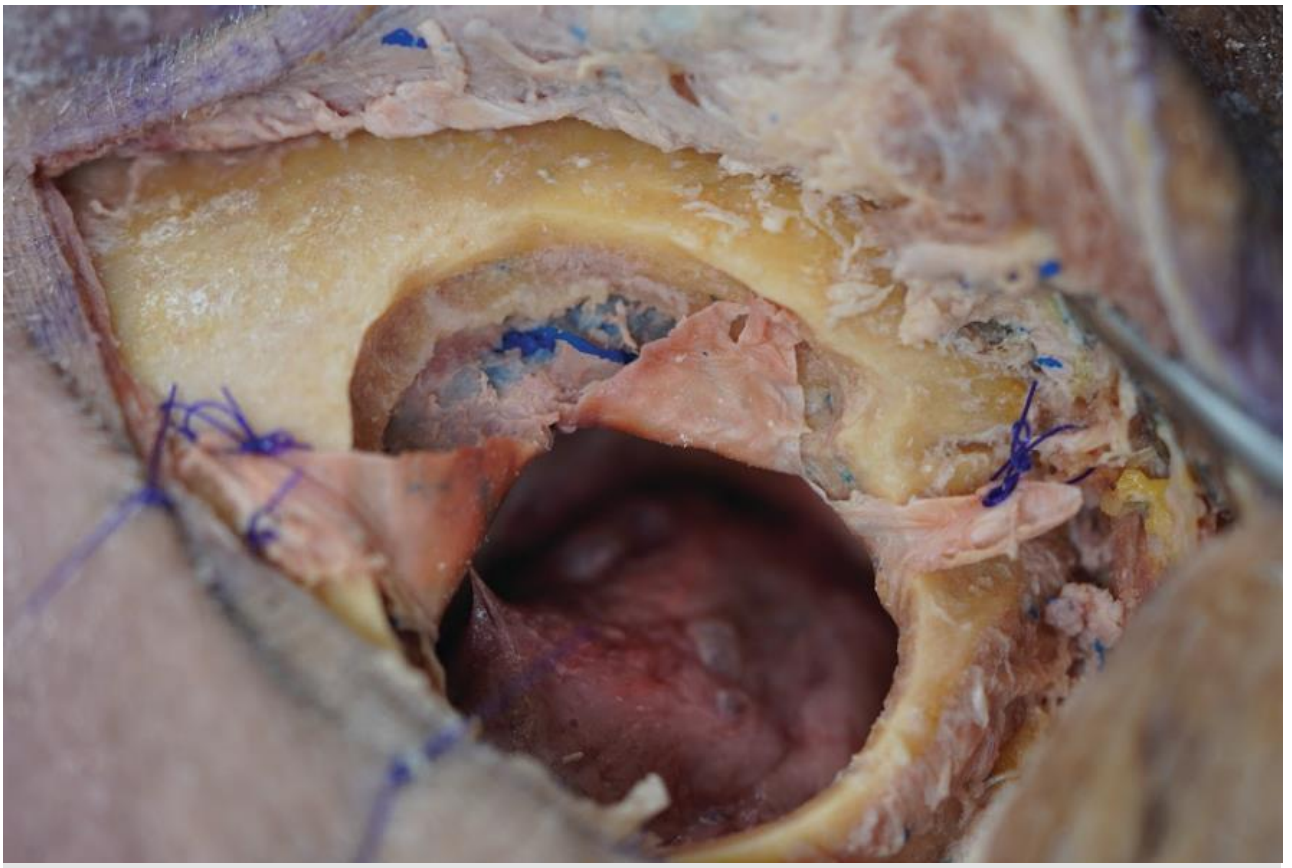


Further drilling was exposed and portion of the sigmoid and transverse sinus is exposed.

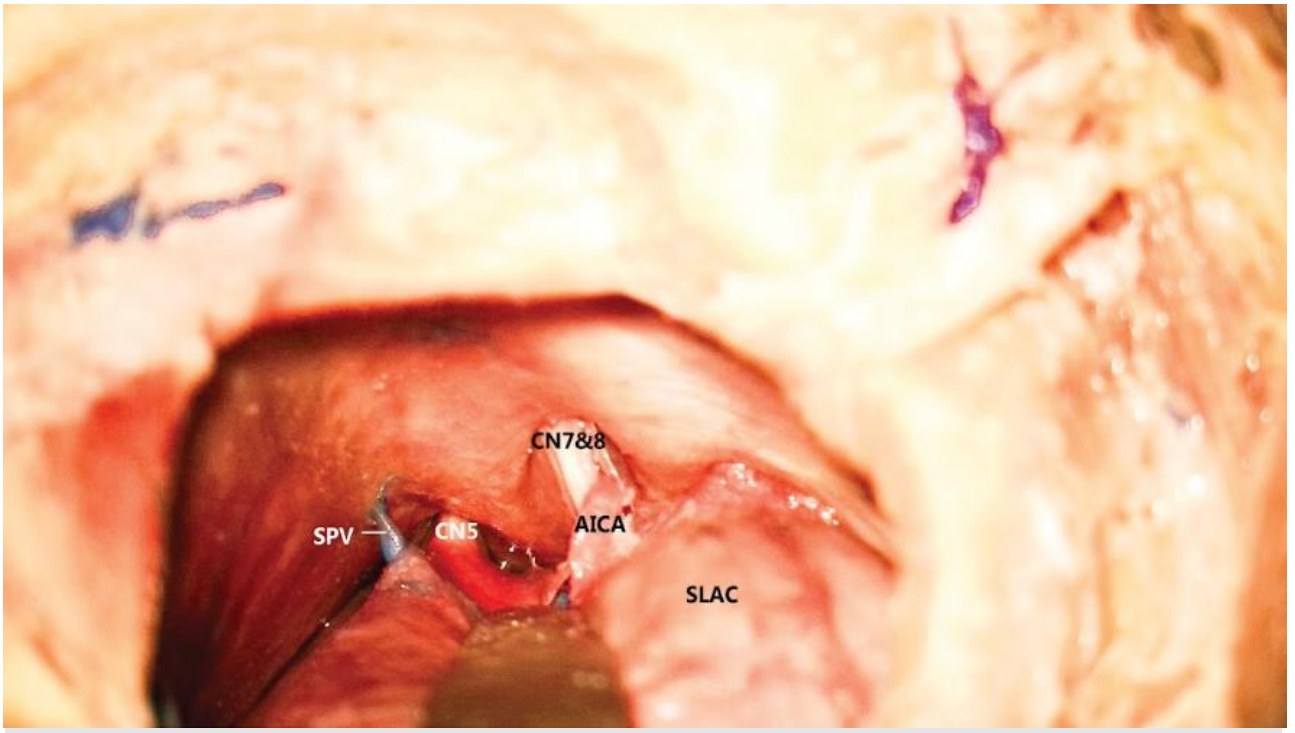
SS = sigmoid sinus

DM = dura mater

TS = transverse sinus



Intracranial expouser of the retrosigmoid approach



Superolateral surface of the cerebellum was retracted and the superior neuro-vascular bundle was exposed.

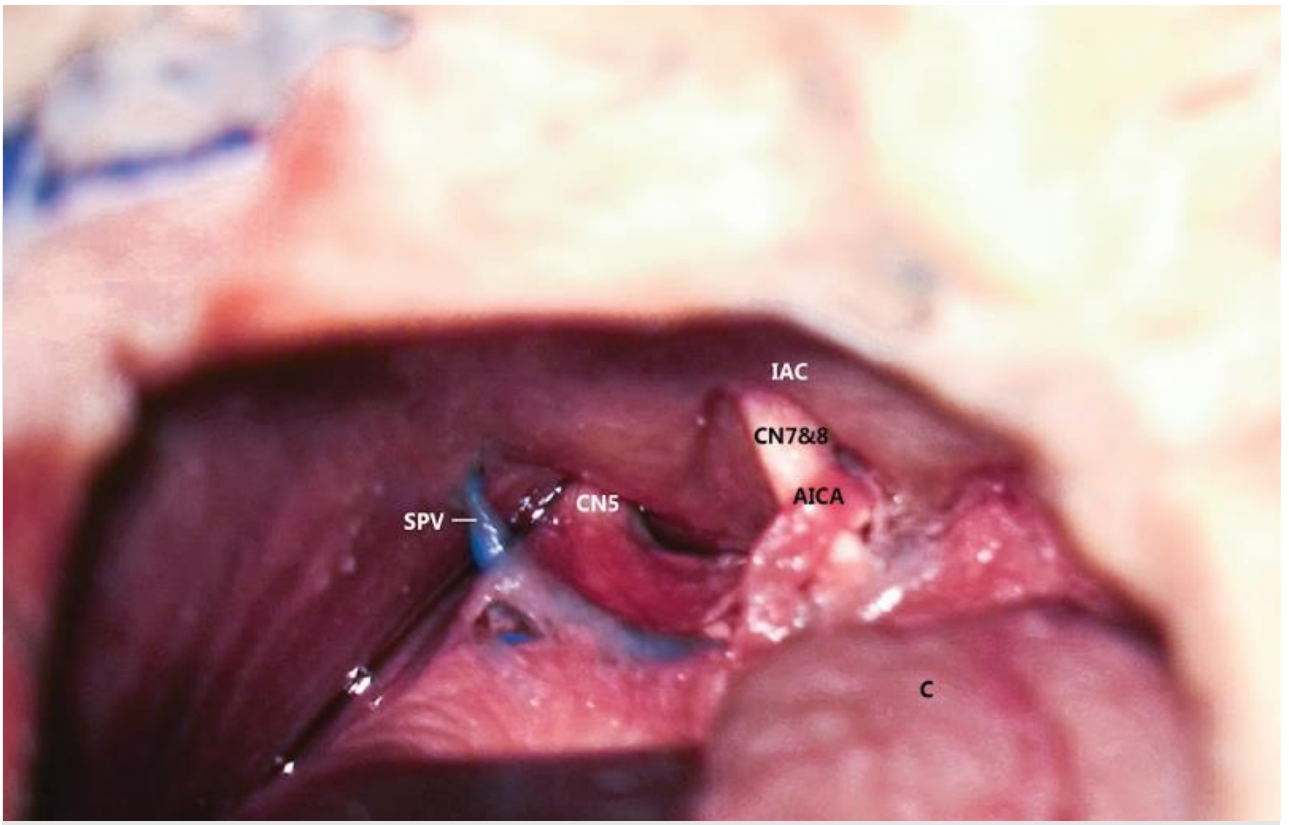
AICA = anterior inferior cerebellar artery

SLAC = superolateral aspect of cerebellum

CNV = trigeminal nerve

CN7&8 = facial and vestibulocochlear nerves

SPV = superior petrosal vein



Retraction placed over the lateral surface of the cerebellum. Exposure of the superior and mid-portion of the cerebellopontine angle.

AICA = anterior inferior cerebellar artery

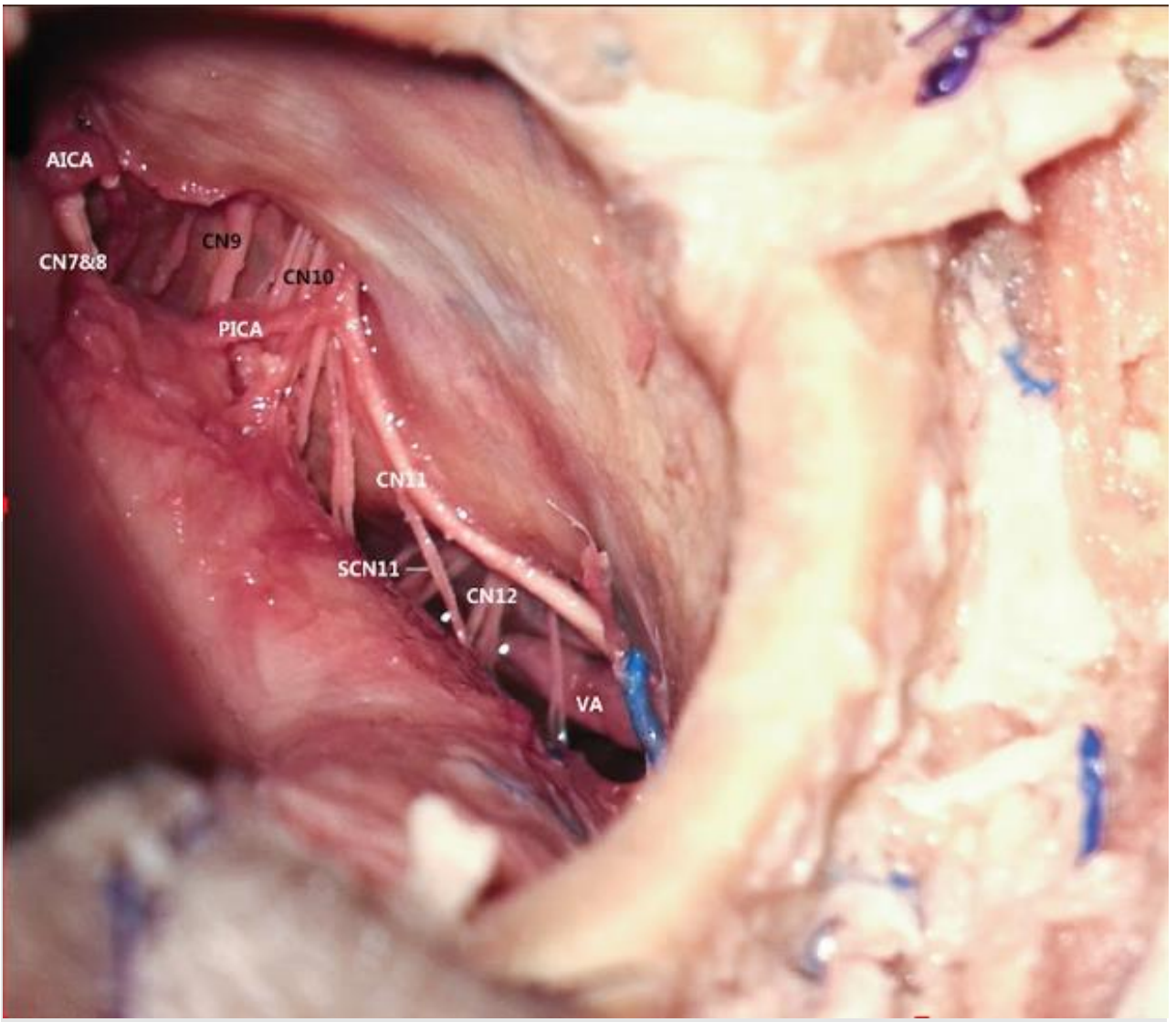
C = cerebellum

CNV = trigeminal nerve

CN7&8 = facial and vestibulocochlear nerves

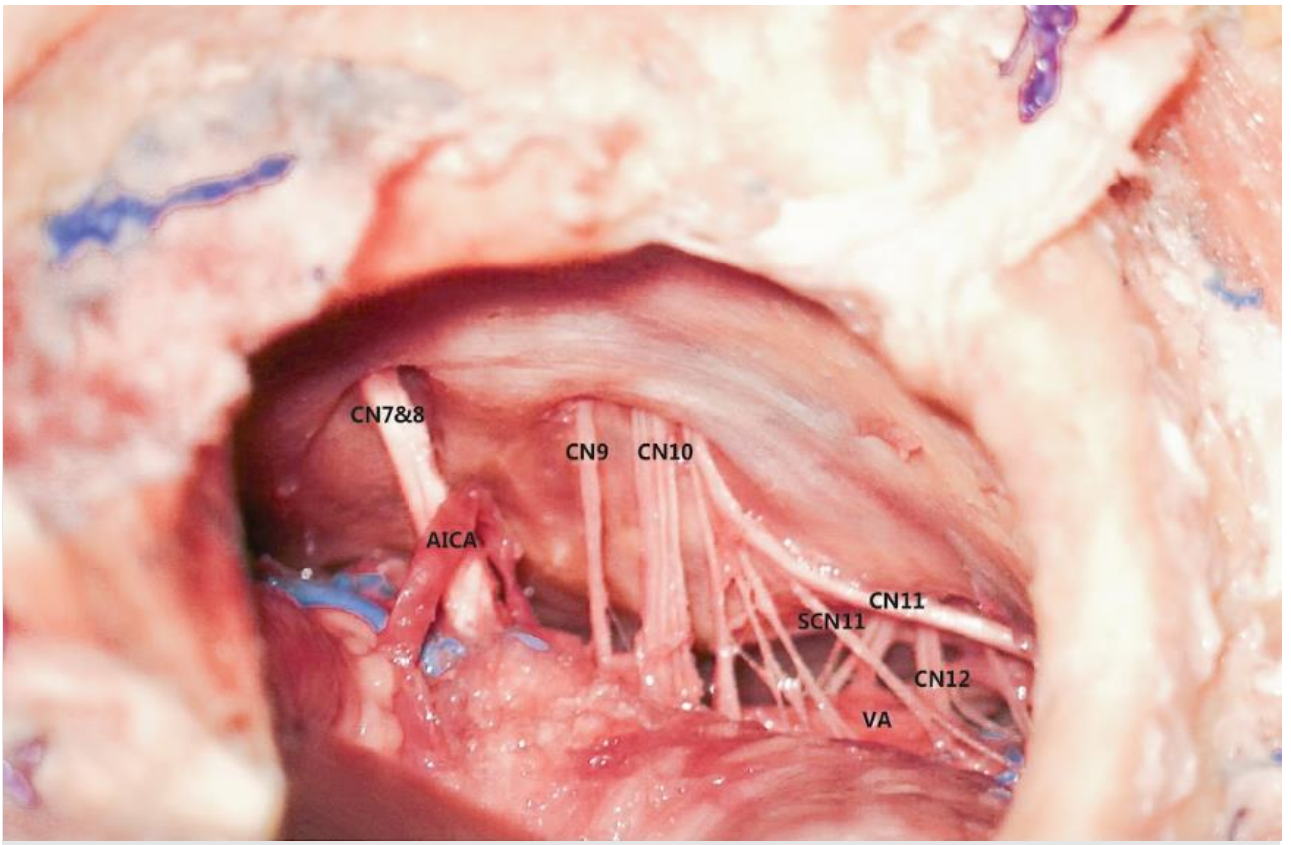
SPV = superior petrosal vein

IAC = internal auditory canal



The inferolateral surface of the cerebellum was retracted to expose the inferior neurovascular bundle of the cerebellopontine angle. Exposing the infralateral portion of the cerebellopontine angle.

AICA = anterior inferior cerebellar artery
CN10 = vagus nerve
CN9 = glossopharyngeal nerve
CN11 = accessory nerve
CN12 = hypoglossal nerve
CN7&8 = facial and vestibulocochlear nerves
VA = vertebral artery
SCN11 = spinal branch of accessory nerve
PICA = posterior inferior cerebellar artery



The inferolateral surface of the cerebellum was retracted to expose the inferior neurovascular bundle of the cerebellopontine angle. Exposing the infralateral position of the cerebellopontine angle.

AICA = anterior inferior cerebellar artery
CN10 = vagus nerve
CN9 = glossopharyngeal nerve
CN11 = accessory nerve
CN12 = hypoglossal nerve
CN7&8 = facial and vestibulocochlear nerves
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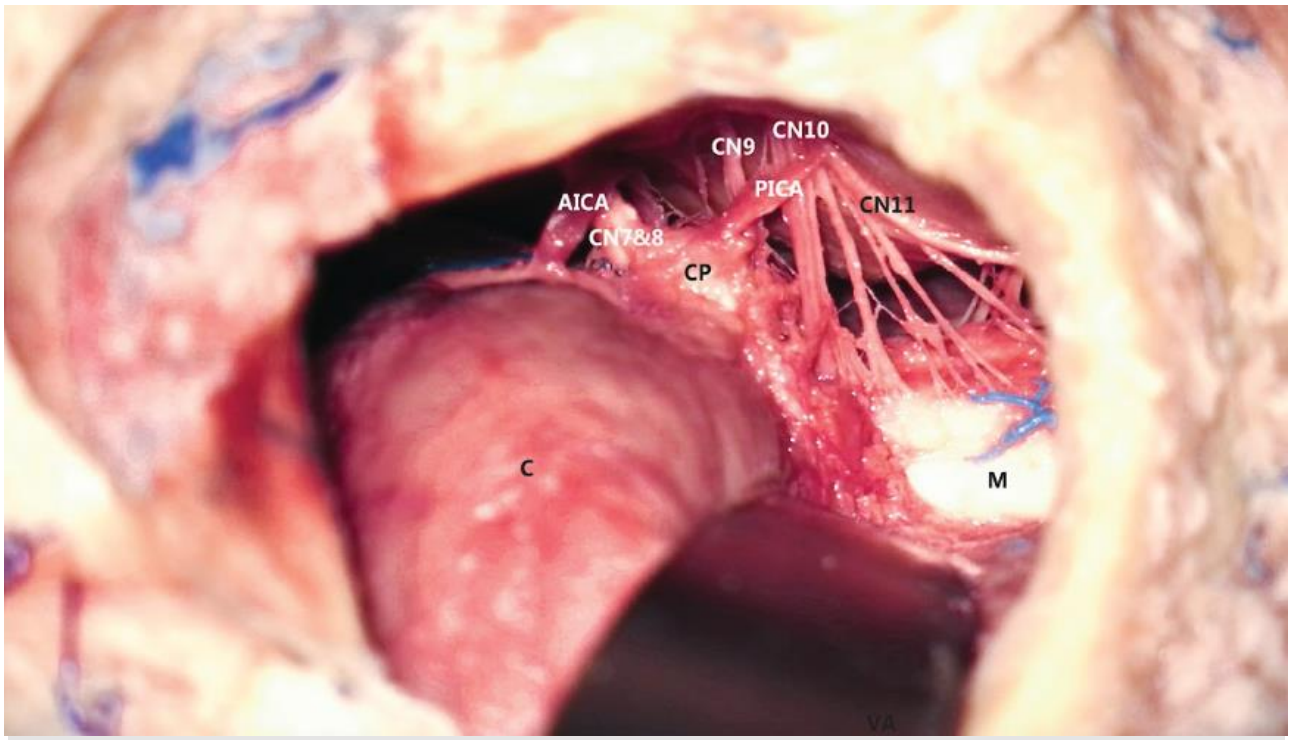
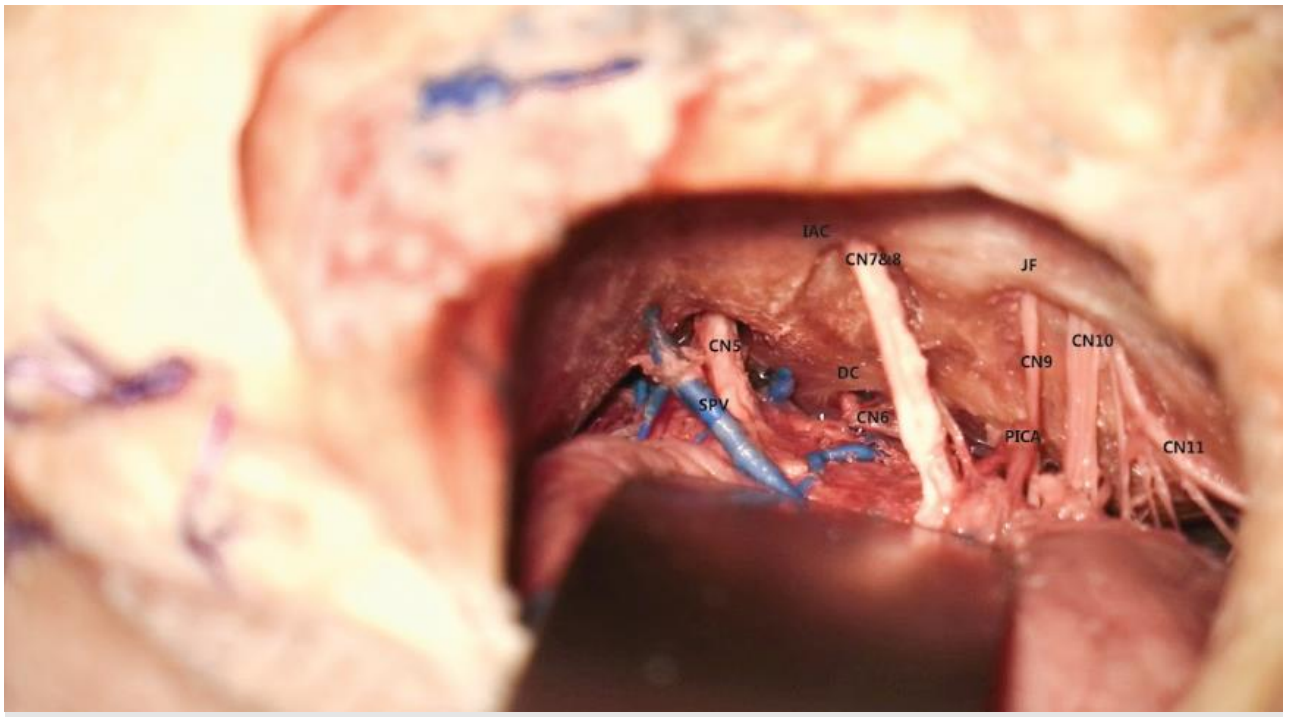


Exposure of the inferior neurovascular bundle of the cerebellopontine angle.

PICA = posterior inferior cerebellar artery
CN9 = glossopharyngeal nerve
CN11 = accessory nerve
CN7&8 = facial and vestibulocochlear nerves
CN11 = accessory
C = cerebellum
CP = choroid plexus
AICA = anterior inferior cerebellar artery
M = medulla



Retraction placed over the lateral surface of the cerebellum. Exposing the inferolateral position of the cerebellopontine angle.

PICA = posterior inferior cerebellar artery

CN9 = glossopharyngeal nerve

CN11 = accessory nerve

CN7&8 = facial and vestibulocochlear nerves

CN11 = accessory

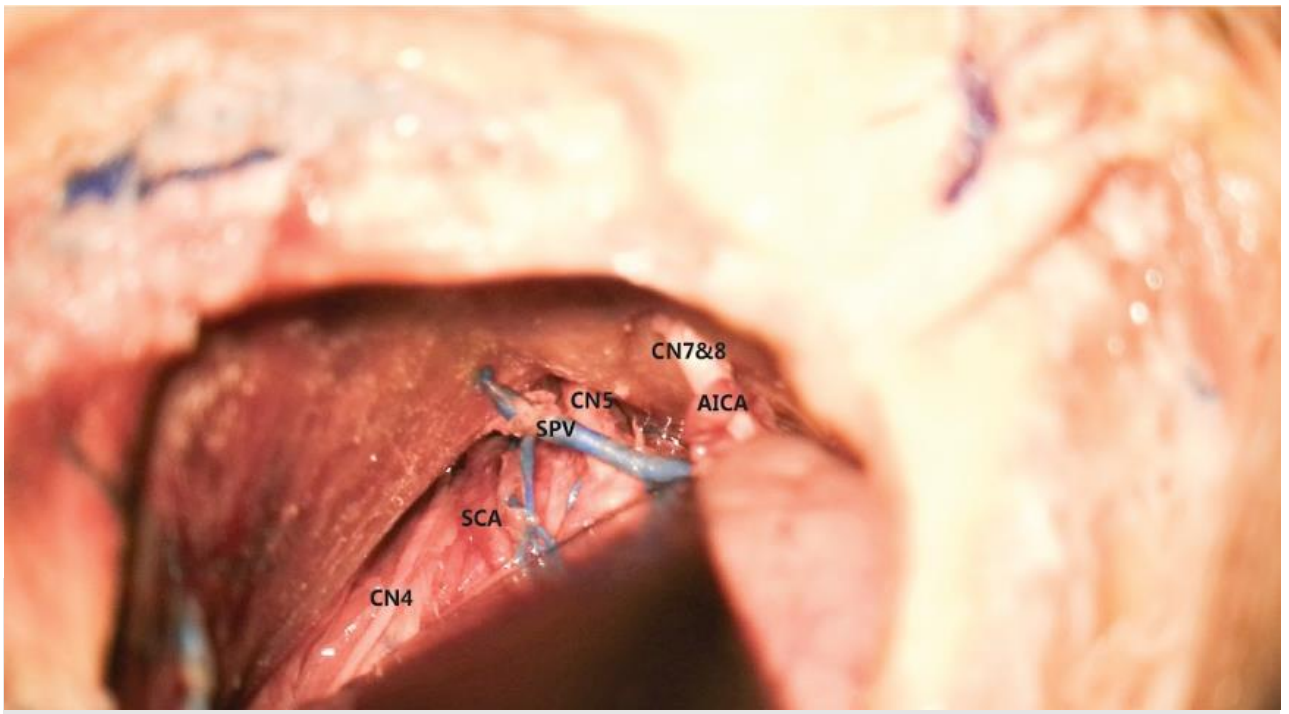
SPV = superior petrosal vein

IAC = internal auditory canal

JF = jugular foramen

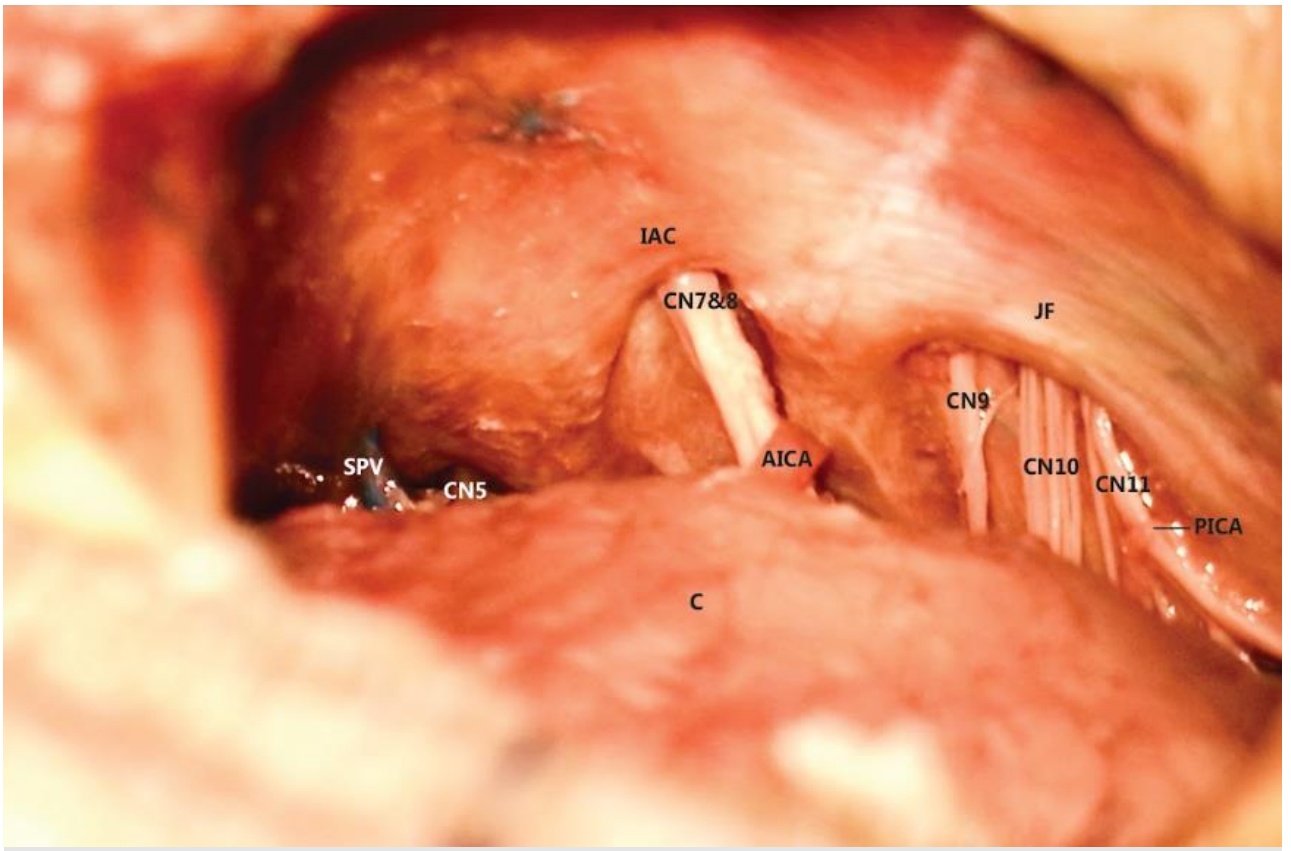
DC = Dorello's canal

CN6 = Abducent nerve



Exposure of the superior compartment of the cerebellopontine angle.

SCA = superior cerebellar artery
AICA = anterior inferior cerebellar artery
CN7&8 = facial and vestibulocochlear nerves
SPV = superior petrosal vein
CN6 = abducens nerve
CN4 = trochlear nerve



Exposure of the superior compartment of the cerebellopontine angle.

IAC = internal auditory canal

C = cerebellum

AICA = anterior inferior cerebellar artery

CN7&8 = facial and vestibulocochlear nerves

CN5 = Trigeminal nerve

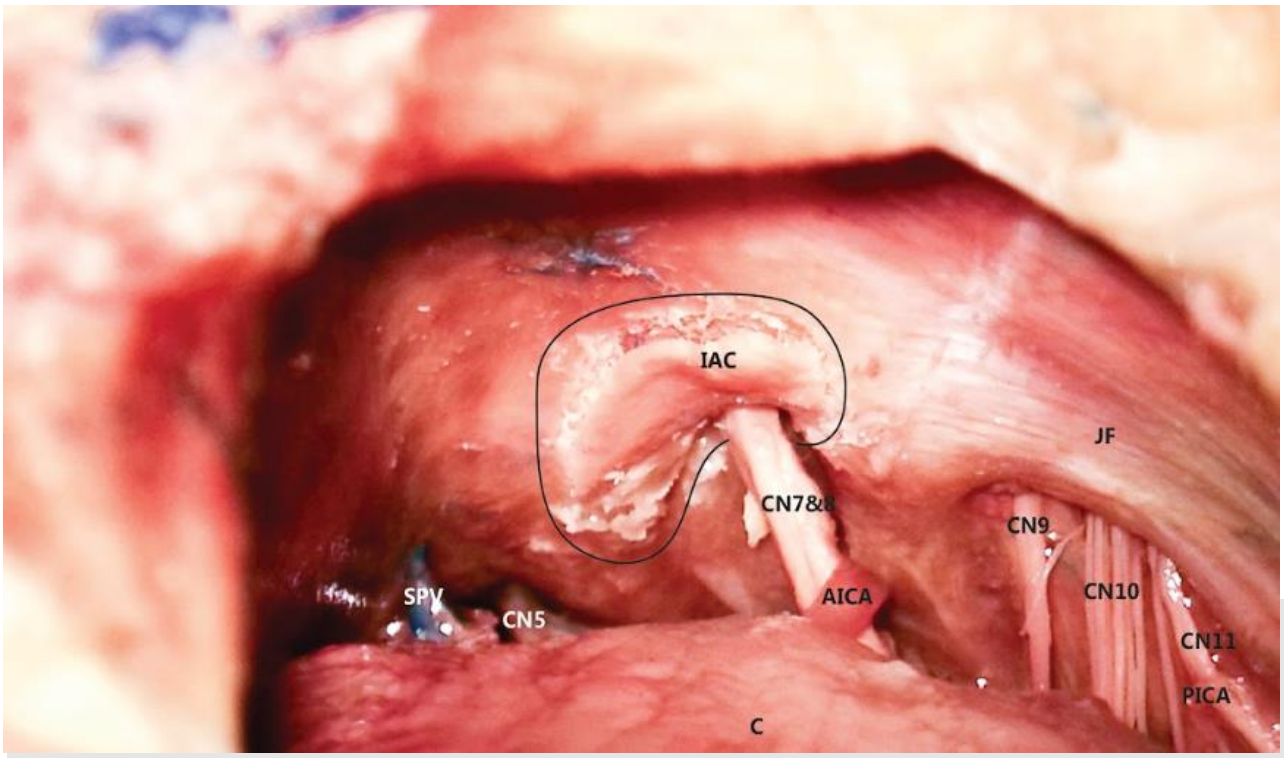
PICA = posterior inferior cerebellar artery

SPV = superior petrosal vein

CN9 = glossopharyngeal nerve

CN10 = vagus nerve

CN11 = accessory nerve



The dura over the IAC was incised.

IAC = internal auditory canal

C = cerebellum

AICA = anterior inferior cerebellar artery

CN7&8 = facial and vestibulocochlear nerves

CN5 = Trigeminal nerve

PICA = posterior inferior cerebellar artery

SPV = superior petrosal vein

CN9 = glossopharyngeal nerve

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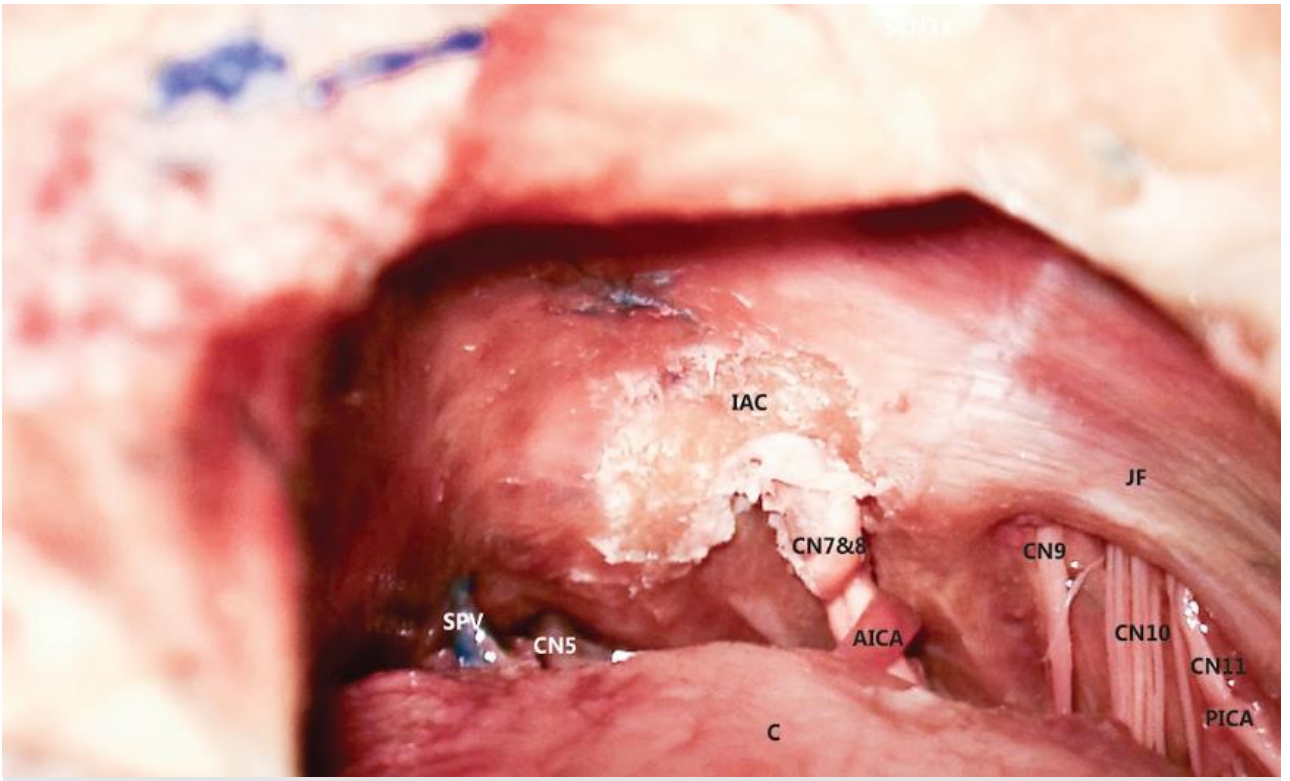

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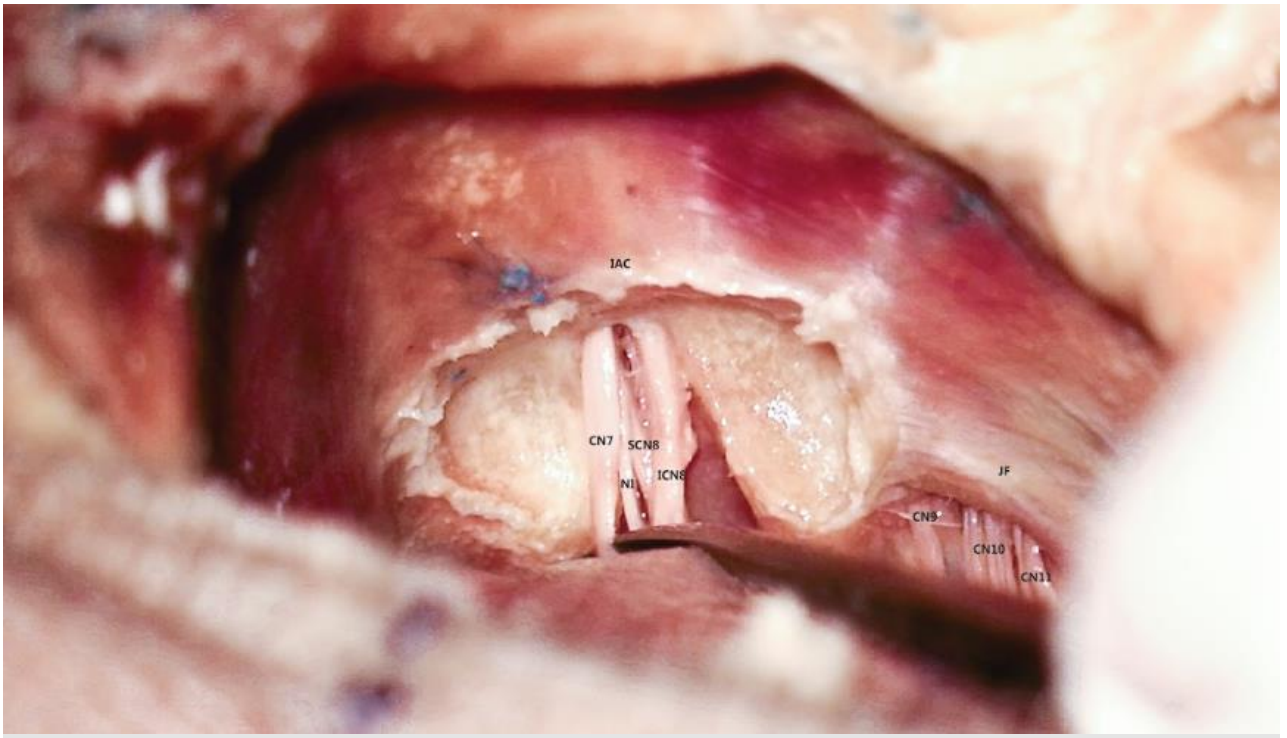
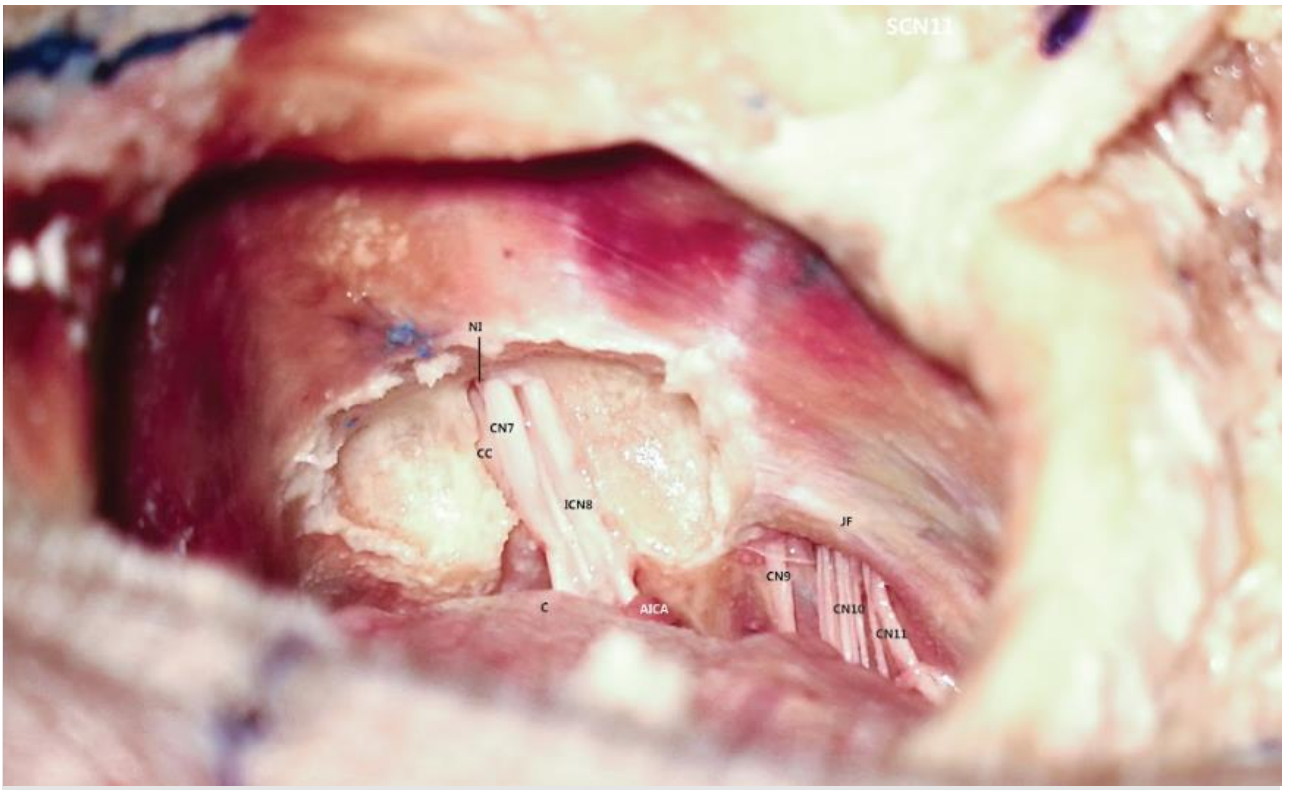


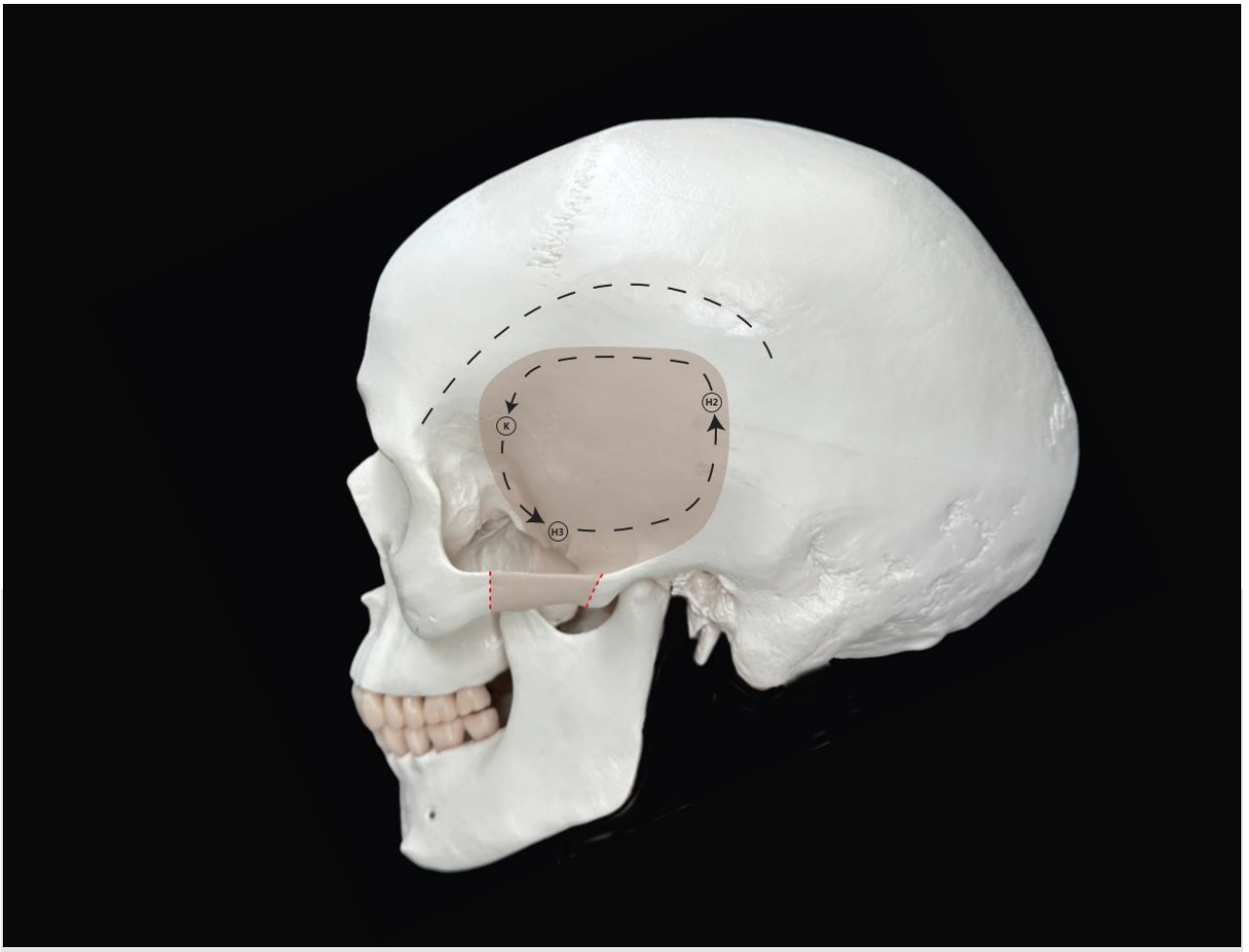
The posterior wall of the IAC was removed.

IAC = internal auditory canal
CN7 = facial nerve
CN9 = glossopharyngeal nerve
CN10 = vagus nerve
CN11 = accessory nerve
NI = nervus intermedius
SCN8 = superior vestibular nerve
JF = jugular foramen



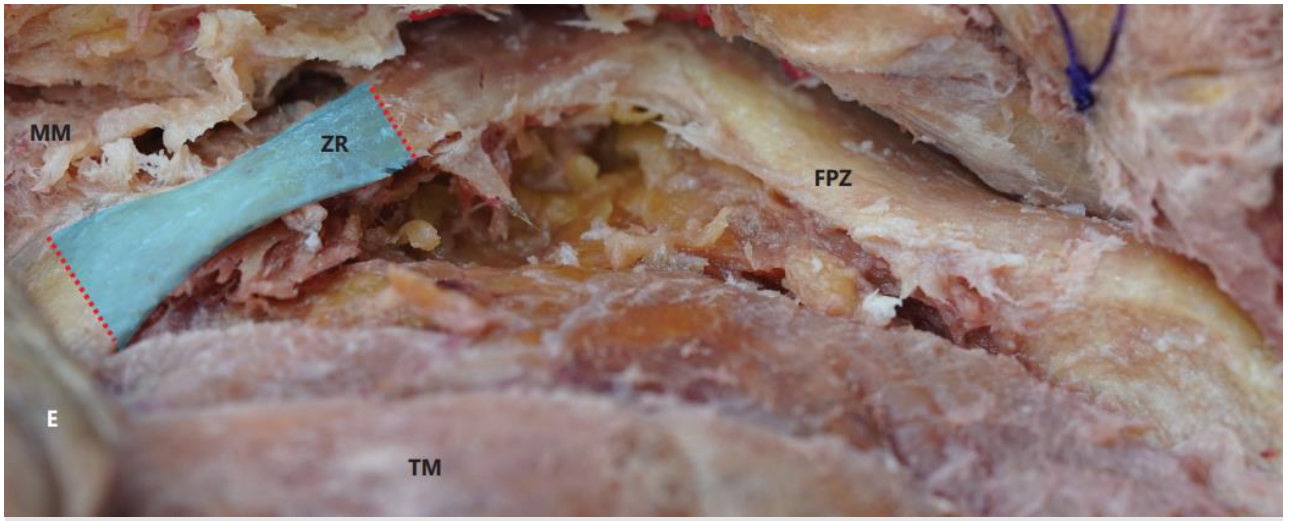
The posterior wall of the IAC was drilled.

IAC = internal auditory canal
C = cerebellum
AICA = anterior inferior cerebellar artery
CN7 = facial nerve
CN9 = glossopharyngeal nerve
CN10 = vagus nerve
CN11 = accessory nerve
CC = cochlear branch of the facial nerve
NI = nervus intermedius



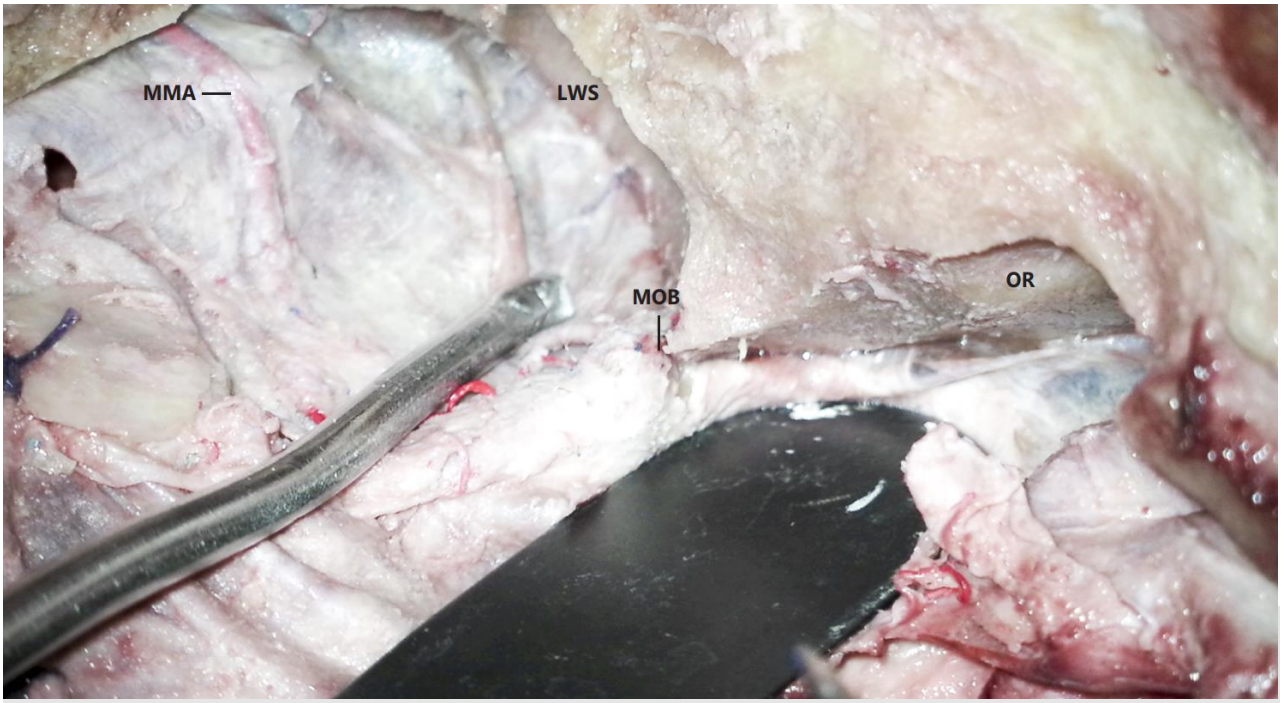
Craniotomy - skull module

K = keyhole
H2 = second burr hole
Red dashed line = zygomatic cutting
H3 = third burr hole



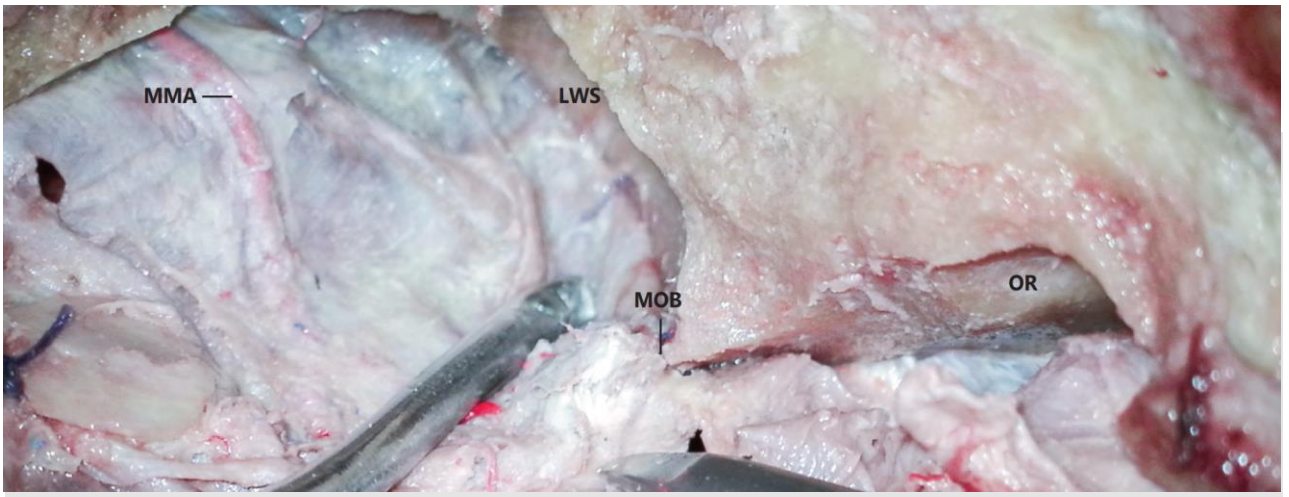
Zygomatic osteotomy location.

TM = temporalis muscle
MM = masseter muscle
ZR = zygomatic root
FPZ = frontal process of zygoma
E = ear



Extradural anterior clinoidectomy.
Orbitotemporal periosteal dissection and superior orbital fissure exposure.
Note the exposed vascular bundle of the meningo-orbital band

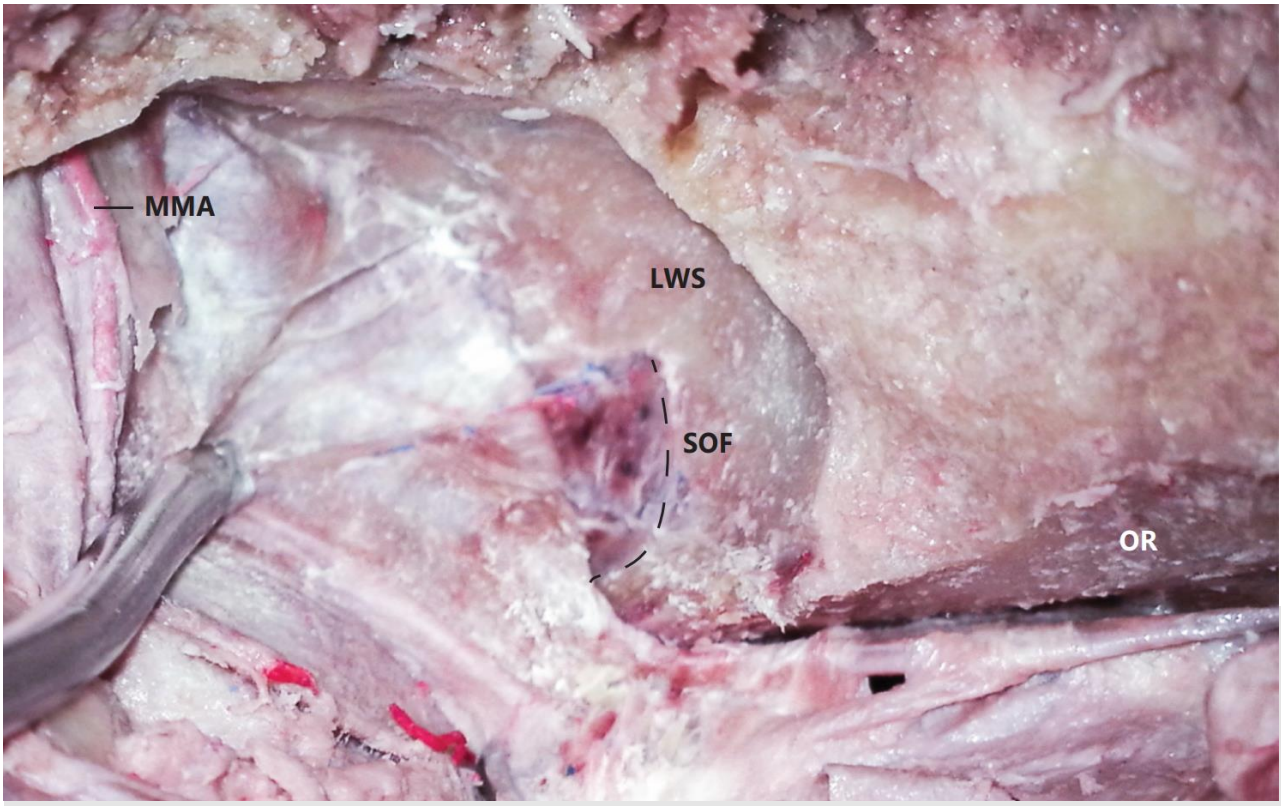
OR = orbital roof
LWS = lesser wing of sphenoid
MOB = meningo-orbital band with the vascular bundle
MMA = middle meningeal artery



Extradural anterior clinodectomy.

I. orbitotemporal periosteal dissection and release of the meningo-orbital band and superior orbital ssure exposure.

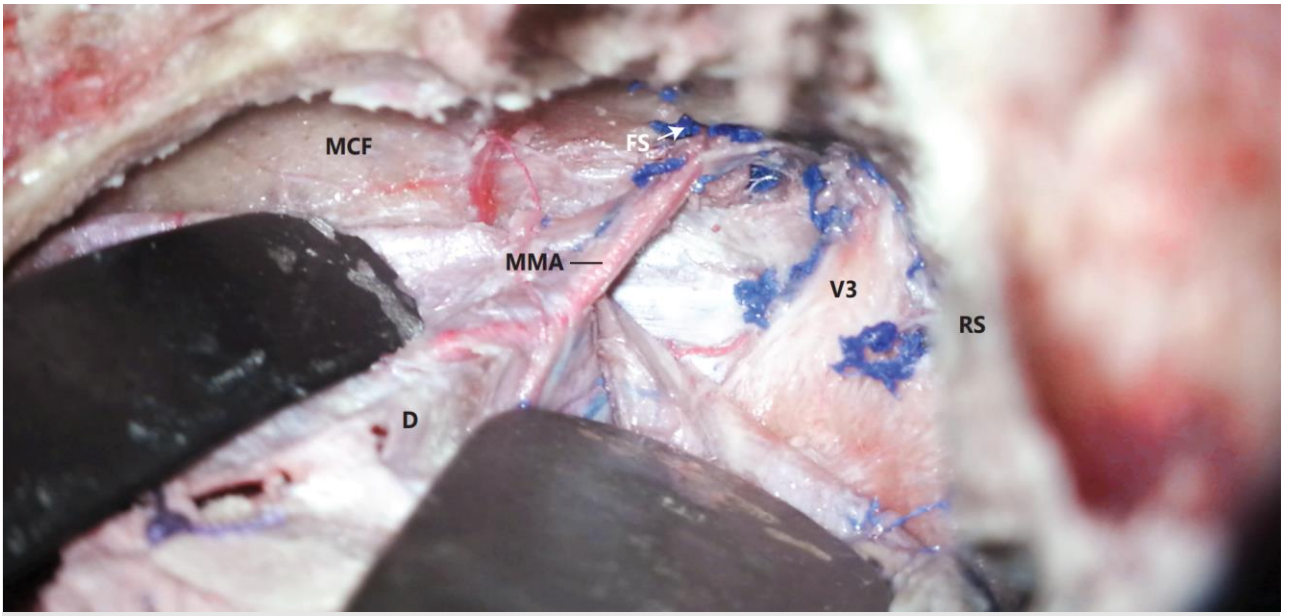
OR = orbital roof
LWS = lesser wing of sphenoid
MOB = meningo-orbital band with the vascular bundle
MMA = middle meningeal artery



Extradural anterior clinoidectomy.

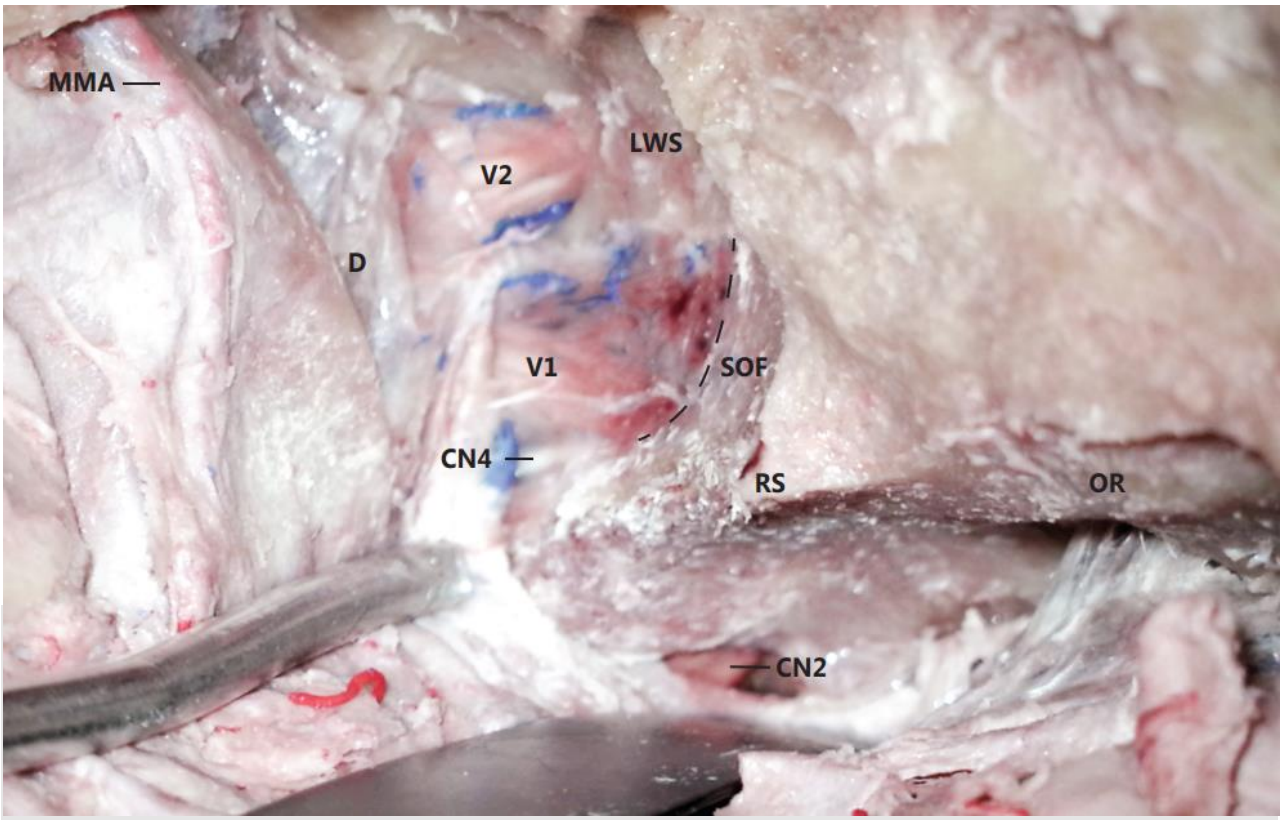
II. Orbitotemporal periosteal dissection and superior orbital fissure exposure

OR = orbital roof
LWS = lesser wing of sphenoid
SOF = superior orbital fissure
MMA = middle meningeal artery



Extradural anterior clinoidectomy.
Orbitotemporal periosteal dissection.

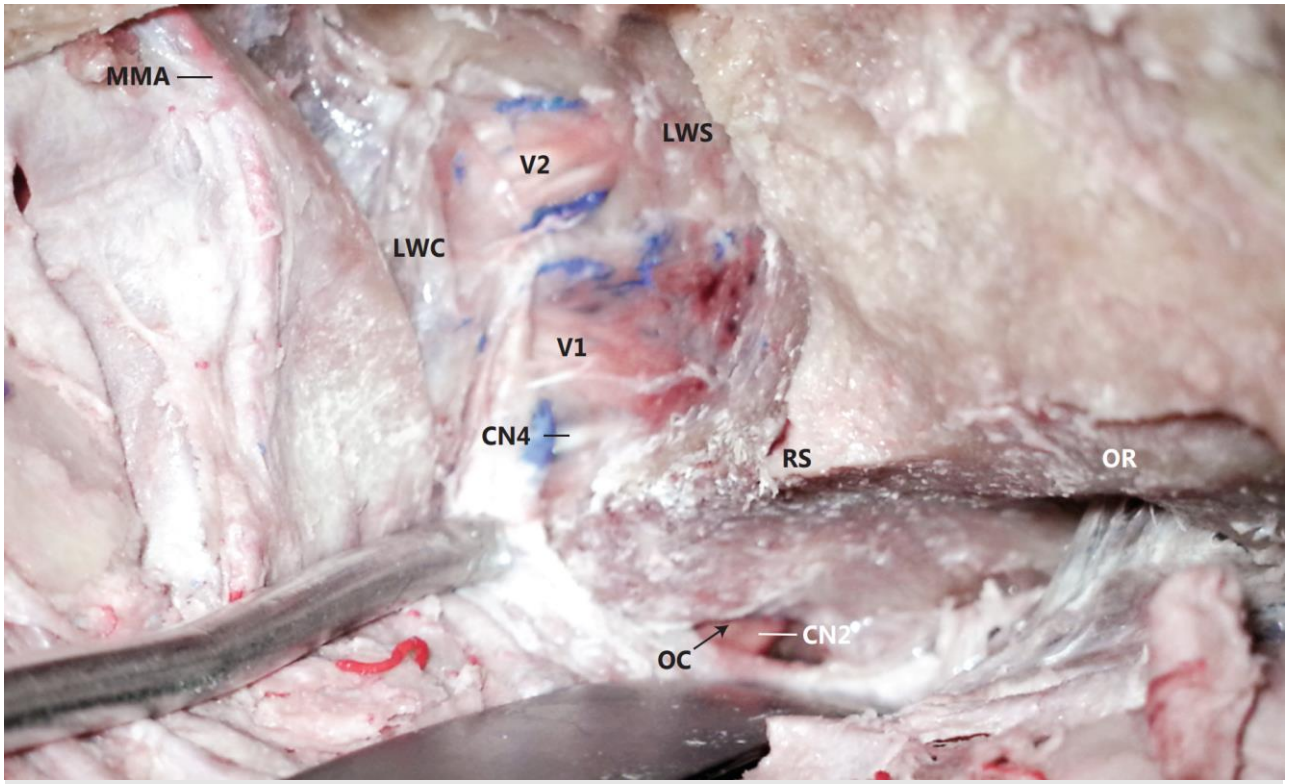
D = dura matter overlying lateral wall of cavernous sinus
MCF = middle cranial fossa
V3 = mandibular branch of trigeminal schwannoma
RS = ridge of sphenoid
MMA = middle meningeal artery
FS = foramen spinosum



Extradural anterior clinoidectomy.

III. Orbitotemporal periosteal dissection and optic canal exposure.

SOF = superior orbital fissure
D = dura matter overlying lateral wall of cavernous sinus
V1 = ophthalmic branch of the trigeminal nerve
V2 = maxillary branch of the trigeminal nerve
CN 4 = trochlear nerve
CN2 = optic nerve
OR = orbital roof
LWS = lesser wing of sphenoid
RS = ridge of sphenoid
MMA = middle meningeal artery



Extradural anterior clinoidectomy.

III. Orbitotemporal periosteal dissection and optic canal exposure.

LWS = lesser wing of sphenoid

RS = ridge of sphenoid

MMA = middle meningeal artery

V1 = ophthalmic branch of the trigeminal nerve

V2 = maxillary branch of the trigeminal nerve

CN 4 = trochlear nerve

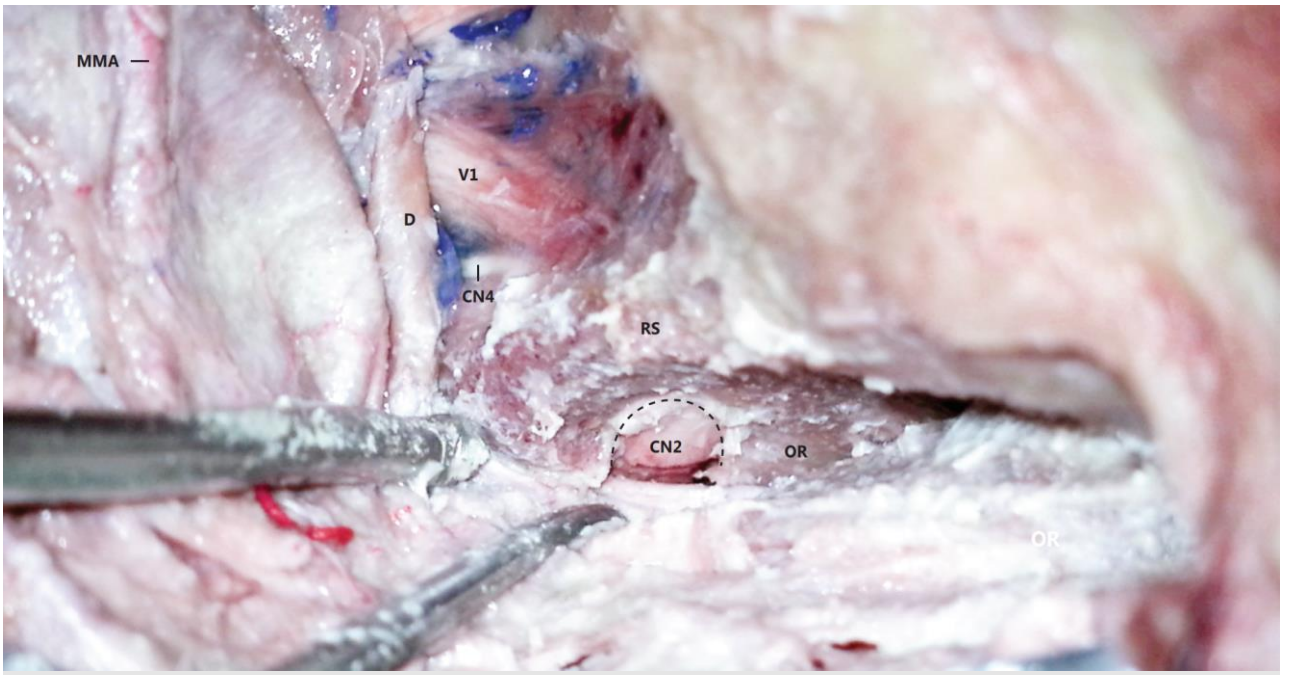
CN2 = optic nerve

OR = orbital roof

D = dura matter overlying lateral wall of cavernous sinus

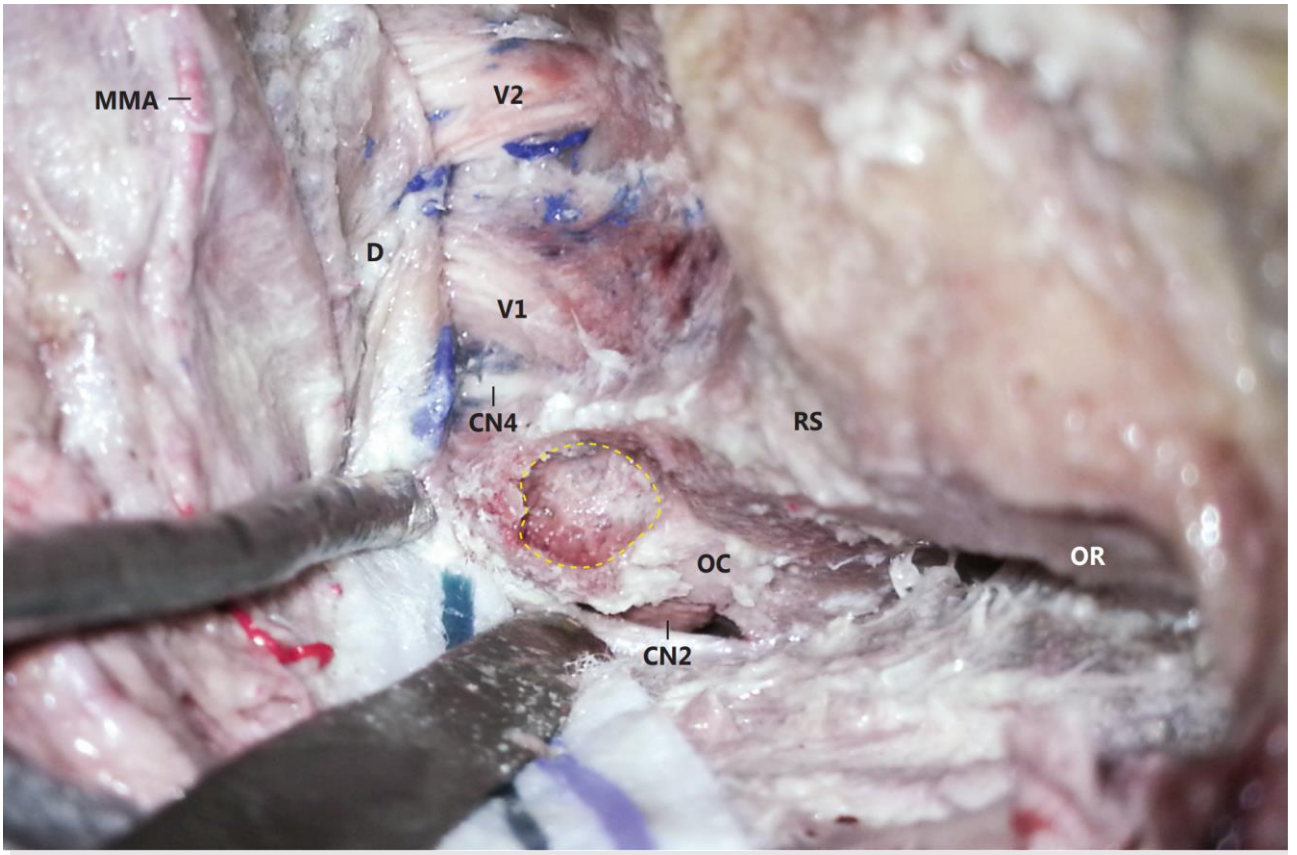
SOF = superior orbital fissure

OC = optical canal



Extradural anterior clinoidectomy.
IV. Enroofing of the optic canal.

V1 = ophthalmic branch of the trigeminal nerve
CN4 = trochlear nerve
RS = ridge of sphenoid
MMA = middle meningeal artery
D = dura matter overlying lateral wall of cavernous sinus
CN2 = optic nerve



Extradural anterior clinoidectomy.
V. Drilling of the base of anterior clinoid.

OC = optic canal

Black dashed line = foramen rotondum

V1 = ophthalmic branch of the trigeminal nerve

V2 = maxillary branch of the trigeminal nerve

CN 4 = trochlear nerve

CN2 = optic nerve

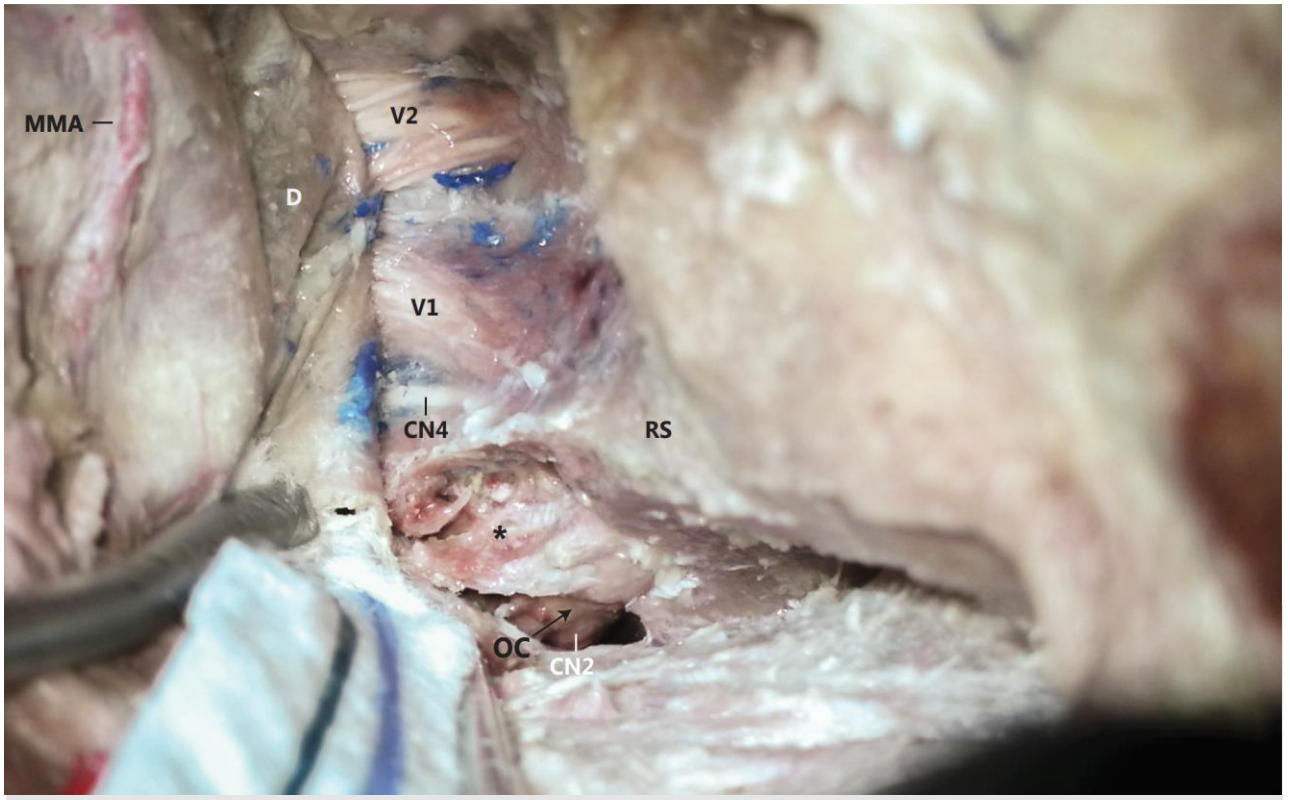
OR = orbital roof

RS = ridge of sphenoid

MMA = middle meningeal artery

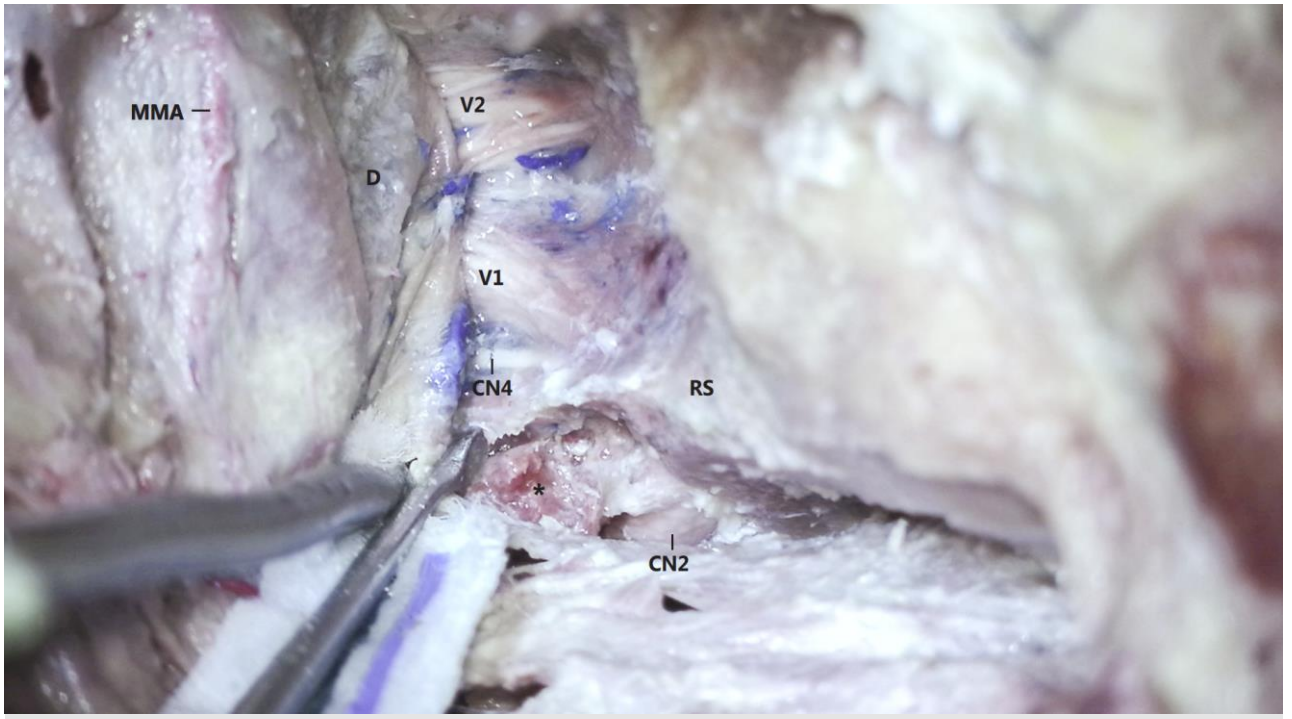
D = dura matter overlying lateral wall of cavernous sinus

Yellow dashed line = drilling of anterior clinoid process



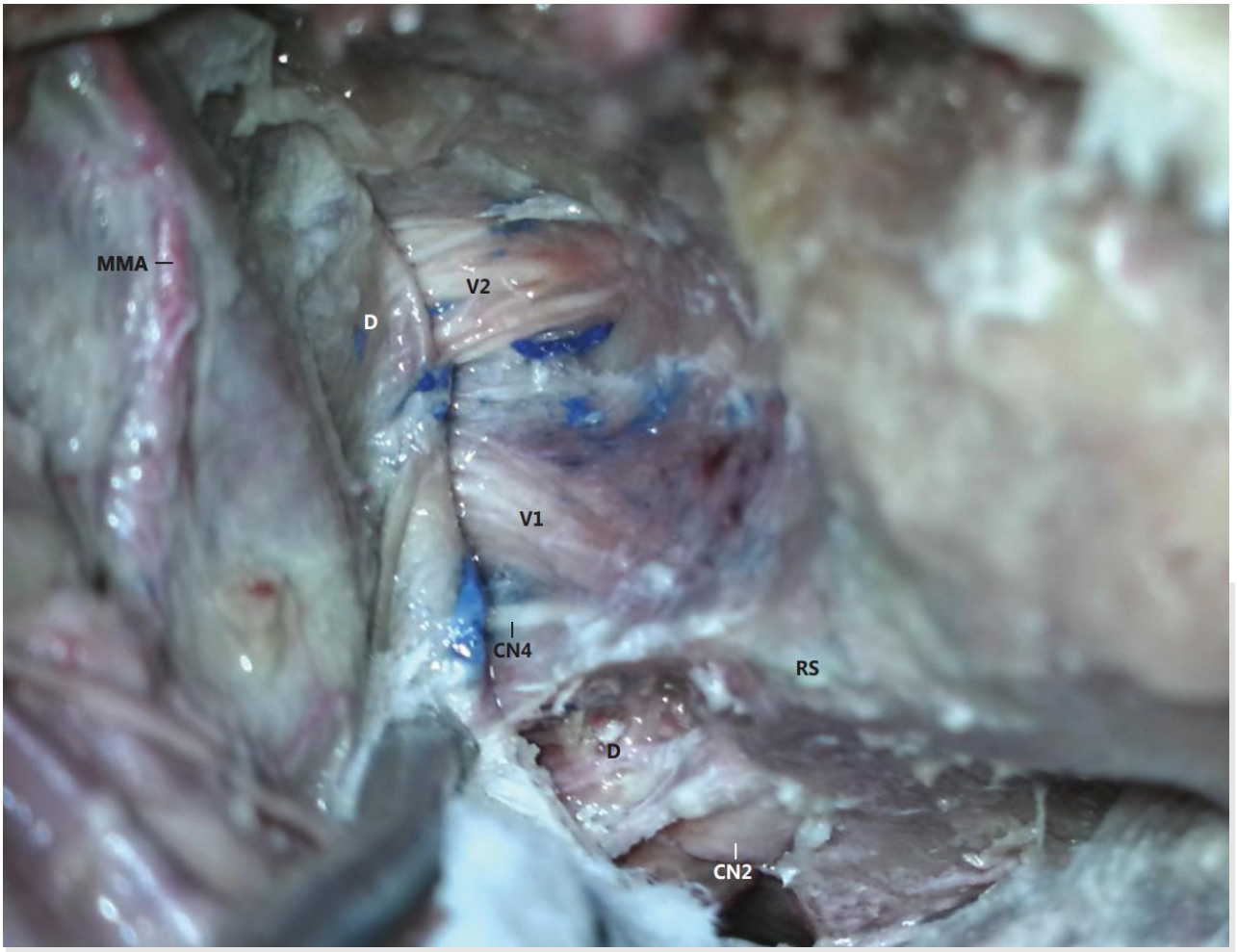
Extradural anterior clinoidectomy.
VI. Coring of the clinoid = asterisk

V1 = ophthalmic branch of the trigeminal nerve
V2 = maxillary branch of the trigeminal nerve
MMA = middle meningeal artery
D = dura matter overlying lateral wall of cavernous sinus
CN 4 = trochlear nerve
CN2 = optic nerve
OC = optic canal
RS = ridge of sphenoid



Extradural anterior clinoidectomy.
VII. Dissection of bone shell = asterisk

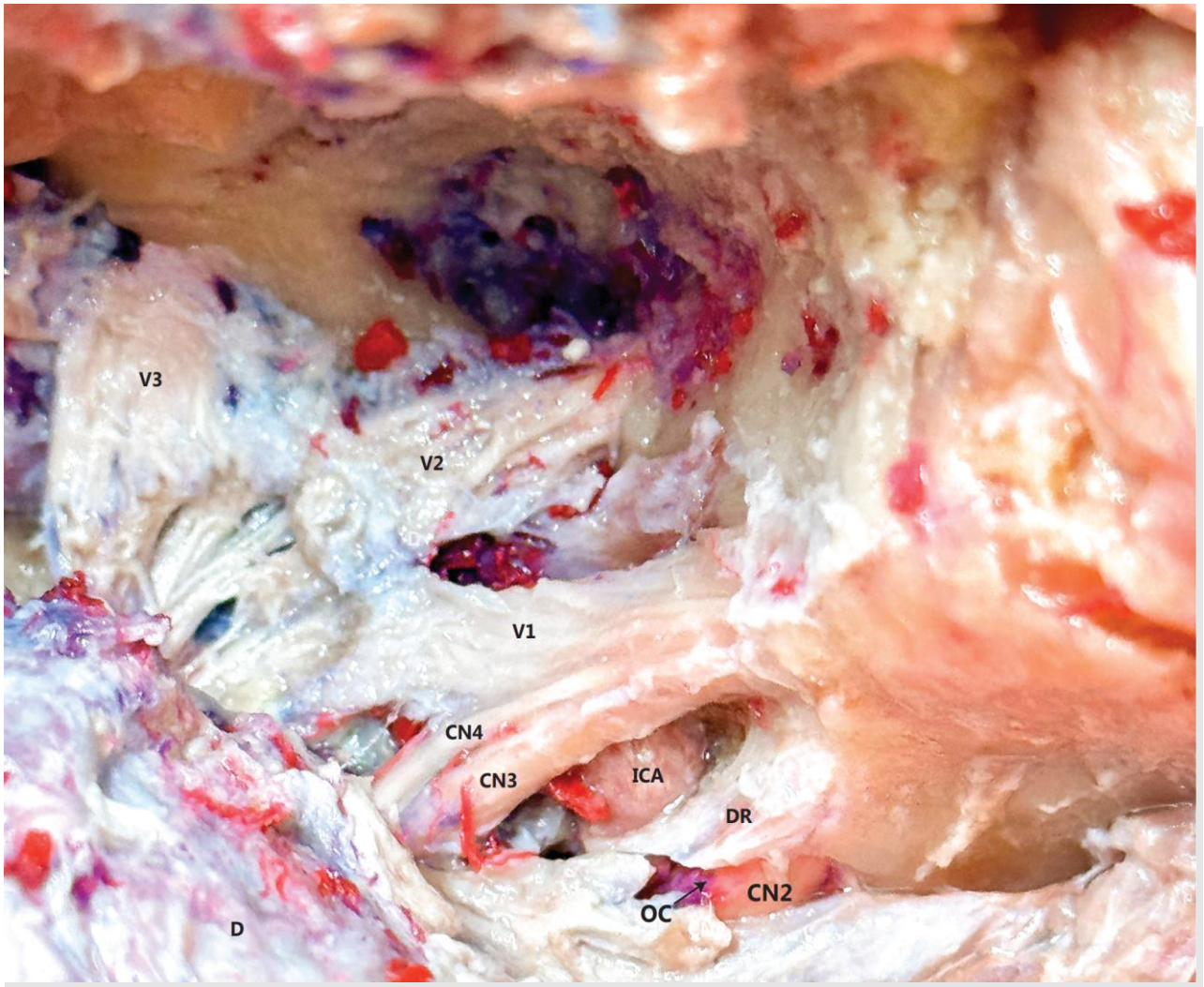
V1 = ophthalmic branch of the trigeminal nerve
V2 = maxillary branch of the trigeminal nerve
RS = ridge of sphenoid
MMA = middle meningeal artery
D = dura matter overlying lateral wall of cavernous sinus
CN 4 = trochlear nerve
CN2 = optic nerve
OR = orbital roof



Extradural anterior clinoidectomy.
VIII. Exoposure of the dura matter overlying the clinoidal segment of internal carotid artery (ICA).

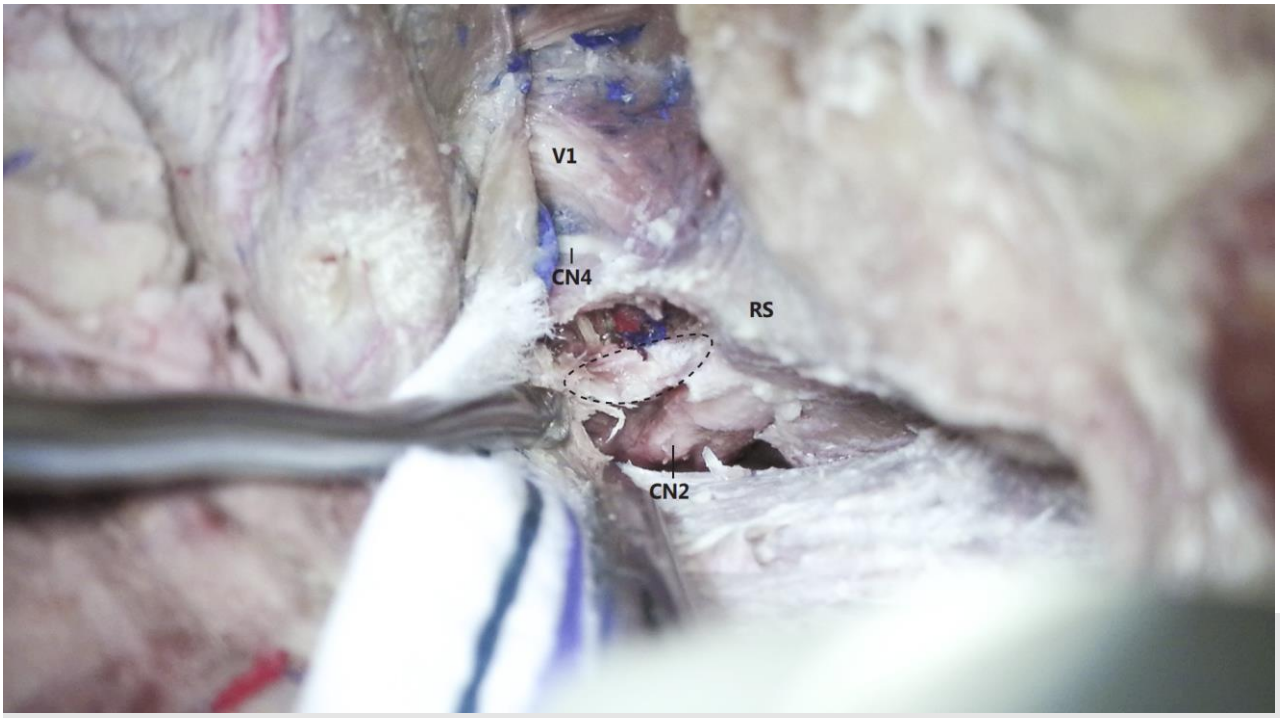
V1 = ophthalmic branch of the trigeminal nerve
V2 = maxillary branch of the trigeminal nerve

CN 4 = trochlear nerve
CN2 = optic nerve
OC = optic canal
RS = ridge of sphenoid
MMA = middle meningeal artery
D = dura matter overlying lateral wall of cavernous sinus
D = dural ring



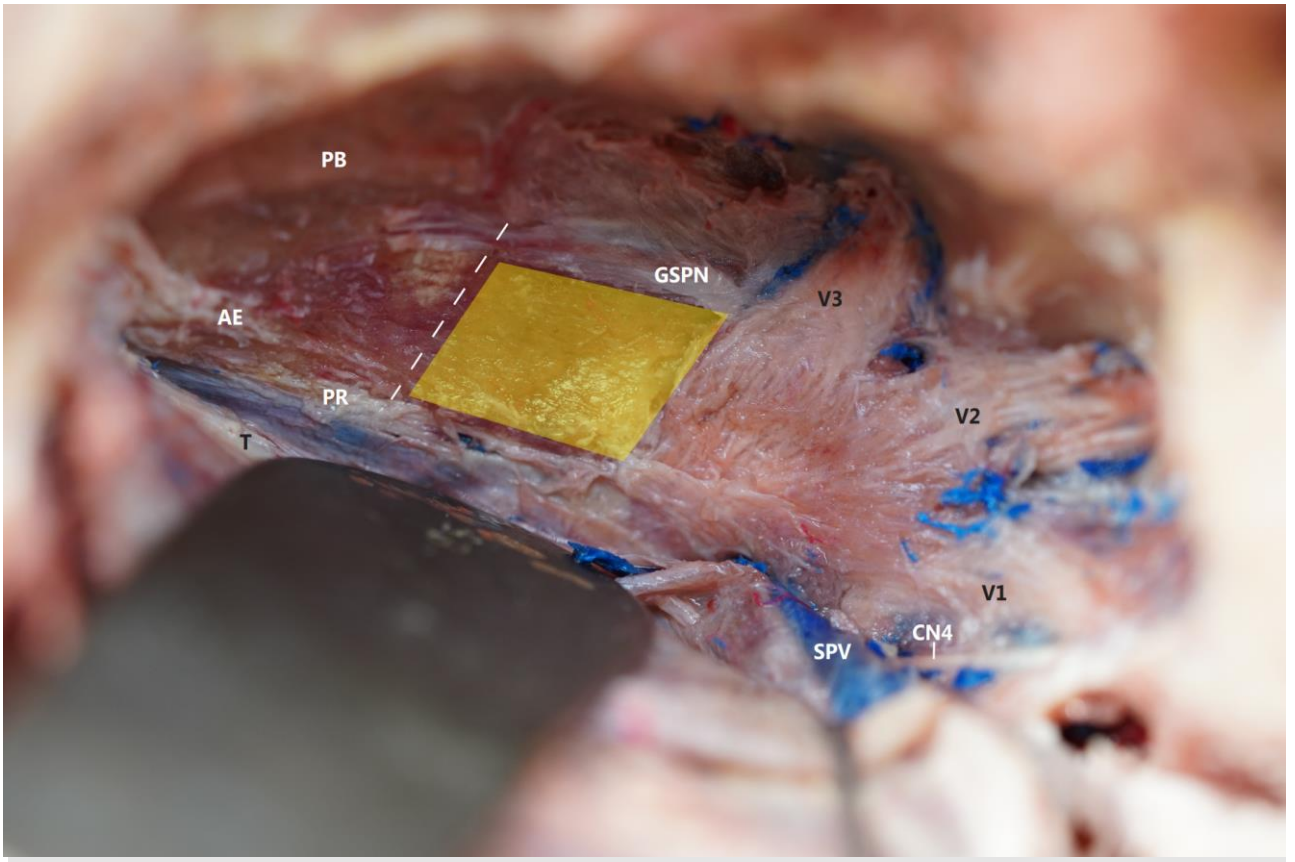
Extradural anterior clinoidectomy.
IX. Exposure of clinoidal segment of ICA

CN3 = oculomotor nerve
CN4 = trochlear nerve
D = dura mater
V1 = ophthalmoc branch of trigeminal nerve
V2 = maxillary branch of the trigeminal nerve
V3 = mandibular branch of the trigeminal nerve
CN2 = optic nerve
MCF = middle cranial fossa
OC = optic canal
ICA = clinoidal segment of ICA
DR = distal dural ring



Extradural anterior clinoidectomy.

Black dashed line = dural ring
V1 = ophthalmic branch of the trigeminal nerve
CN4 = trochlear nerve
CN2 = optic nerve
OR = orbital roof
OC = optic canal
RS = ridge of sphenoid



Petrosectomy
I. Yellow highlighted area demonstrate the appropriate location of the petrosectomy.

AE = Arcuate eminence

PR = Petrous bone ridge

White dashed line = lateral extent of the petrosectomy

V2 = maxillary branch of the trigeminal nerve

V3 = mandibular branch of the trigeminal nerve

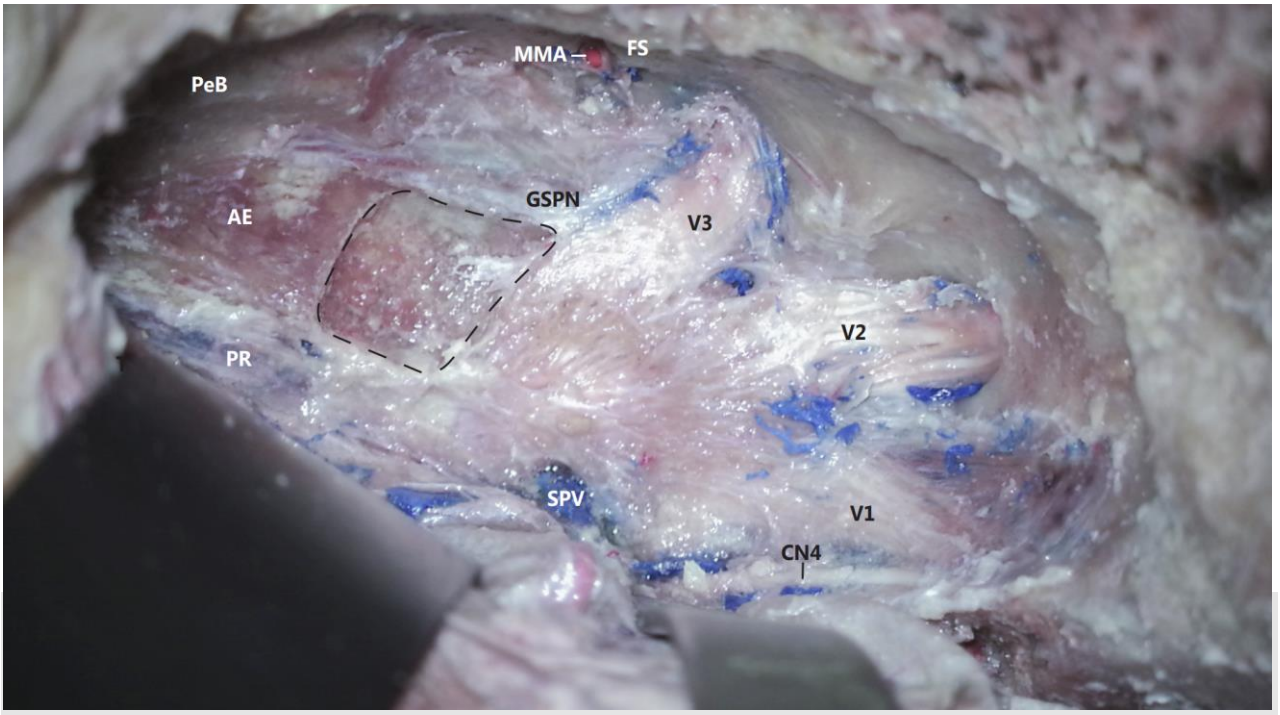
PB = petrosal bone

T = tentorium cerebelli

V1 = ophthalmic branch of the trigeminal nerve

SPV = superior petrosal vein

GSPN = greater supercial petrosal nerve

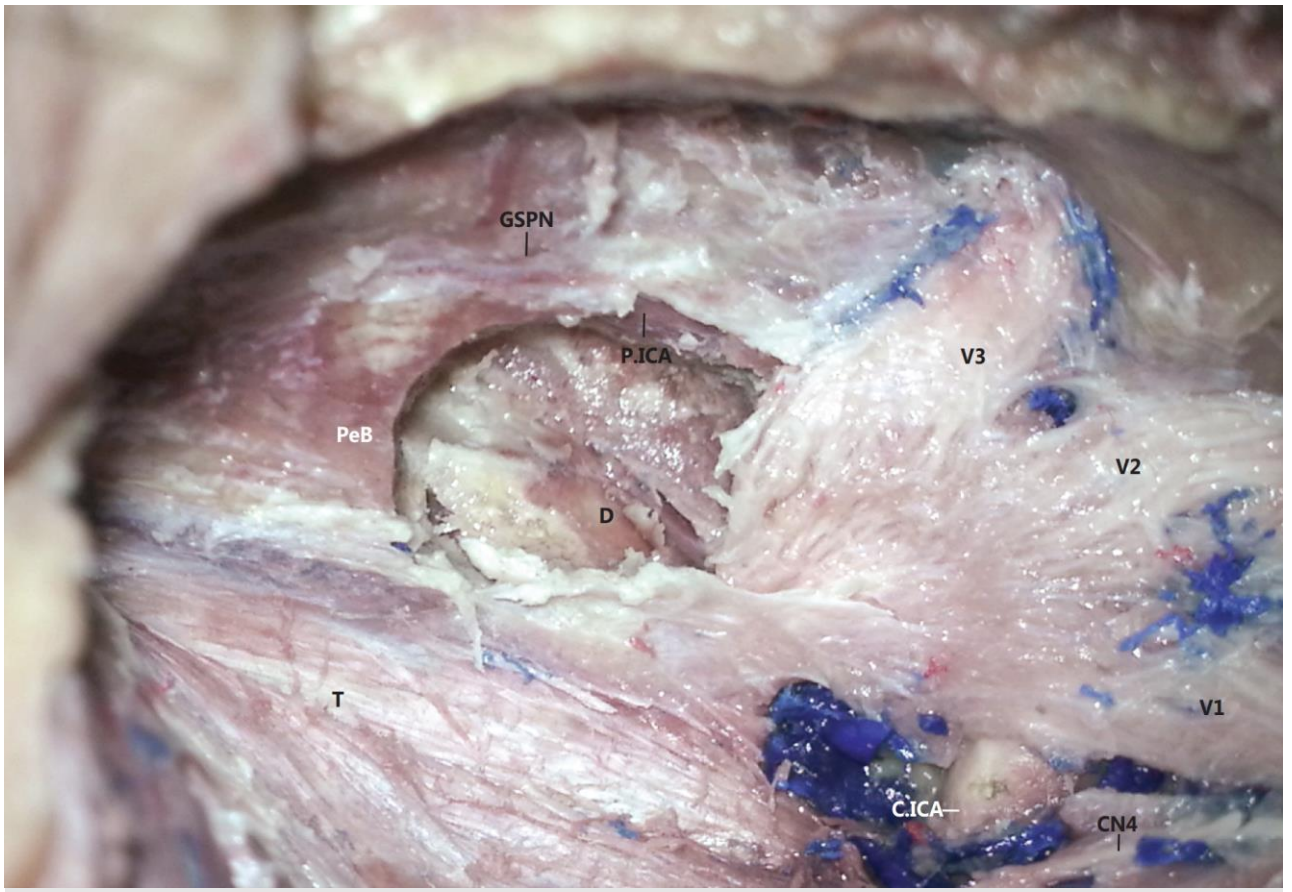


Petrosectomy
II. Area of drilling marked with black dashed line

AE: Arcuate eminence
PR: Petrous bone ridge
FS: Foramen spinosum

V1 = ophthalmic branch of the trigeminal nerve
V3 = maxillary branch of the trigeminal nerve
V3 = mandibular branch of the trigeminal nerve
CN 4 = trochlear nerve
SPV = superior pterosal vein

PeB = petrosal bone
MMA = middle meningeal artery
GSPN = greater supercial petrosal nerve

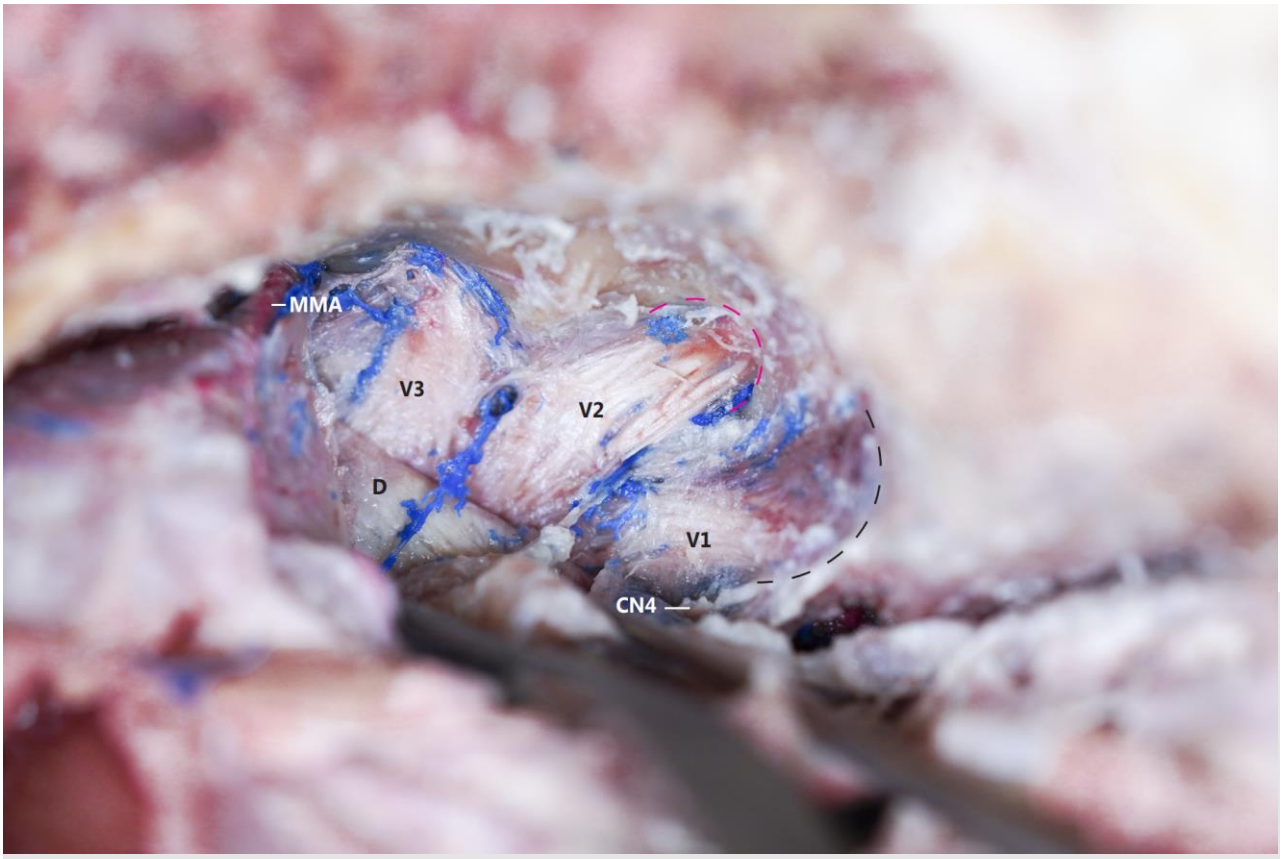


Petrosectomy
III. Exposure of the dura overlying the posterior fossa.

T = tentorium cerebelli
PB = petrosal bone

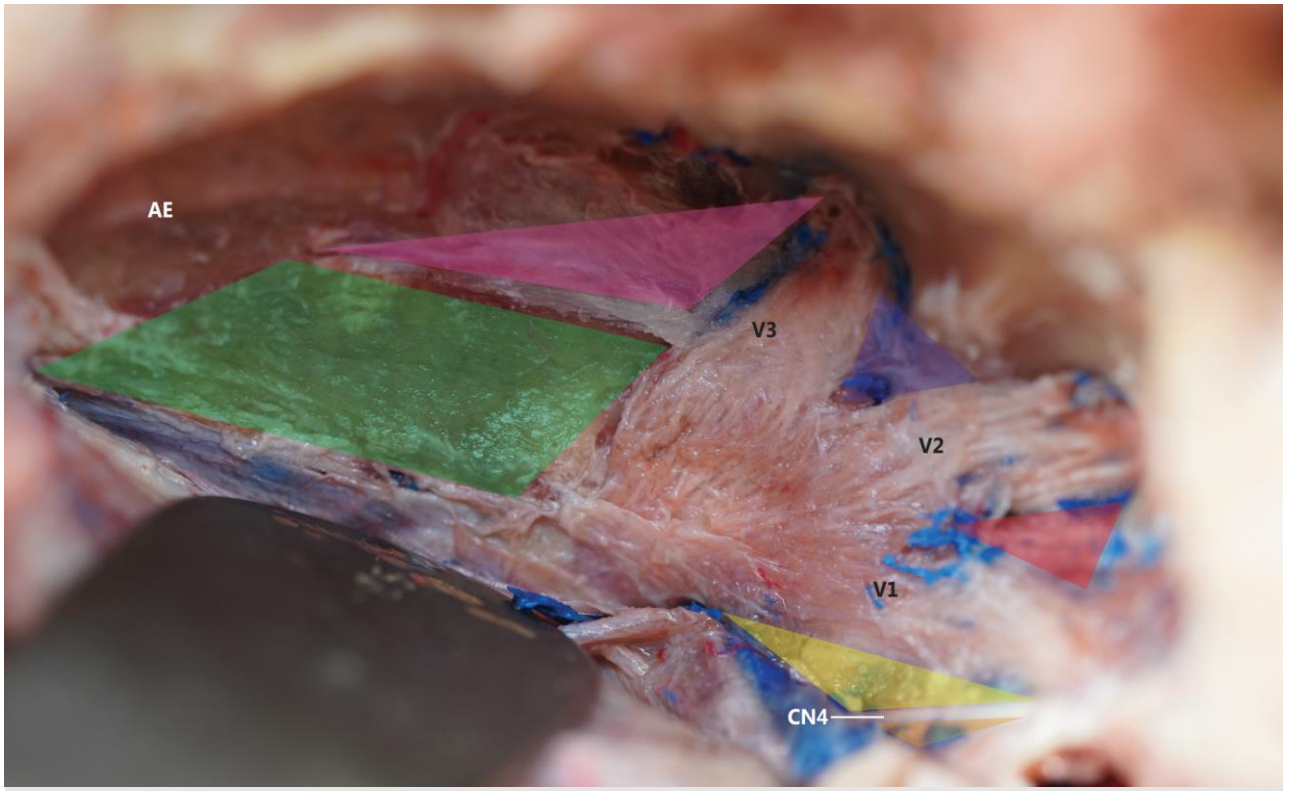
V1 = ophthalmic branch of the trigeminal nerve
V3 = maxillary branch of the trigeminal nerve
V3 = mandibular branch of the trigeminal nerve
CN 4 = trochlear nerve
D = dura overlying posterior fossa

GSPN = greater supercial petrosal nerve
C.ICA = cavernous segment of ICA
P.ICA = petrous segment of ICA



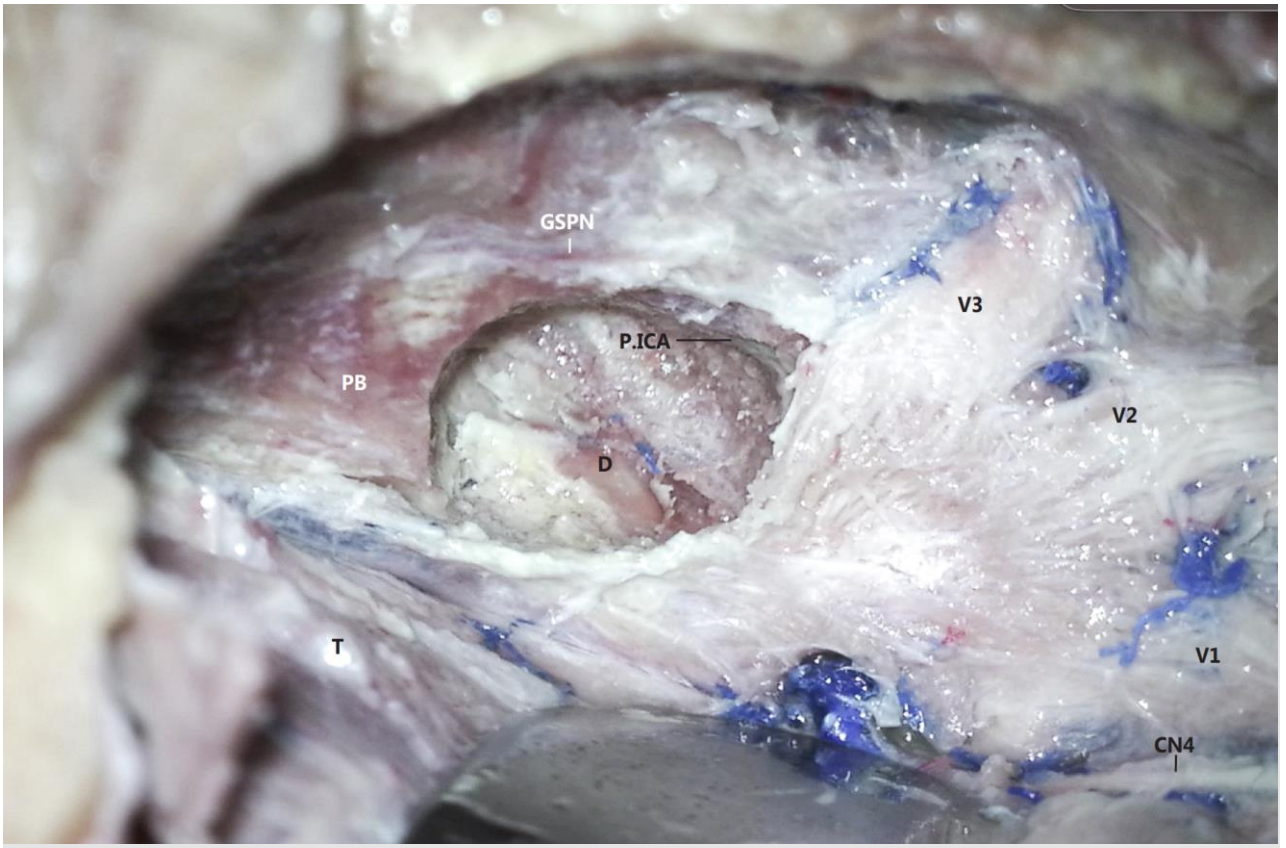
Black dashed line = superior orbital ssure
Pink dashed line = foramen rotundum

V1 = ophthalmic branch of the trigeminal nerve
V3 = maxillary branch of the trigeminal nerve
V3 = mandibular branch of the trigeminal nerve
CN4 = trochlear nerve
RS = ridge of sphenoid
D = dura matter overlying lateral wall of cavernous sinus



Supratrochlear triangle = orange shaded area
Anteriolateral triangle = blue shaded area
AE = Arcuate eminence
CN 4 = trochlear nerve

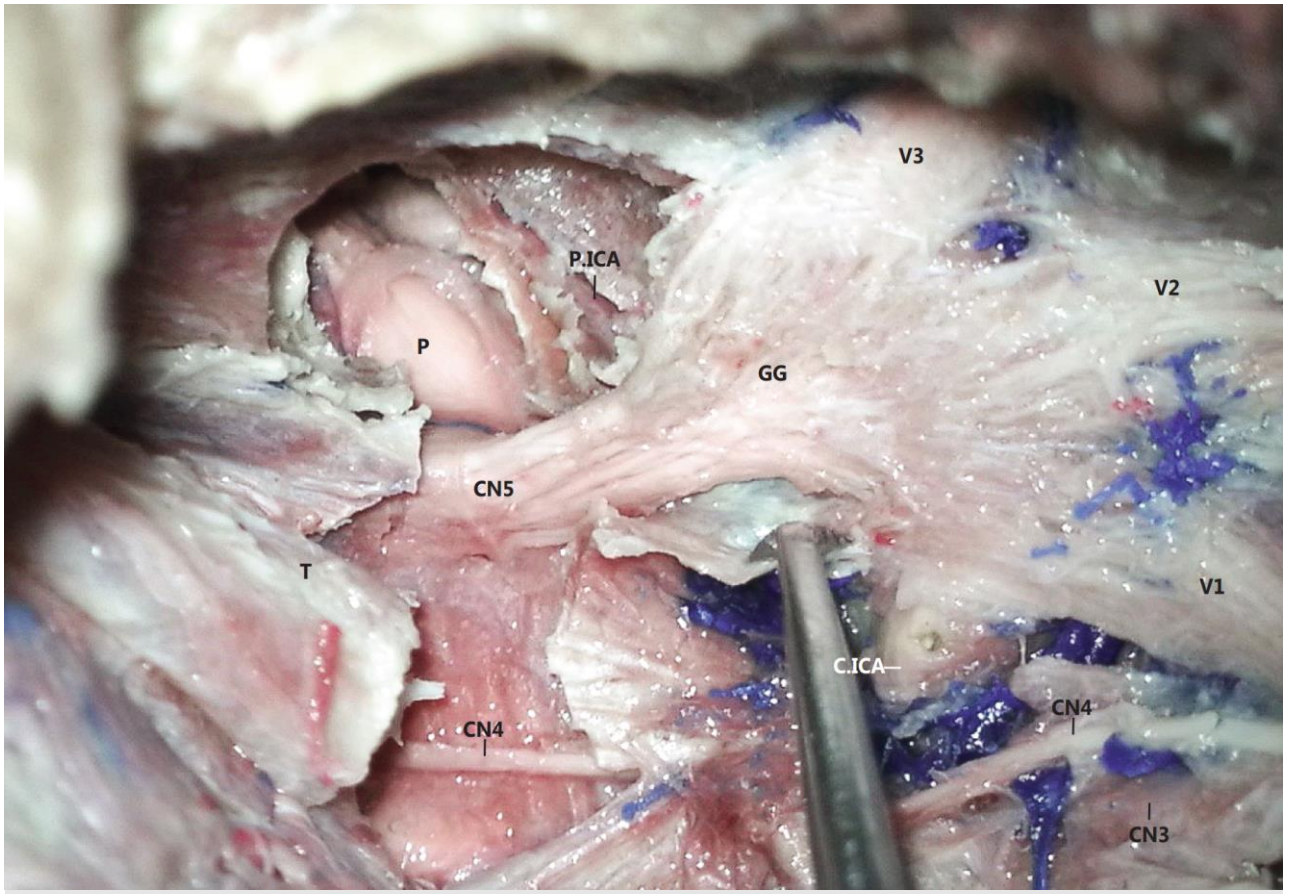
V1 = ophthalmic branch of the trigeminal nerve
V3 = maxillary branch of the trigeminal nerve
V3 = mandibular branch of the trigeminal nerve
Kawase posteromedial triangle = green shaded area
Glasscock posterolteral triangle = pink shaded area
Infratrochlear triangle = yellow shaded area



Extradural anterior clinoidectomy.
VIII. Exposure of the dura matter overlying the clinoidal segment of internal carotid artery (ICA).

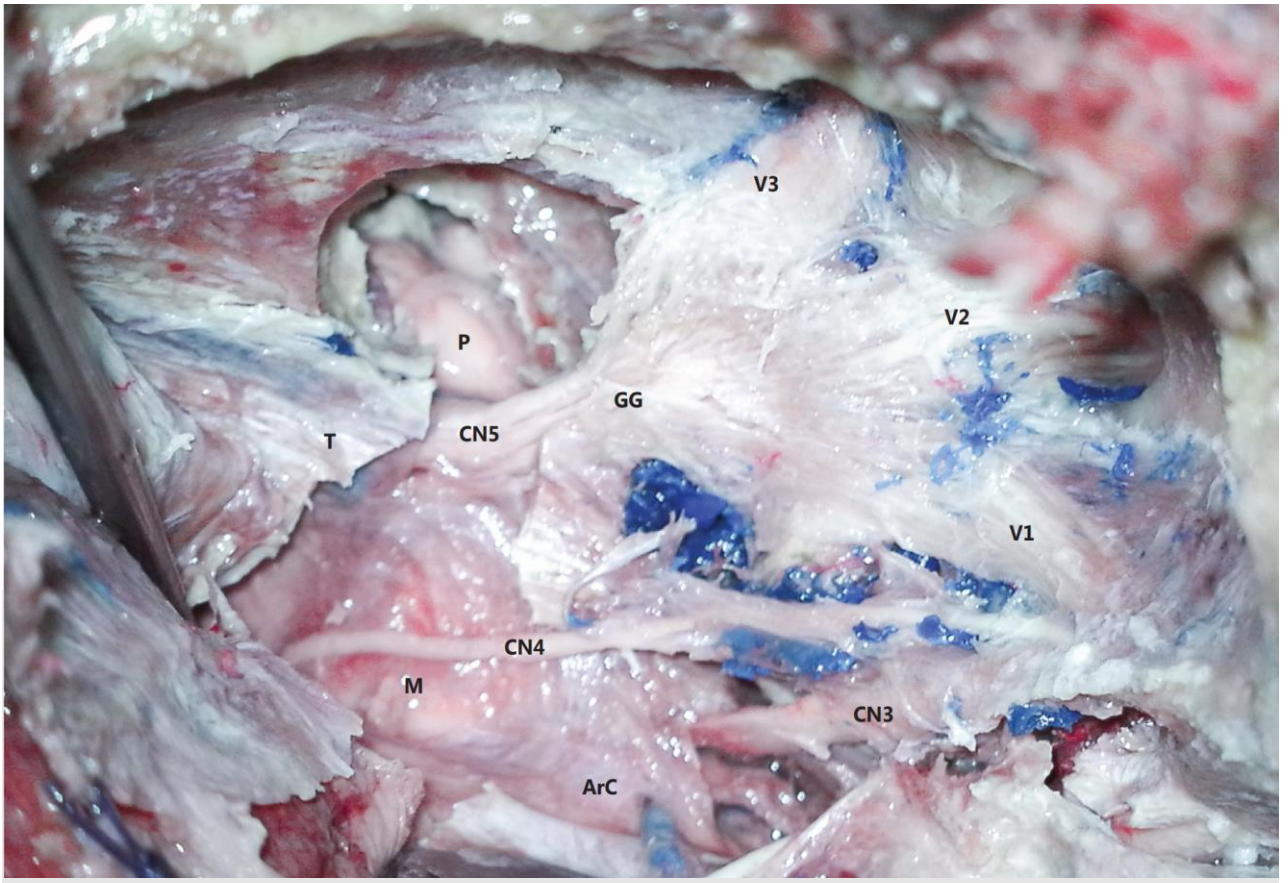
D = dura overlying posterior fossa
T = tentorium cerebelli
PB = petrous bone

V1 = ophthalmic branch of the trigeminal nerve
V3 = maxillary branch of the trigeminal nerve
V3 = mandibular branch of the trigeminal nerve
CN 4 = trochlear nerve
P. ICA = petrous segment of internal carotid artery



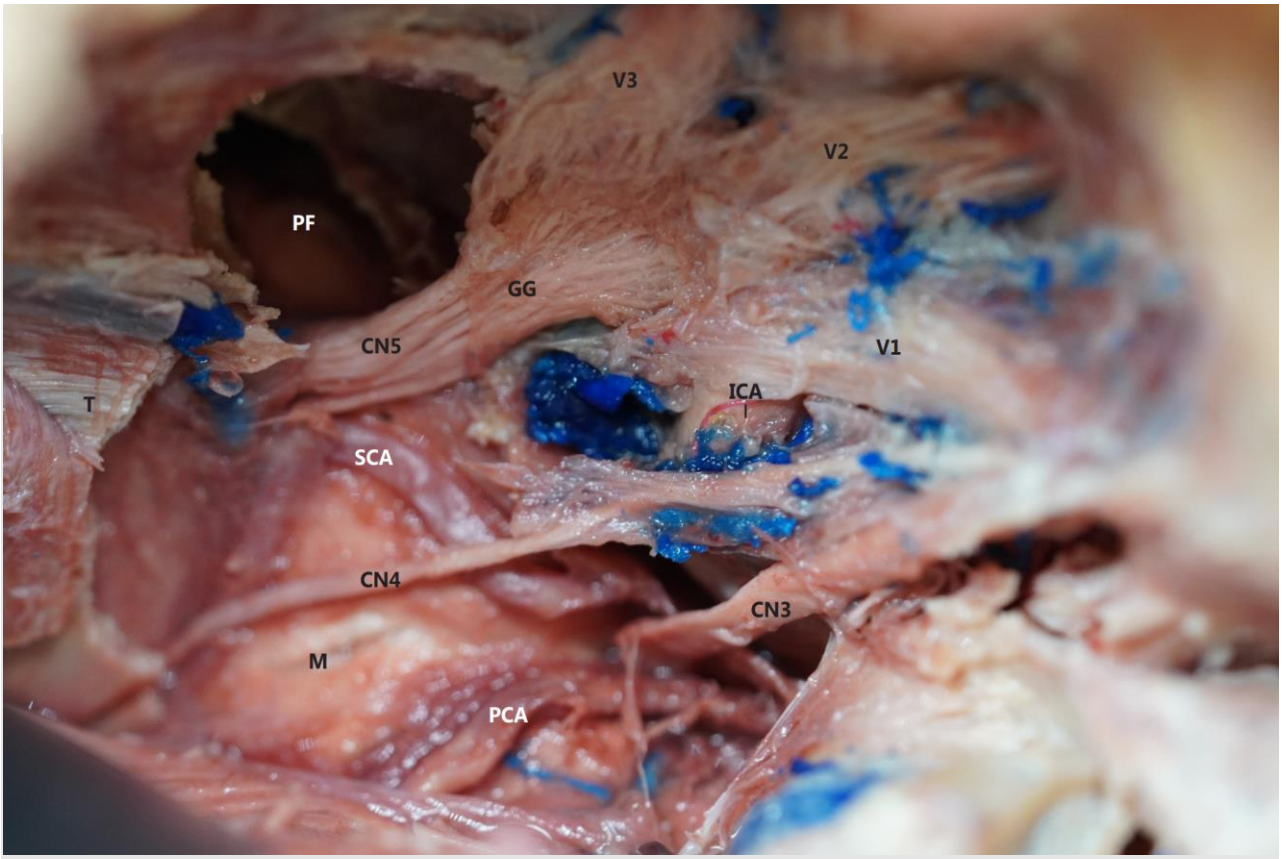
Petrosectomy was performed and supra and infratentorial dura were incised.

T = tentorium cerebelli
P = pons
CN5 = trigeminal nerve
V1 = ophthalmic branch of the trigeminal nerve
V3 = maxillary branch of the trigeminal nerve
V3 = mandibular branch of the trigeminal nerve
CN 4 = trochlear nerve
CN3 = oculomotor nerve
GG = gasserian ganglion
C.ICA = cavernous segment of ICA
P.ICA = petrous segment of ICA



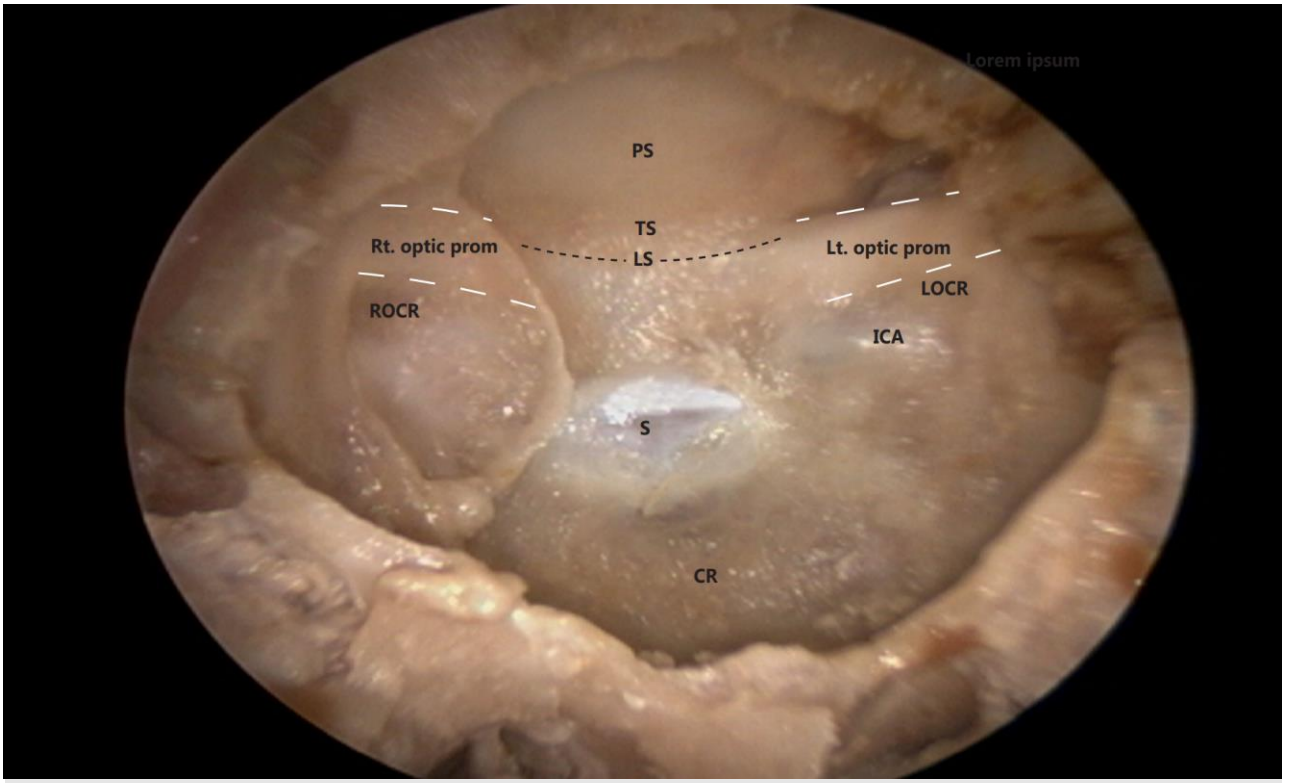
Extradural anterior clinoidectomy.
VIII. Exoposure of the dura matter overlying the clinoidal segment of internal carotid artery (ICA).

P = pons
M = midbrain
CN5 = trigeminal nerve
V1 = ophthalmic branch of the trigeminal nerve
V3 = maxillary branch of the trigeminal nerve
V3 = mandibular branch of the trigeminal nerve
CN 4 = trochlear nerve
T = tentorium cerebelli
CN3 = oculomotor nerve
GG = gasserian ganglion
ArC = arachnoid layer overlying the midbrain

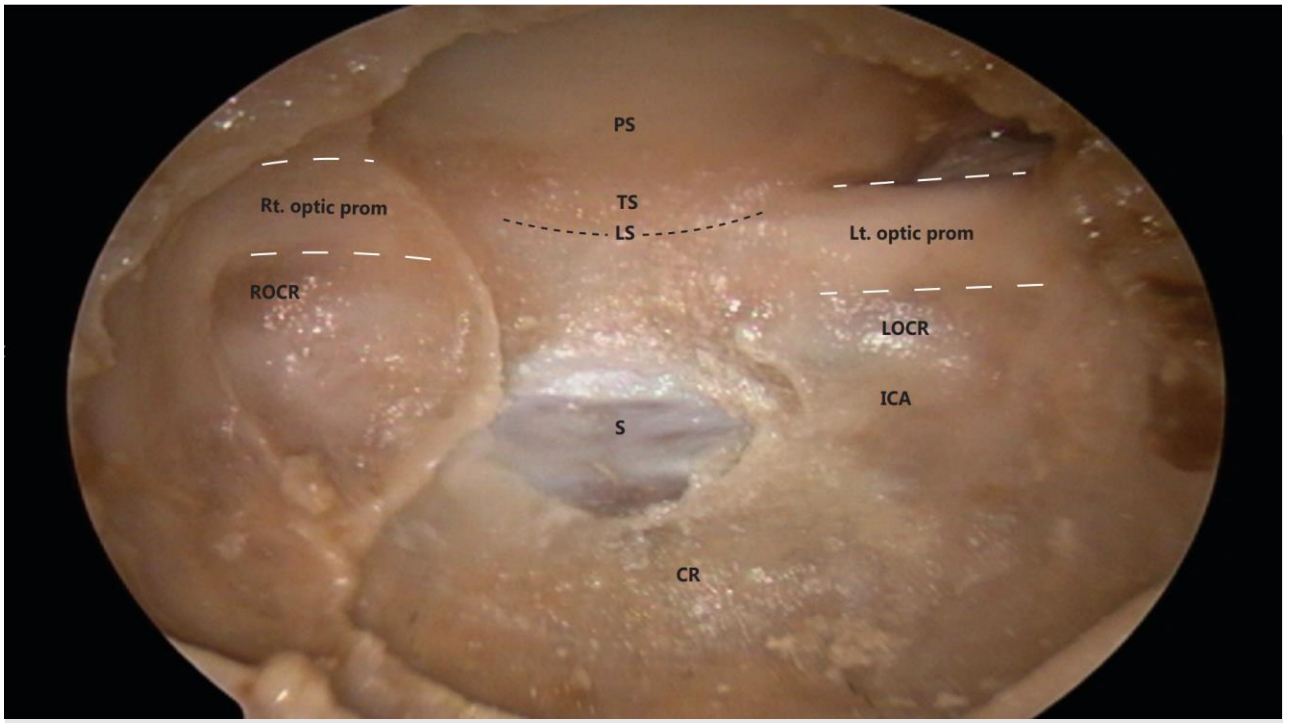


Extradural Subtemporal Transzygormatic Approach

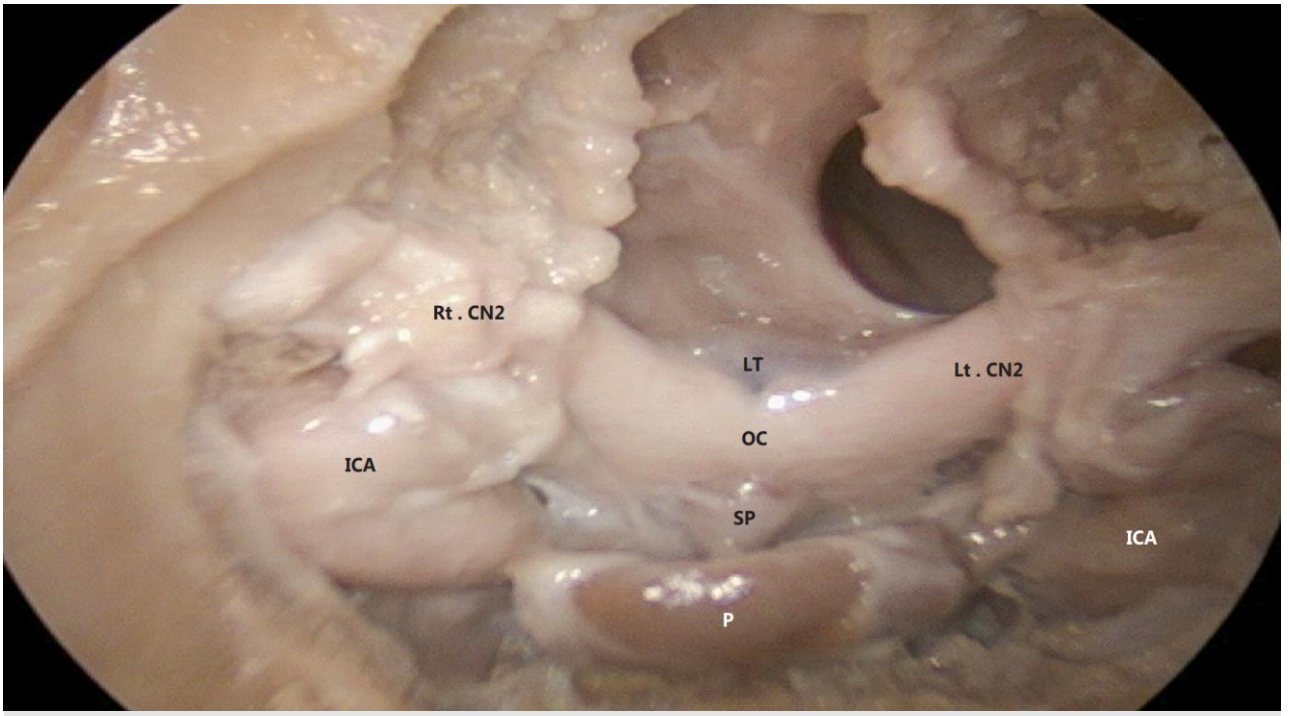
PCA = posterior cerebral artery
M = midbrain
CN5 = trigeminal nerve
V1 = ophthalmic branch of the trigeminal nerve
V2 = maxillary branch of the trigeminal nerve
V3 = mandibular branch of the trigeminal nerve
CN 4 = trochlear nerve
T = tentorium cerebelli
SCA = superior cerebellar artery
CN4 = troclear nerve
CN3 = oculomotor nerve
GG = gasserian ganglion
ICA = cavernous segment of internal carotid artery
PF = posterior fossa



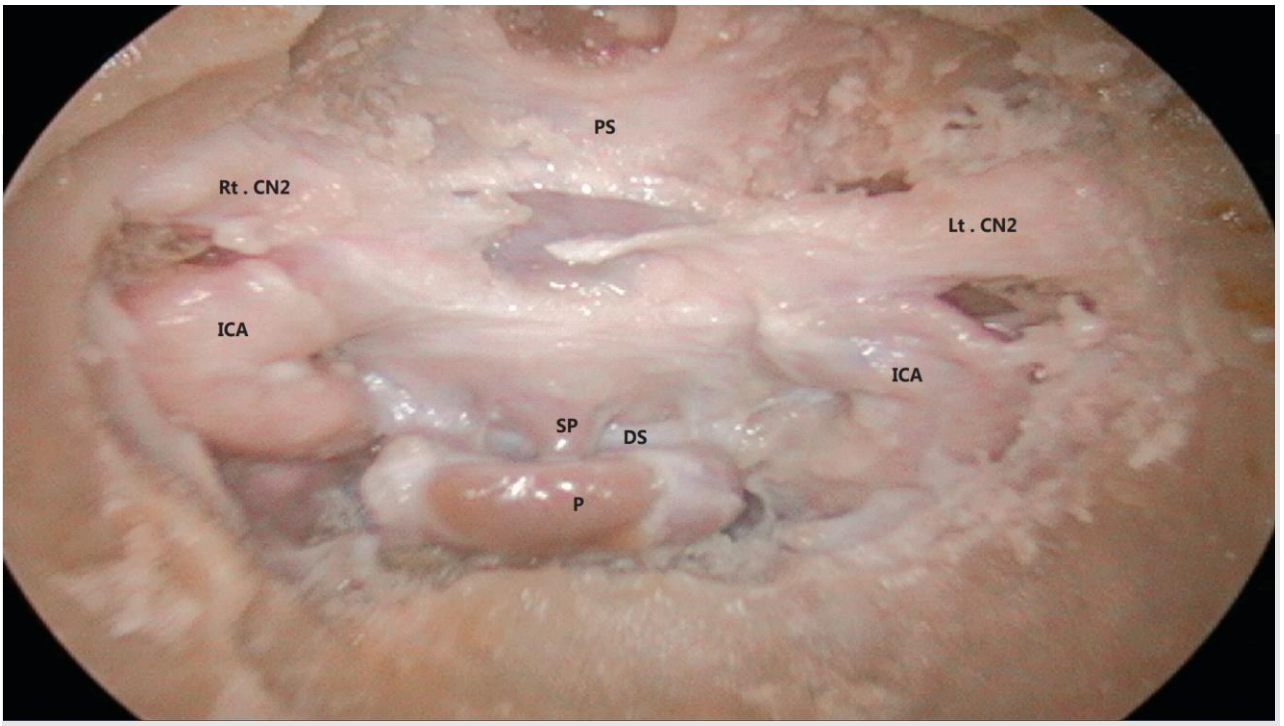
PS = planum sellae
LS = limbus sphenoidale
TS = tuberculum sellae
ROCR = right lateral optic-carotid recess
LOCR = leftlateral optic-carotid recess
S = sella
CR = clival recess
ICA = cavernous segment of internal carotid artery
Rt. opric prom = right prominence of optic nerve
Lt. opric prom = left prominence of optic nerve



PS = planum sellae
LS = limbus sphenoidale
TS = tuberculum sellae
ROCR = right lateral optic-carotid recess
CR = clival recess
ICA = cavernous segment of internal carotid artery
Rt. optic prom = right prominence of optic nerve
LOCR = left lateral optic-carotid recess
S = sella
Lt. optic prom = left prominence of optic nerve



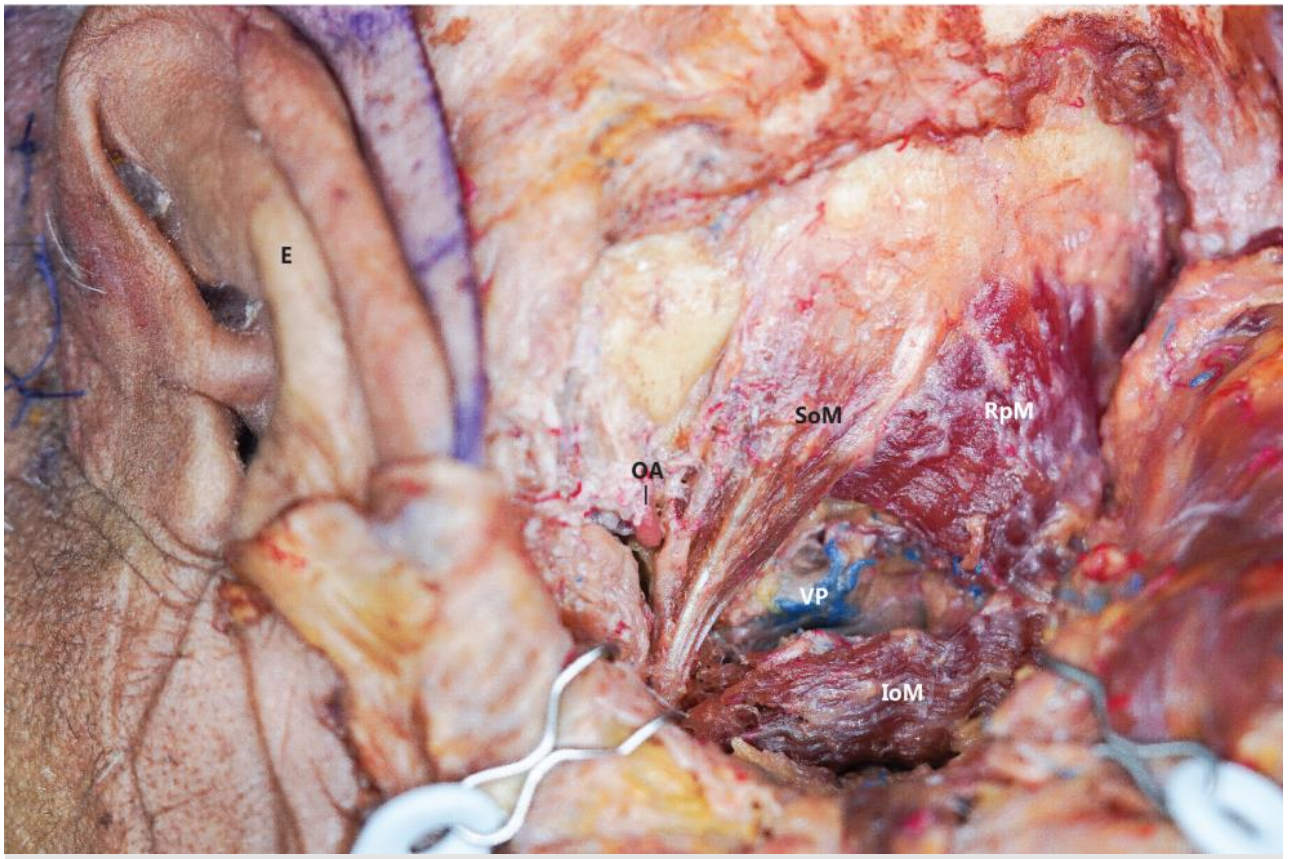
ICA = cavernous segment of internal carotid artery
Rt. CN2 = right optic nerve
Lt. CN2 = left optic nerve
SP = stalk of pituitary
P = pituitary
LT = lamina terminalis
OC = chiasm



PS = planum sellae
DS = diaphragm sellae
ICA = cavernous segment of internal carotid artery

Rt. CN2 = right optic nerve
Lt. CN2 = left optic nerve
SP = stalk of pituitary
P = pituitary

Demonstration of the skin incision variations. The lazy S incision.



The suboccipital triangle is formed by three muscles: the superior oblique, the rectus capitis minor, and the rectus capitis major.

SoM = superior oblique muscle

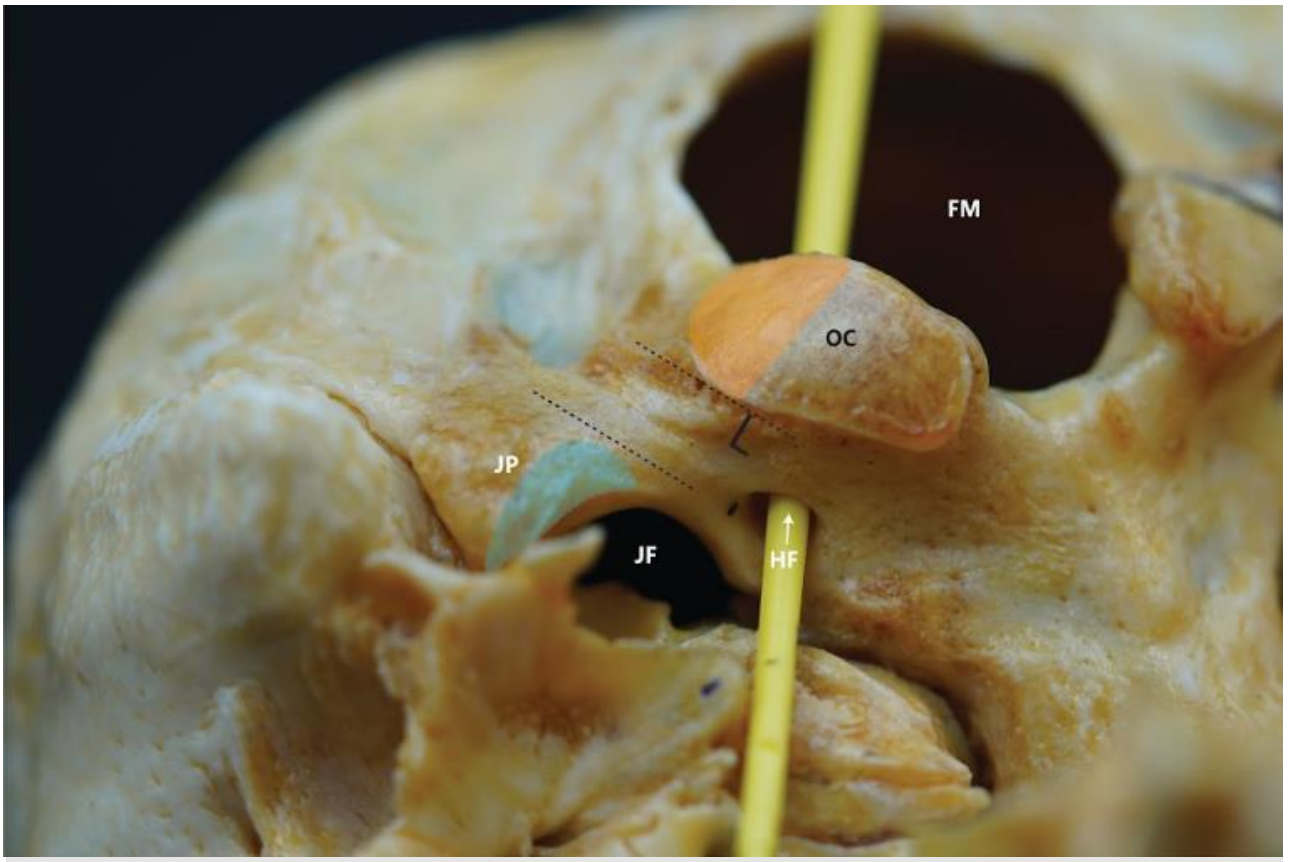
IoM = inferior oblique muscle

RpM = rectus capitis posterior major

E = ear

VP = venous plexus in fat pad

OA = occipital artery



Demonstration of the following:

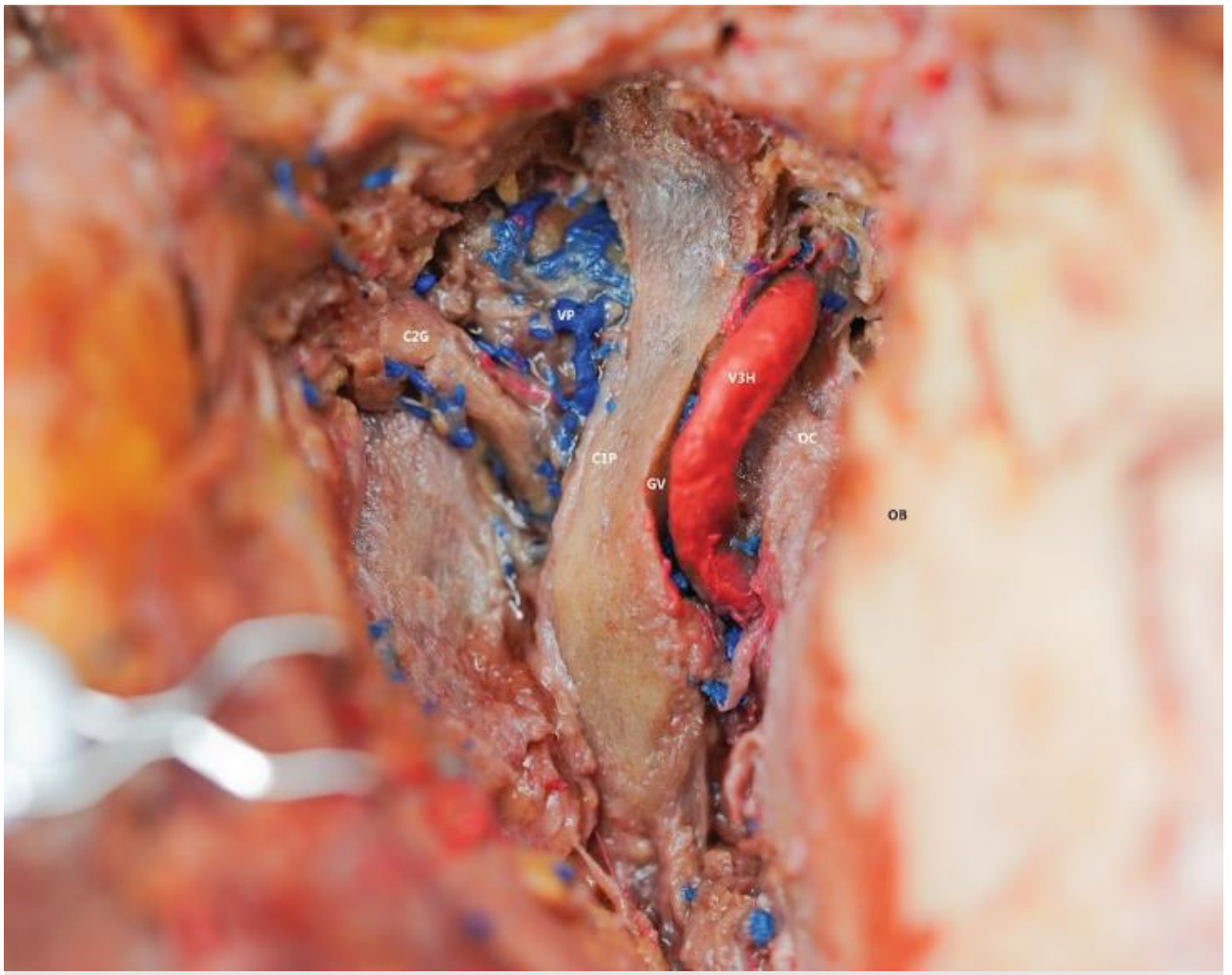
The transcodylar = orange highlight

Supracondylar = black dashed line

Paracondylar approaches = blue highlight

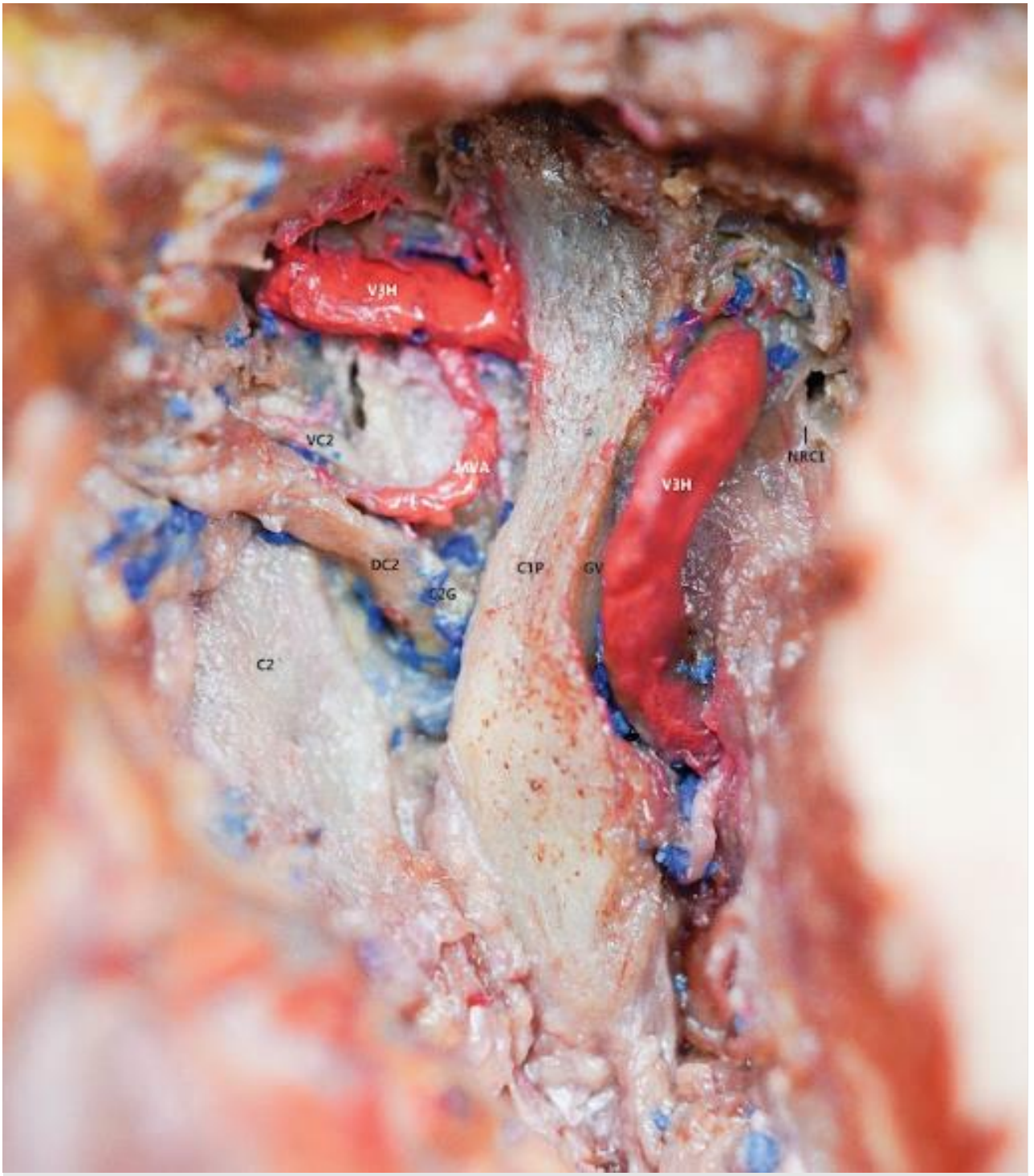
FM = foramen magnum
JF = jugular Foramen
HF = hypoglossal foramen
OC = occipital condyle
JP = jugular process.

If the posterior one third of the occipital condyle was removed, the anterolateral portion of the foramen magnum will be accessed. If the supracondylar above the hypoglossal canal was drilled the lower lateral edge of the clivus will be exposed. The jugular tubercle can be accessed if the supracondylar portion below the hypoglossal canal was removed. The paracondylar approach gives access to the jugular bulb



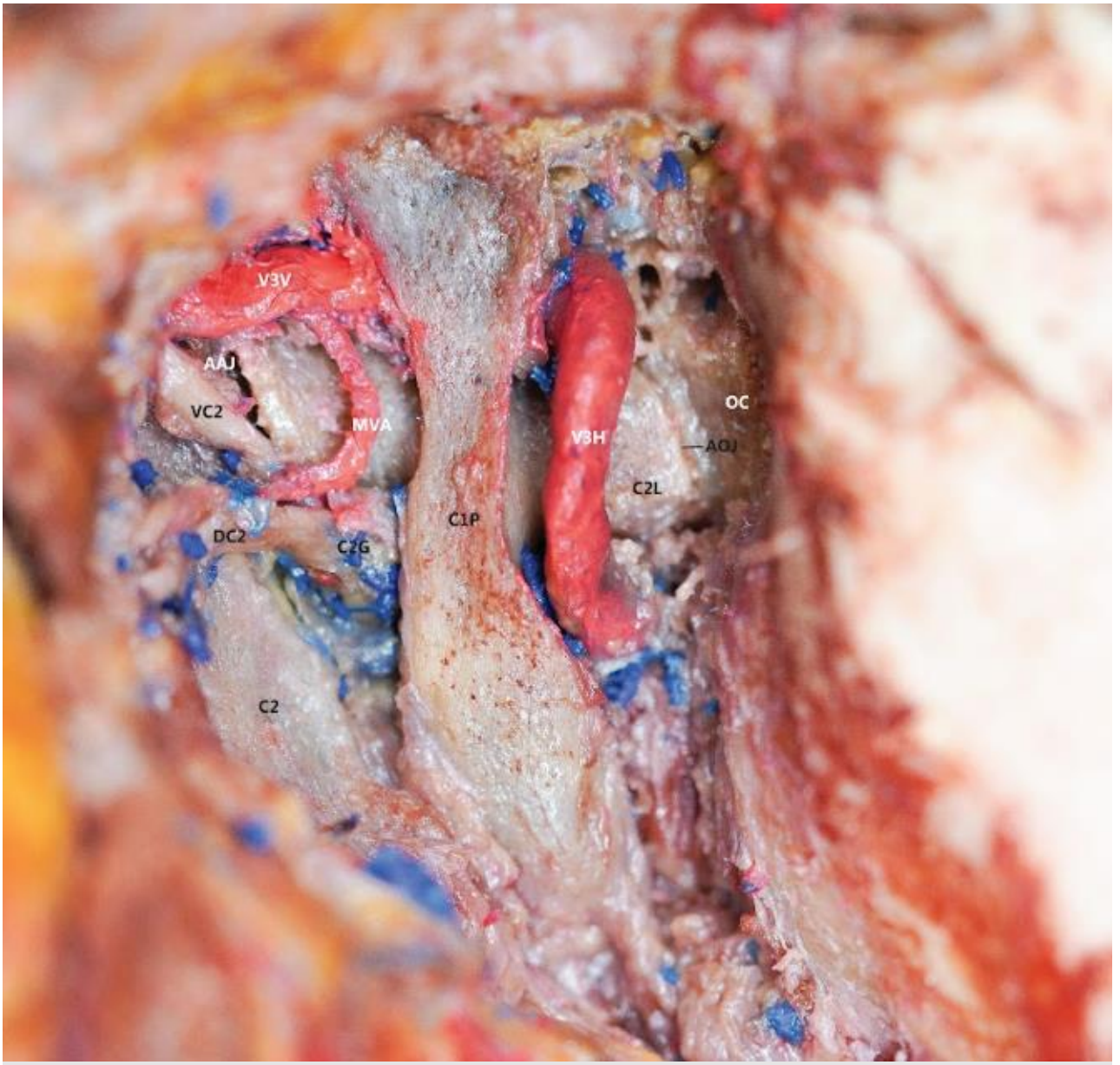
Far Lateral Approach

V3H = horizontal branch of vertebral artery
OB = occipital bone
C1P = posterior arch of C1 vertebra
GV = groove of vertebral artery
OC = occipital condyle
C2G = C2 vertebra ganglion
VP = venous plexus



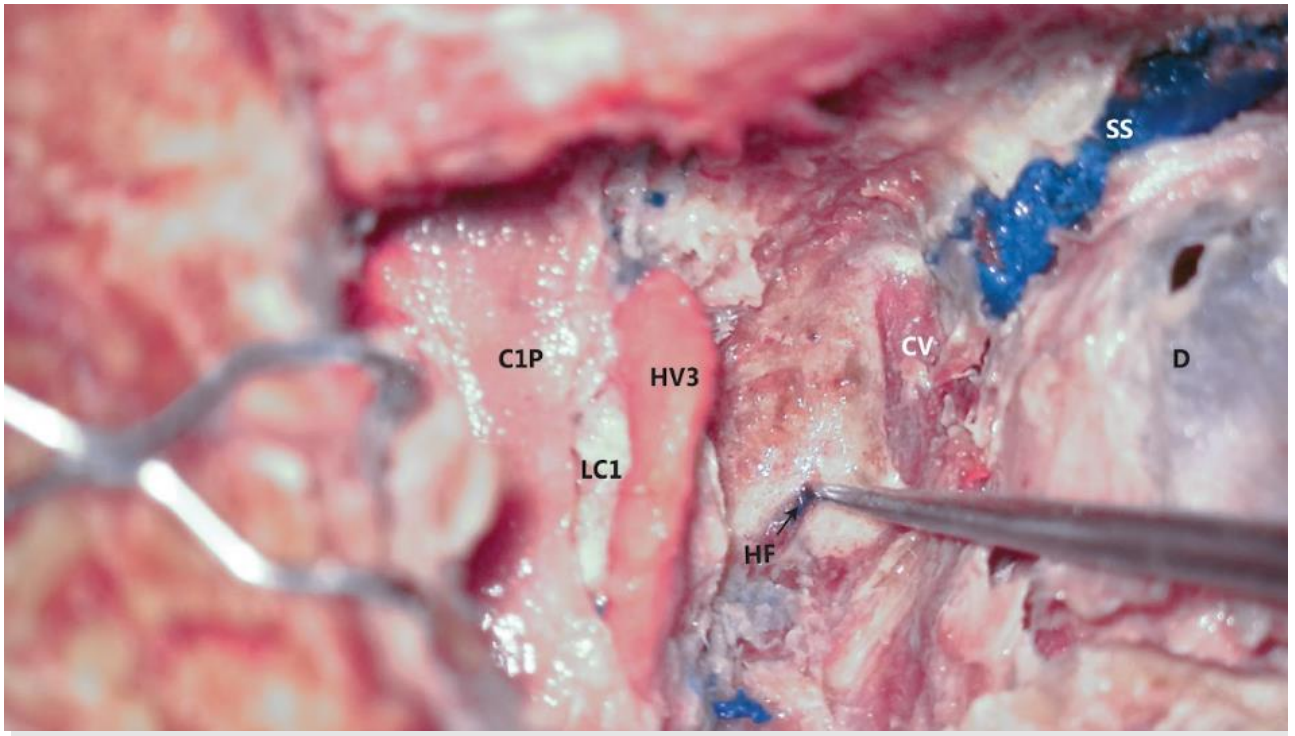
V3H = horizontal branch of vertebral artery
C1P = posterior arch of C1 vertebra
GV = groove of vertebral artery
C2G = C2 vertebra ganglion
NRC1 = nerve root of C1

DC2 = dorsal ramus of C2
VC2 = ventral ramus of C2
MVA = muscular branch of vertebral artery
C2 = C2 vertebra



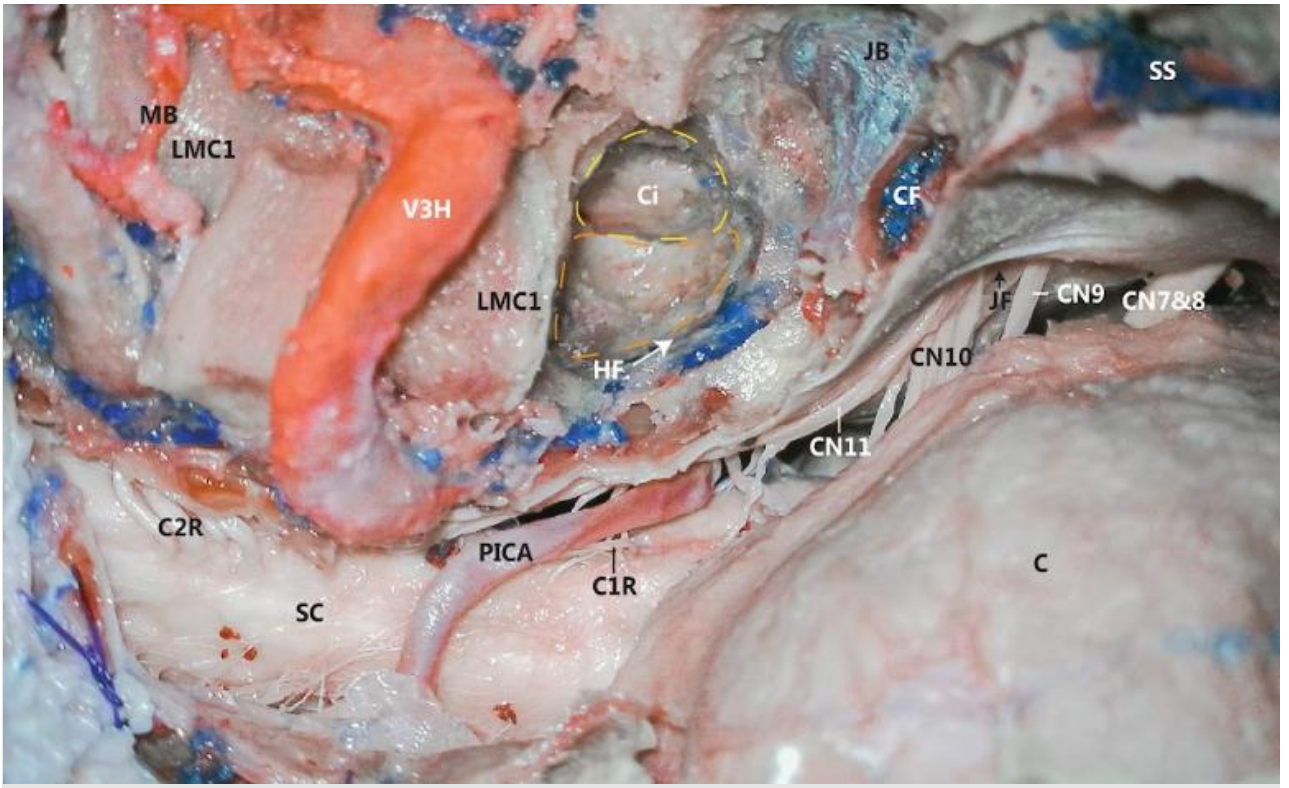
V3H = horizontal branch of vertebral artery
C1P = posterior arch of C1 vertebra
C2G = C2 vertebra ganglion
DC2 = dorsal ramus of C2
VC2 = ventral ramus of C2

MVA = muscular branch of vertebral artery
C2 = C2 vertebra
OC = occipital condyle
C2L = lateral mass of C2
AAJ = atlantoaxial joint
AOJ = atlantooccipital joint



Exposure of the hypoglossal canal.

V3H = horizontal branch of vertebral artery
HF = Hypoglossal foramen
SS = sigmoid sinus
CV = condylur vein
D = dura matter
C1P = posterior arch of C1 vertebra
LC1 = lateral mass of C1 vertebra



Intradural exposure of the far lateral approach with supracondylar exposure (orange dashed lines) of the clivus (yellow dashed lines) and jugular bulb.

V3H = vertebral artery horizontal segment

LMC1 = lateral mass of C1 vertebra

Ci = clivus

HF = hypoglossal foramen

CF = condylar foramen

JB = jugular bulb

SS = sigmoid sinus

Orange dashed line = supracondylar exposure below hypoglossal canal

PICA = posterior inferior cerebellar artery anterior and lateral medullary segments

C2R = C2 rootlets

SC = spinal cord

C1R = C1 rootlets

JF = jugular foramen

CN 11 = spinal accessory nerve

CN 10 = vagus nerve

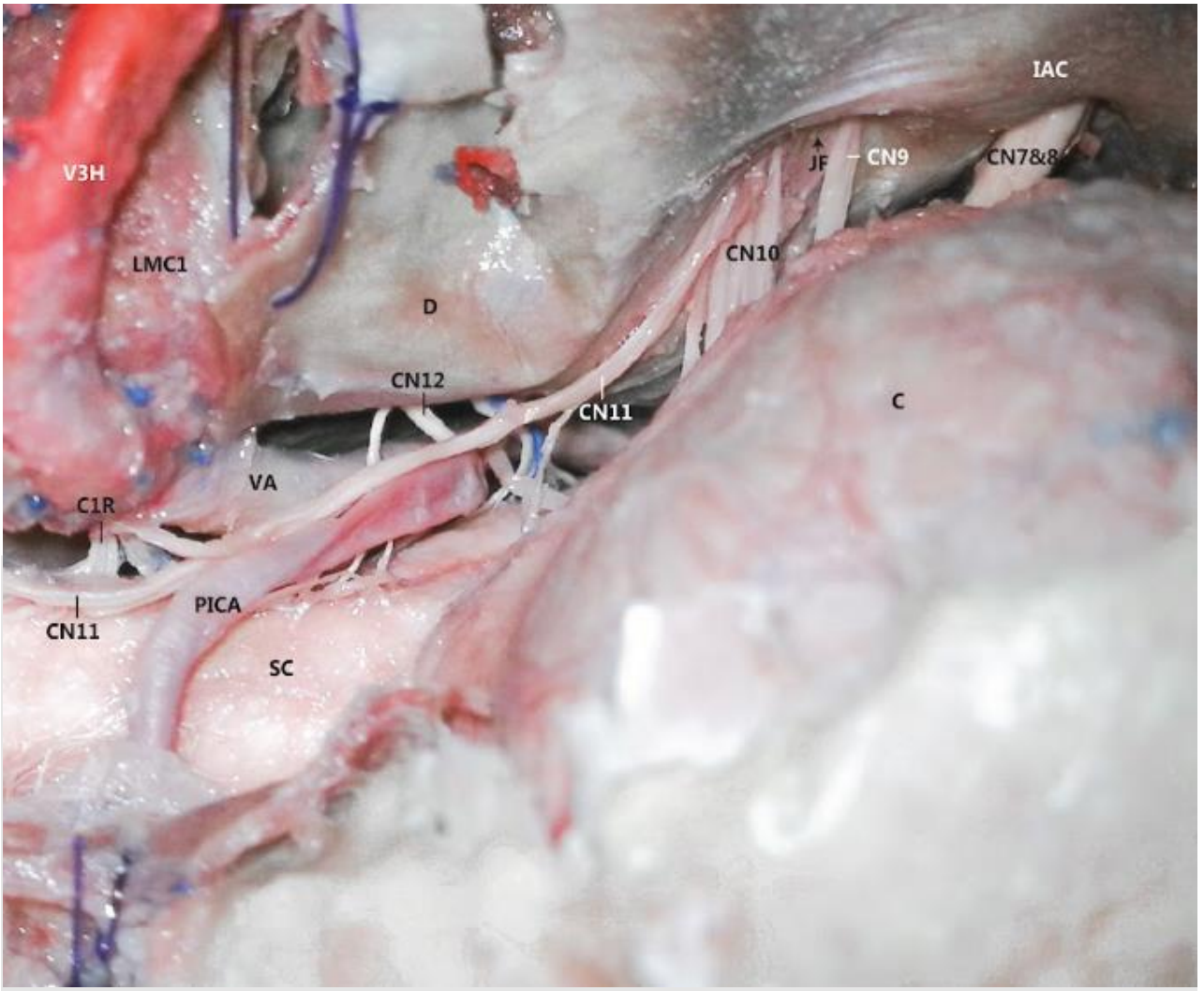
C = cerebellum

MB = muscular branch

Black dashed line demonstrates the removed posterior process of C1

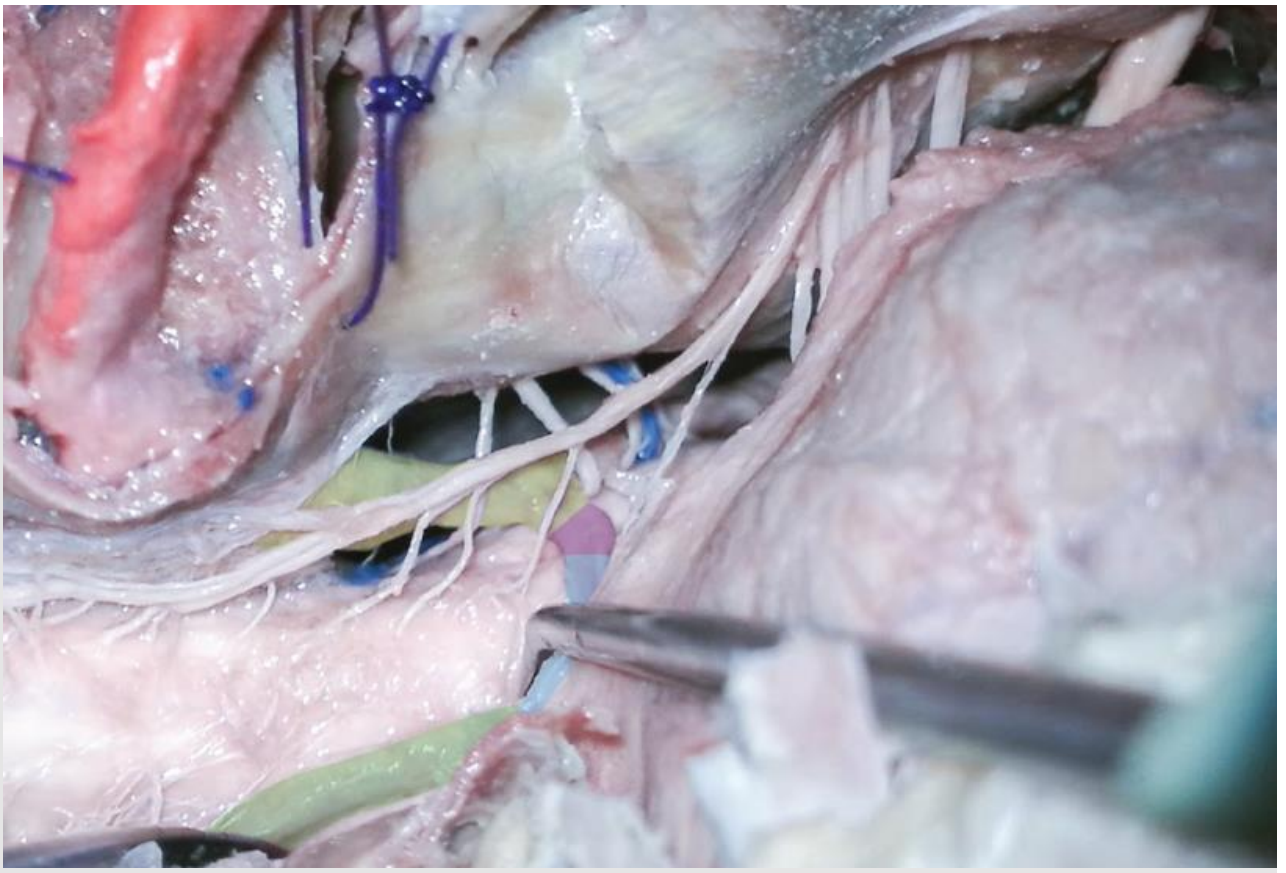
CN 9 = glossopharyngeal nerve

CN 7 & 8 = vestibulocochlear and facial nerve complex



Intradural exposure of far lateral approach

V3H = vertebral artery horizontal segment
LMC1 = lateral mass of C1 vertebra
IAC = internal auditory canal
PICA = posterior inferior cerebellar artery
JF = jugular foramen
SC = spinal cord
D = dura mater
C1R = C1 rootlets
CN 11 = spinal accessory nerve
CN 10 = vagus nerve
CN 9 = glossopharyngeal nerve
CN 7 & 8 = vestibulocochlear and facial nerve complex
C = cerebellum



Intradural exposure of far lateral approach

Purple shaded area = anterior medullary segment of PICA

lue shaded area = lateral medullary segment of PICA

Green shaded area = tonsillomedullary segment of PICA

Yellow shaded area = intradural segment of vertebral artery

Patient positioning: supine with neck slightly extended. Skin incision: 3-5 cm oblique over the skin crease.

LSI = lateral margin of the skin Incision
TSI = transverse skin incision.

MI = midline at the level of thyroid cartilage (medial margin of skin incision)
ASCM = anteriorborder of sternocleidomastoid
DL = distance to lateral incision

Subcutaneous dissection & platysma muscle exposure.

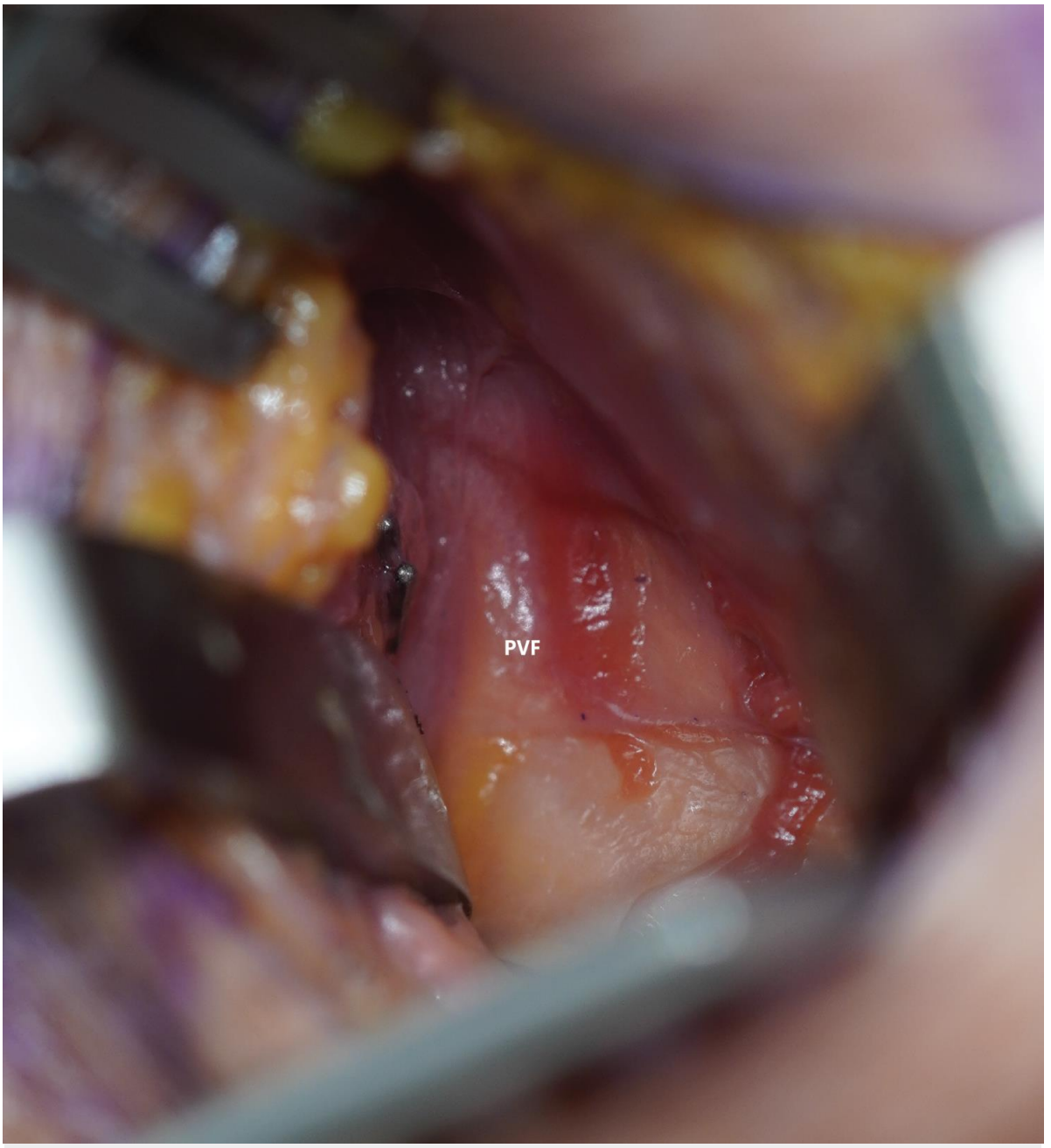
PyM = Platysma muscle
SC = subcutaneous tissue

Anterior cervical discectomy of C5-C6. Platysma muscle incision & retraction.

Asterisk = fascia covering the platysma muscle.

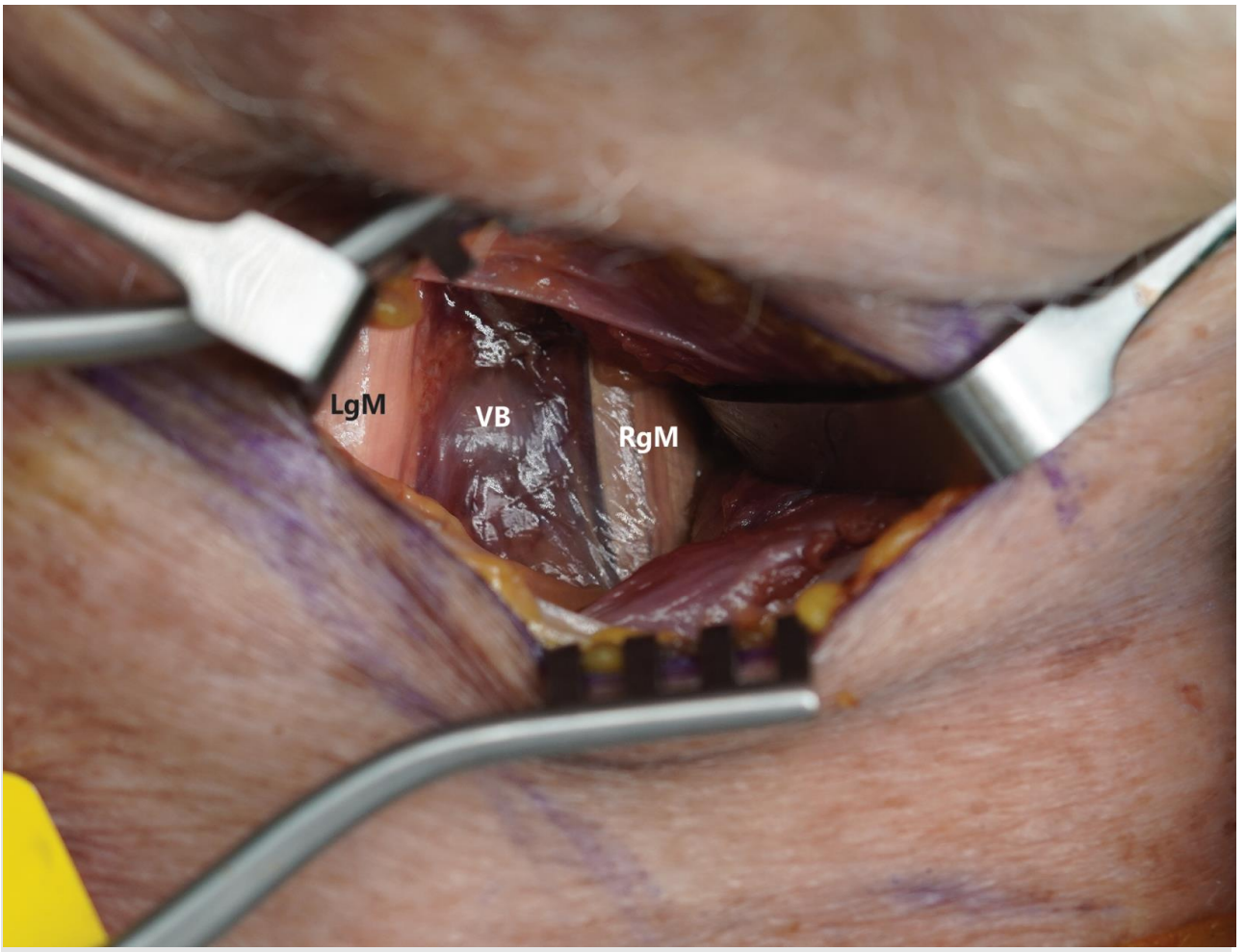
Sharp dissection in the plane between the sternocleidomastoid and omohyoid muscle.

SCM = sternocleidomastoid muscle
OhM = omohyoid muscle
White arrow = shows the plane of dissection.

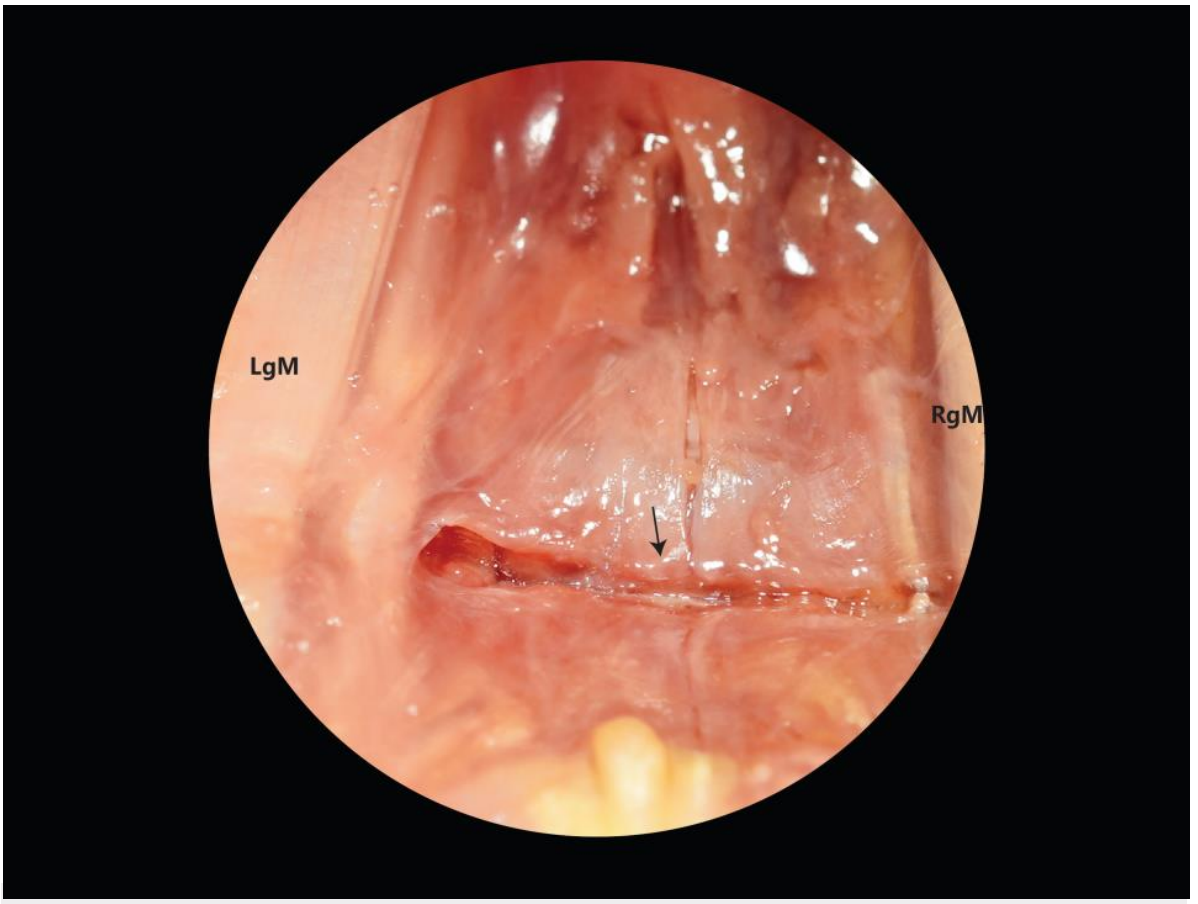


Carotid sheath (carotid artery, jugular vein, vagus nerve) retracted laterally, trachea and esophagus retracted medially.

PVF = paravertebral fascia.

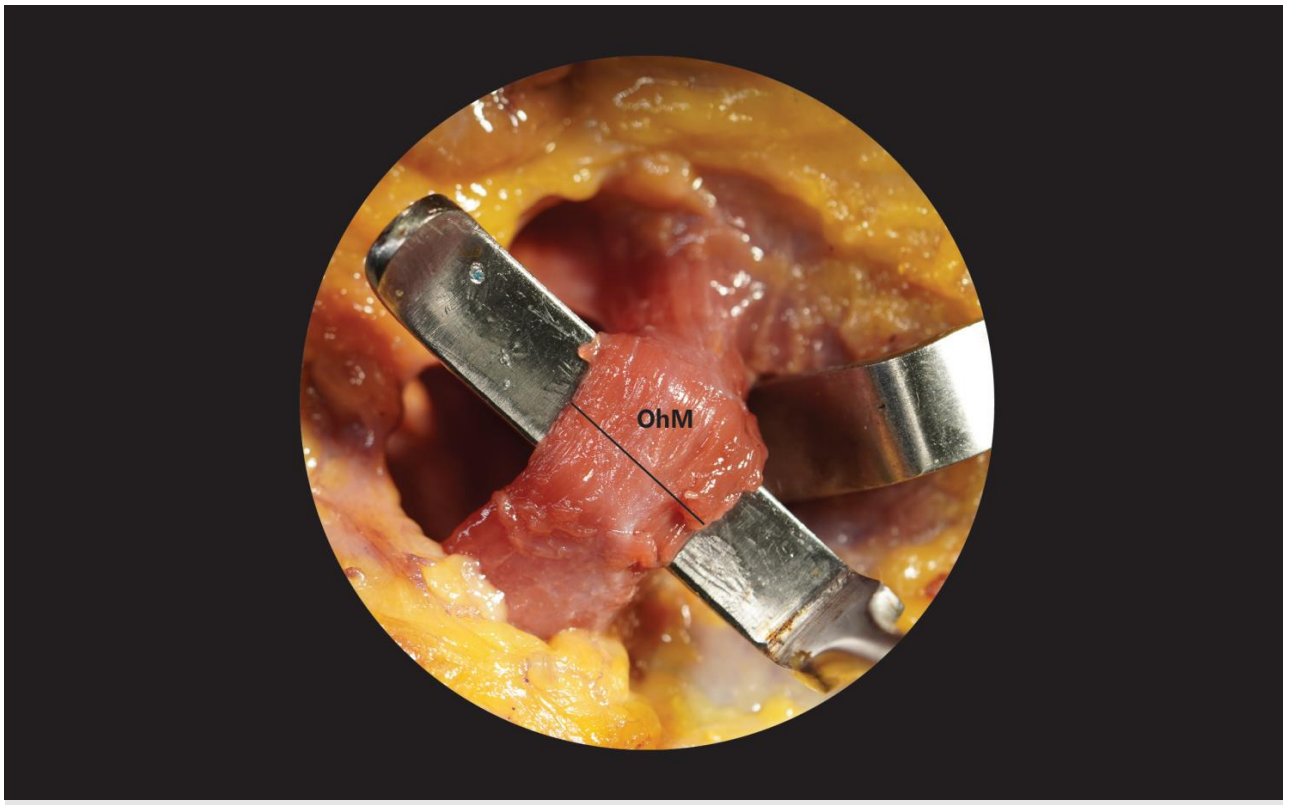


RgM = right longus colli muscle
LgM = left longus colli muscle
VB = vertebral body.

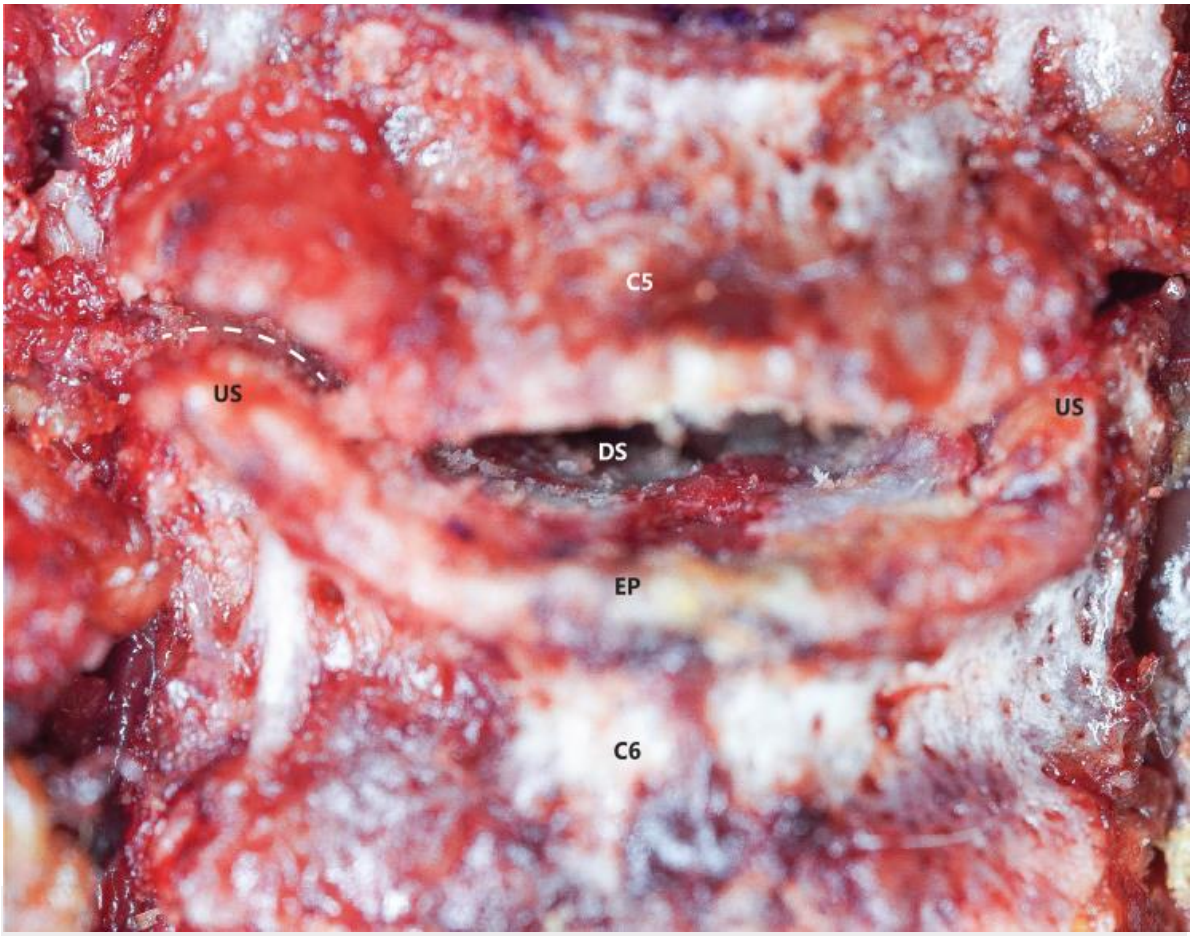


Anterior longitudinal Ligament (ALL) incision at the C5-C6 intervertebral space.

RgM = right longus colli muscle
LgM = left longus colli muscle.



Omohyoid muscle (OhM) can be isolated and cutted for further expouser as demonstrated.



The disc is meticulously removed and cleaned out from the intervertebral space, including the posterior longitudinal ligament if necessary.

DS = intravertebral disc space
C5 = C5 vertebra
C6 = C6 vertebra
US = uncinate process
EP = end plate of C6
White dashed line = Luschka's joint.