

Atlas for Target Volume Delineation for Craniospinal Radiotherapy

SIOPE Brain Tumour Group
Guide for Clinical Trial Protocols

Collaborators

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Guidelines

- Please refer individual trial protocols for detailed guidelines on radiotherapy techniques

General guidelines on Craniospinal Radiotherapy

- Accurate delineation of subarchnoid space for craniospinal radiotherapy using photon and particle therapy is essential to avoid marginal recurrences.
- Planning CT scan should be done with 1-3 mm slice thickness with 1-mm slice thickness over the skull base
- It is recommended to fuse planning CT scan with T1W Gad and T2W MRI
- The cranial CTV encompasses the whole brain within the inner table of the skull, cribriform plate, most inferior part of the temporal lobes, pituitary fossa and the CSF contained within the dural sheath of cranial nerves.

General guidelines on Craniospinal Radiotherapy

- CSF within the dural sheaths of cranial nerves identified by skull base foramen through which they pass
- Brain is contouring using the CT scan window setting :
Window/level: 1500-2000/300-350
- Cribriform plate and skull base foramen are contoured using the CT scan window setting: window/level: 3000/400
- The spinal CTV should include the spinal subarachnoid space include nerve roots laterally
- The lower limit of spinal CTV is at the lower limit of thecal sac on the latest MRI scan and there is no need to include sacral nerve root canal in the spinal CTV

Steps for the delineation of craniospinal CTV

Step 1 : Delineate the whole brain within the inner table of skull

Step 2 : Ensure that the cribriform plate, middle cranial fossae, and the pituitary fossa are in the CTV

Step 3 : Ensure that the optic nerves are included in the CTV

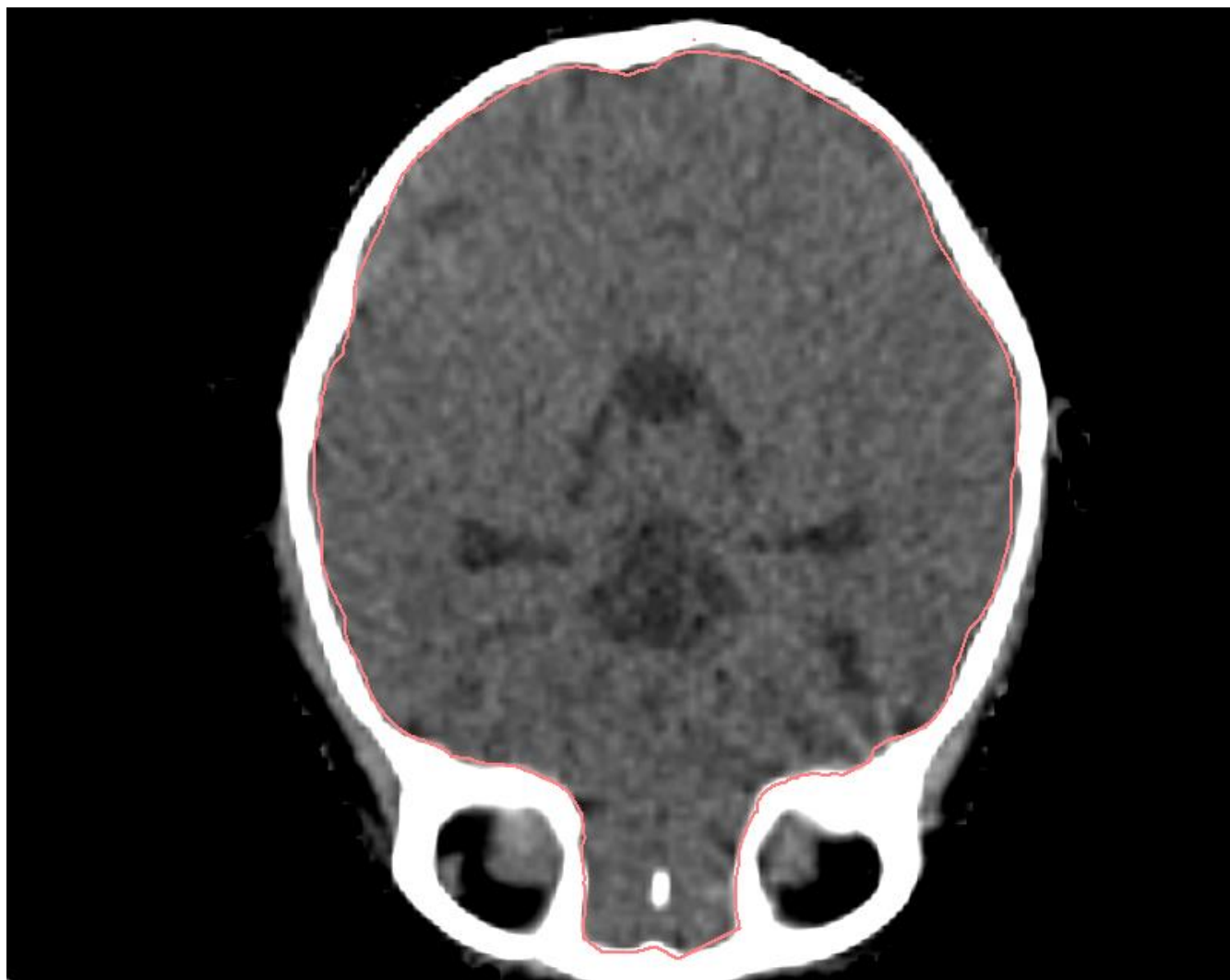
Step 4 : Delineate the following skull base foramina bilaterally to be include in the cranial CTV:

- Superior orbital fissures
- Optic canals
- Foramen rotundum
- Foramen ovale
- Internal acoustic meatus
- Jugular foramen
- Hypoglossal canal

Step 5 : Delineation of spinal CTV and ensure accurate delineation of the lower end of thecal sac

STEP 1

DELINEATION OF THE WHOLE BRAIN













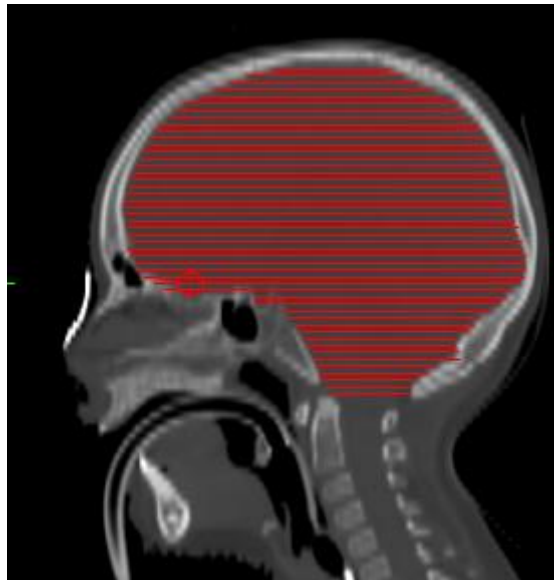
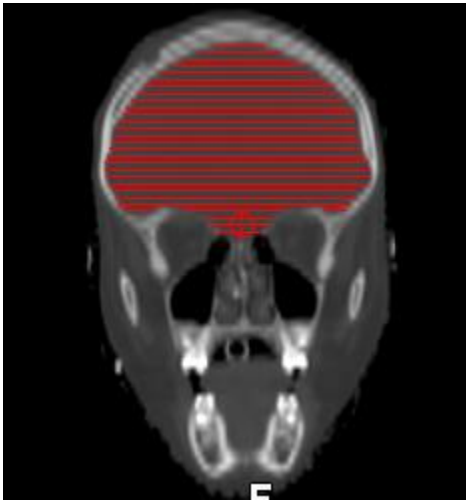




STEP 2

CRIBRIFORM PLATE, MIDDLE CRANIAL FOSSAE, AND PITUITARY FOSSA

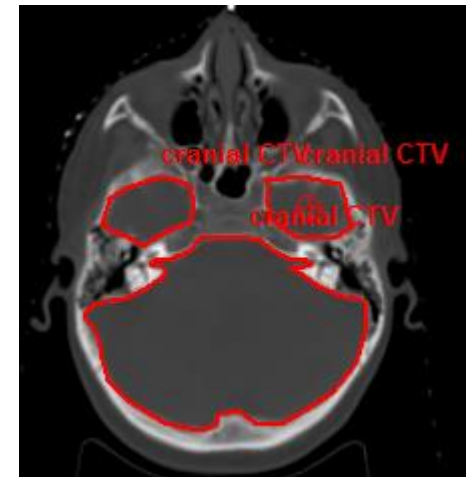
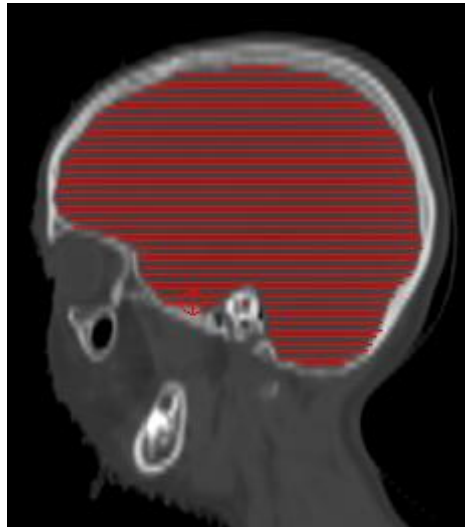
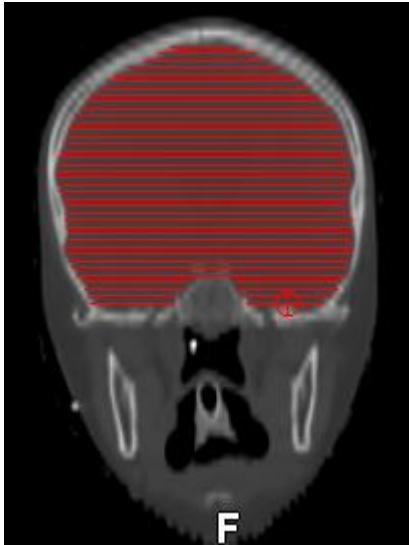
Cribriform plate



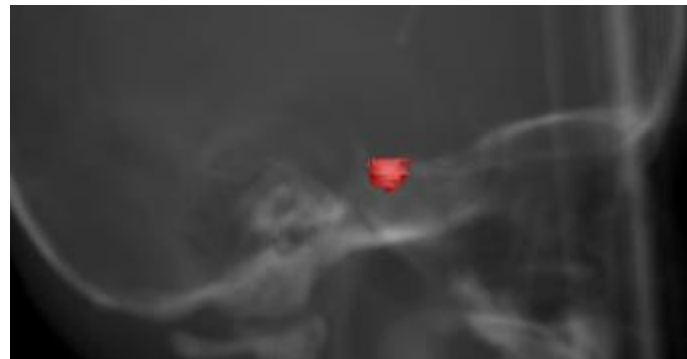
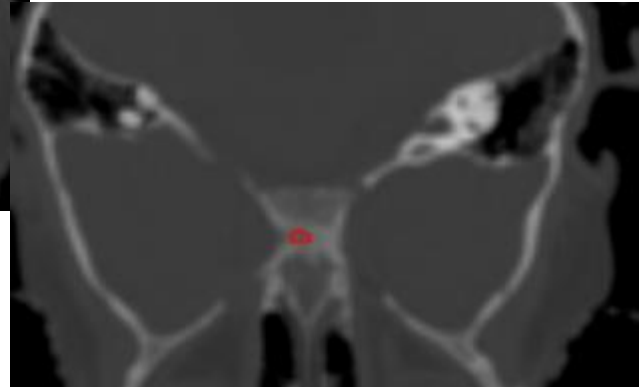
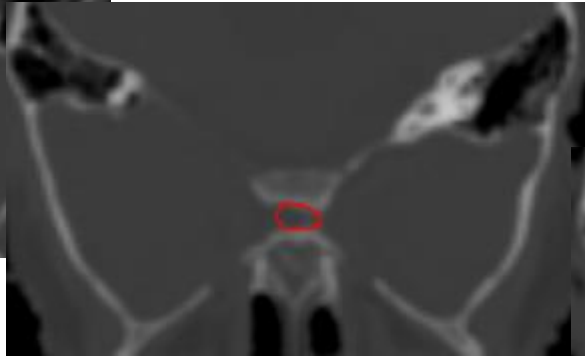
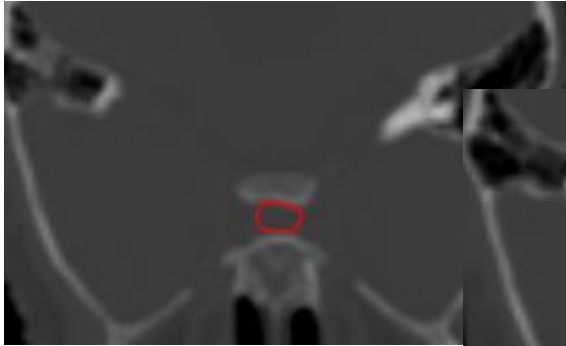
Cribriform plate is contoured using bone window setting (width 3000 and level 400)



Middle cranial fossae



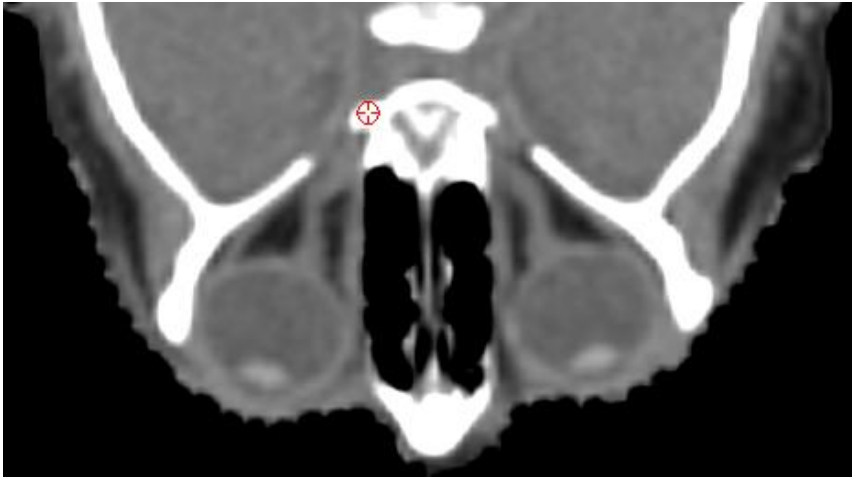
Pituitary fossa



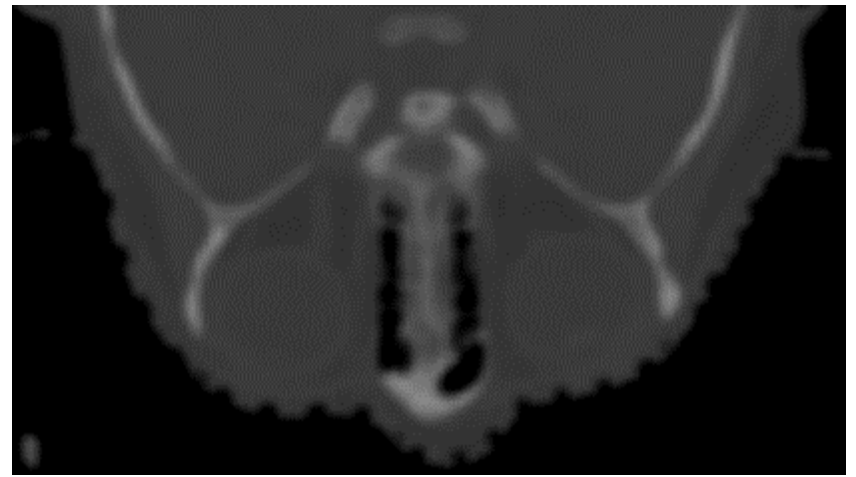
STEP 3

THE OPTIC NERVES (PARTS OF) AND CANALS

Optic nerves & Optic canals



Optic nerves are contoured using
window width 350 and level 40

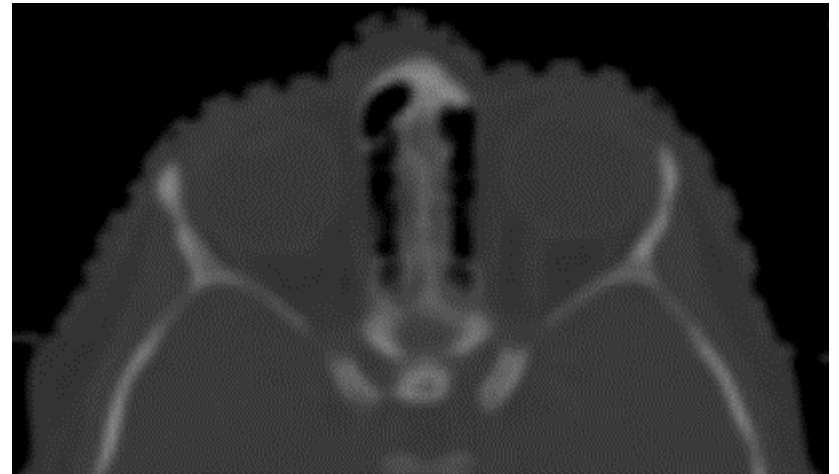
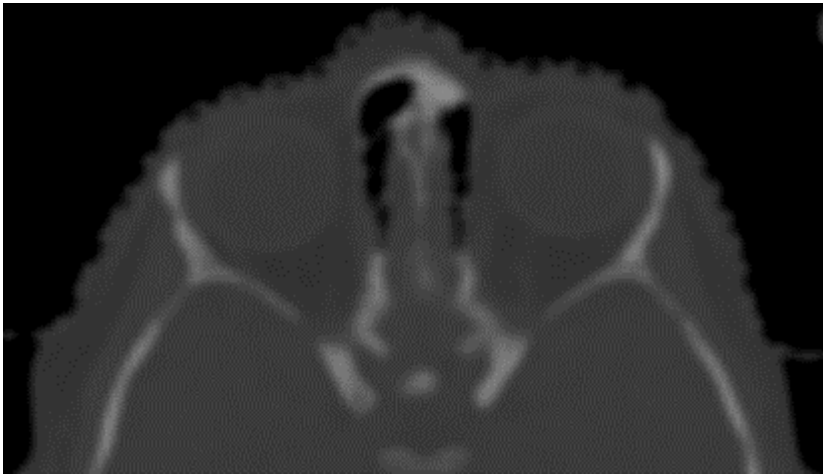


Optic canals are contoured using
bone window setting (width 3000
and level 400)

STEP 4

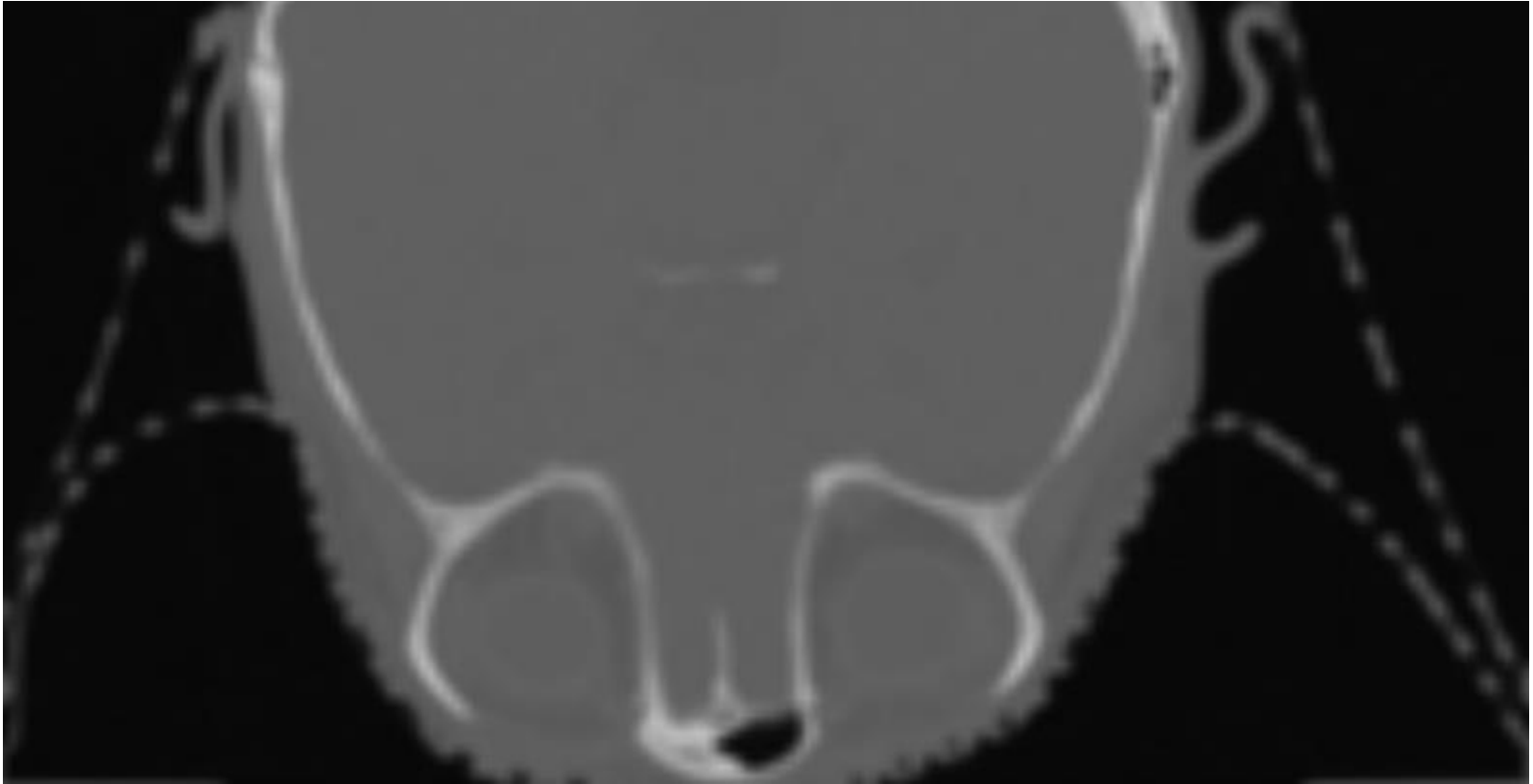
**DELINEATE SKULL BASE
FORAMEN WITH CRANIAL
NERVES**

Skull base foramen



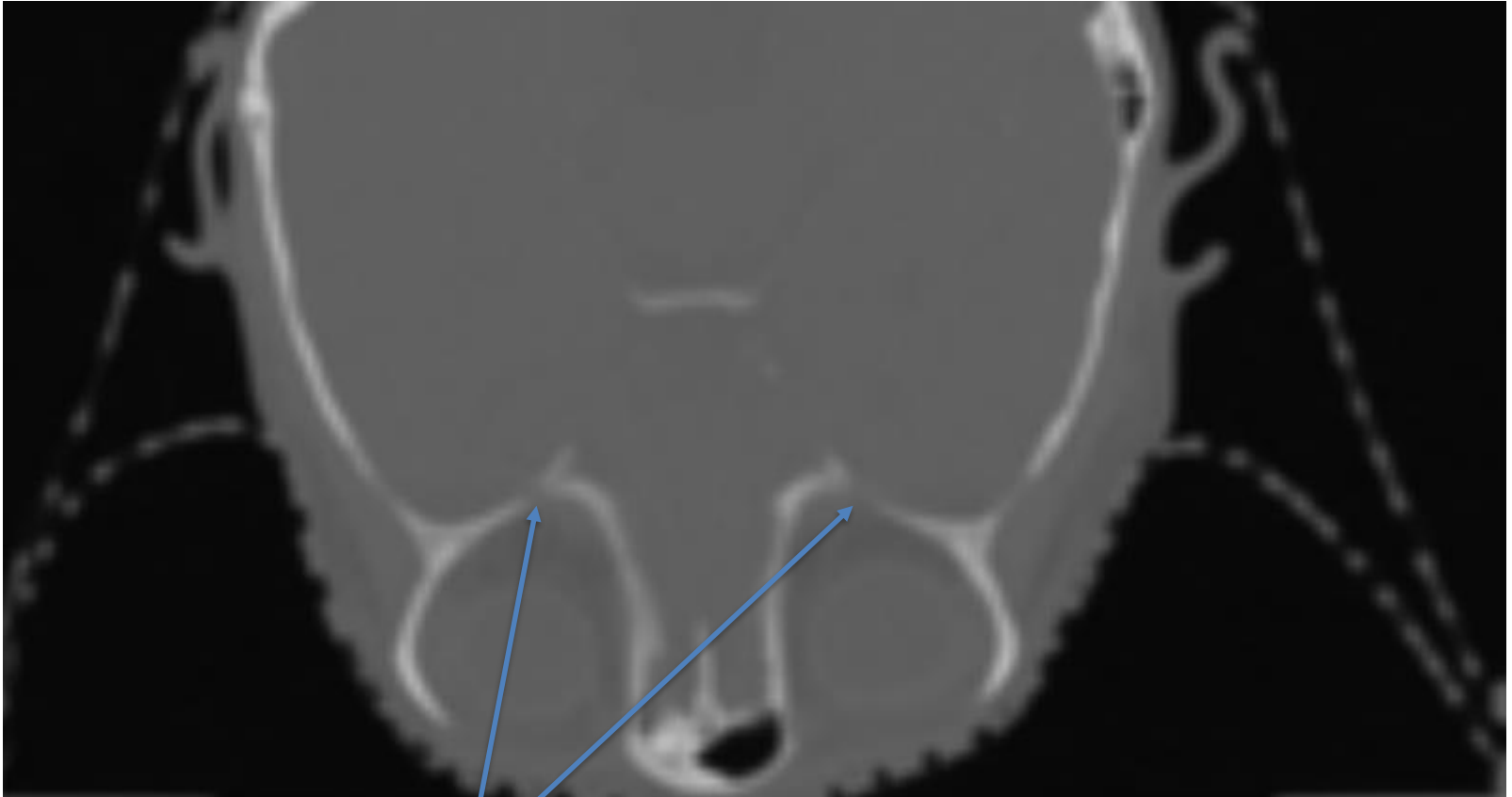
Skull base foramen are contoured using bone window setting (width 3000 and level 400)

Superior orbital fissure



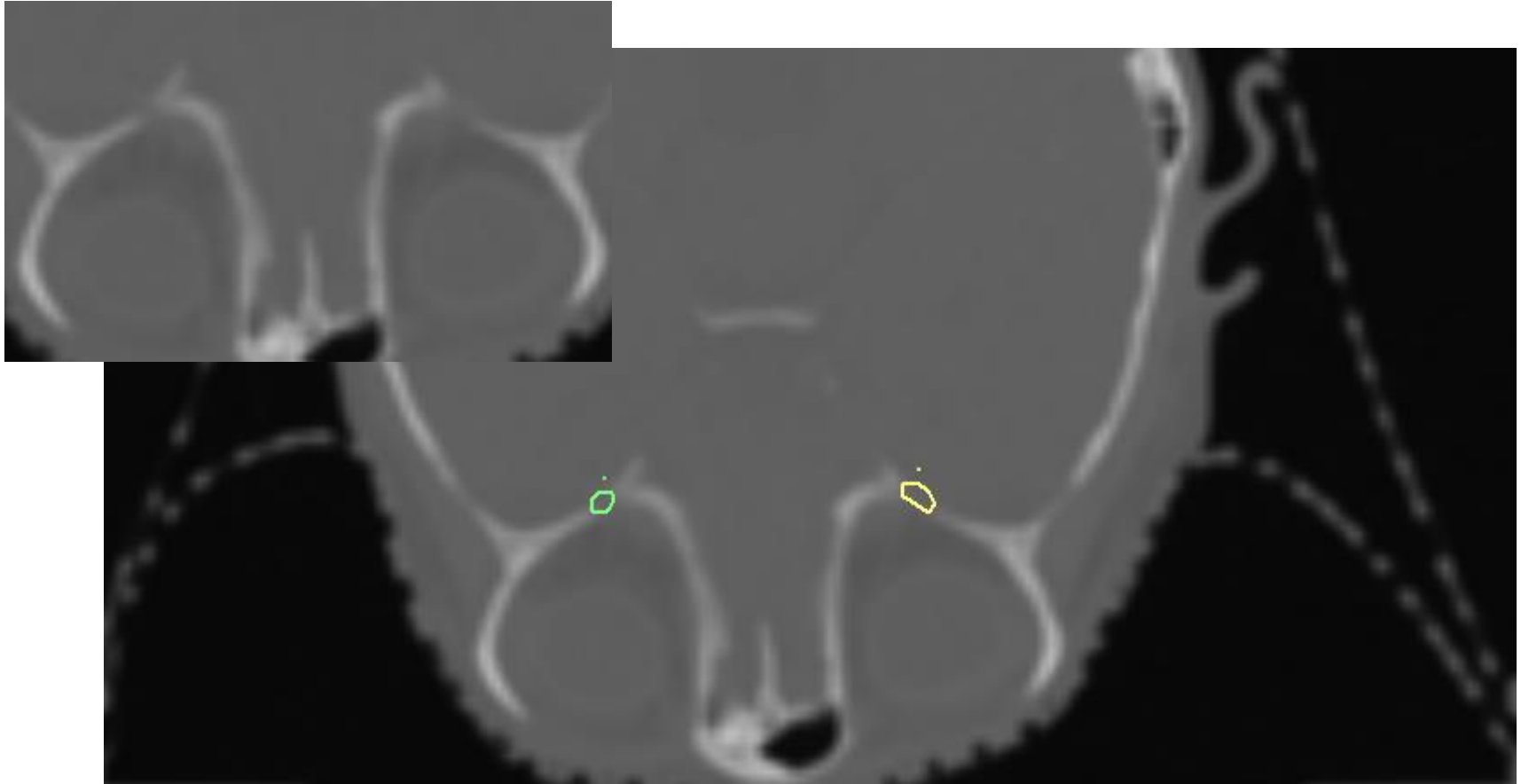
Axial section just above the start of superior orbital fissure

Superior orbital fissure

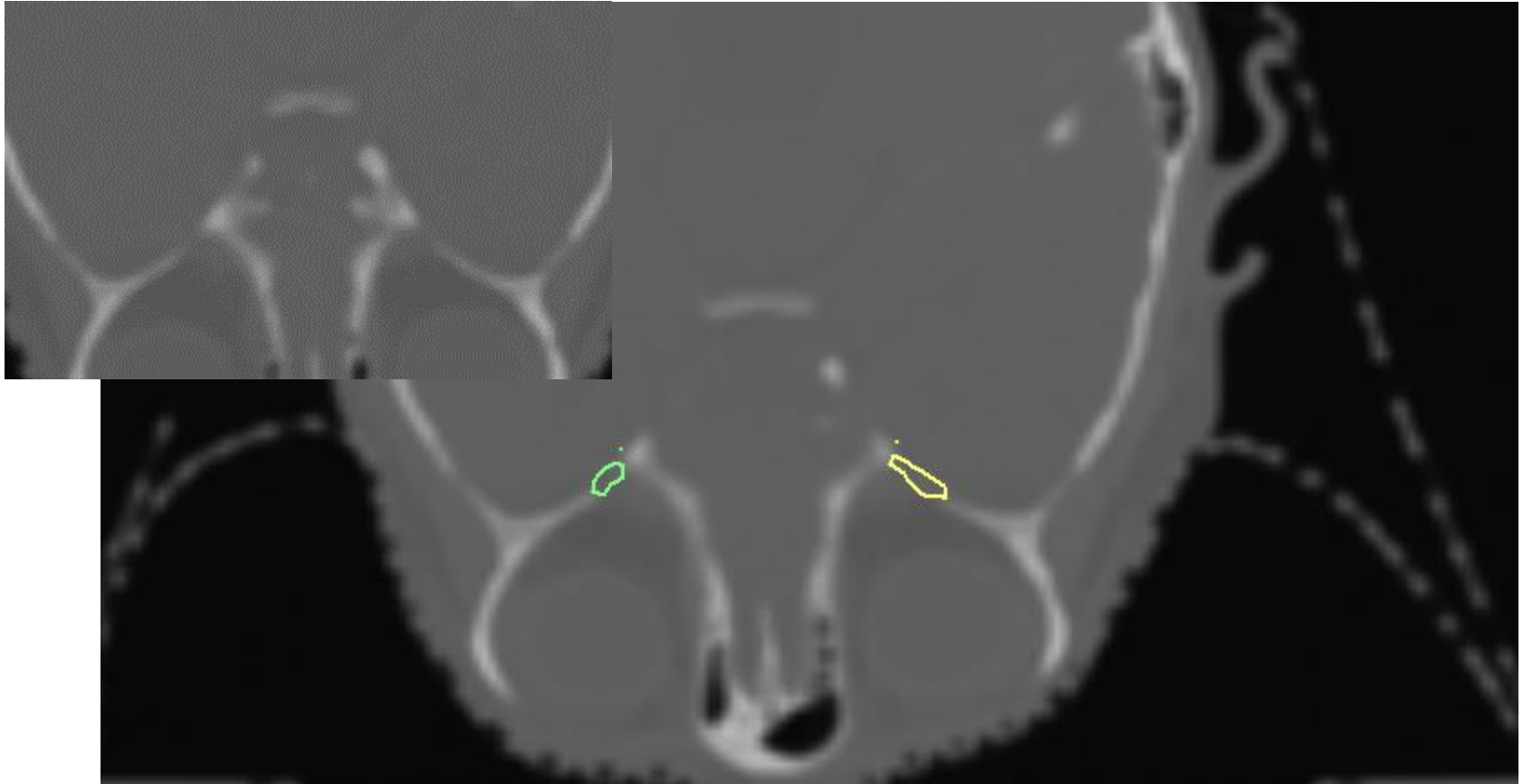


Superior orbital fissures

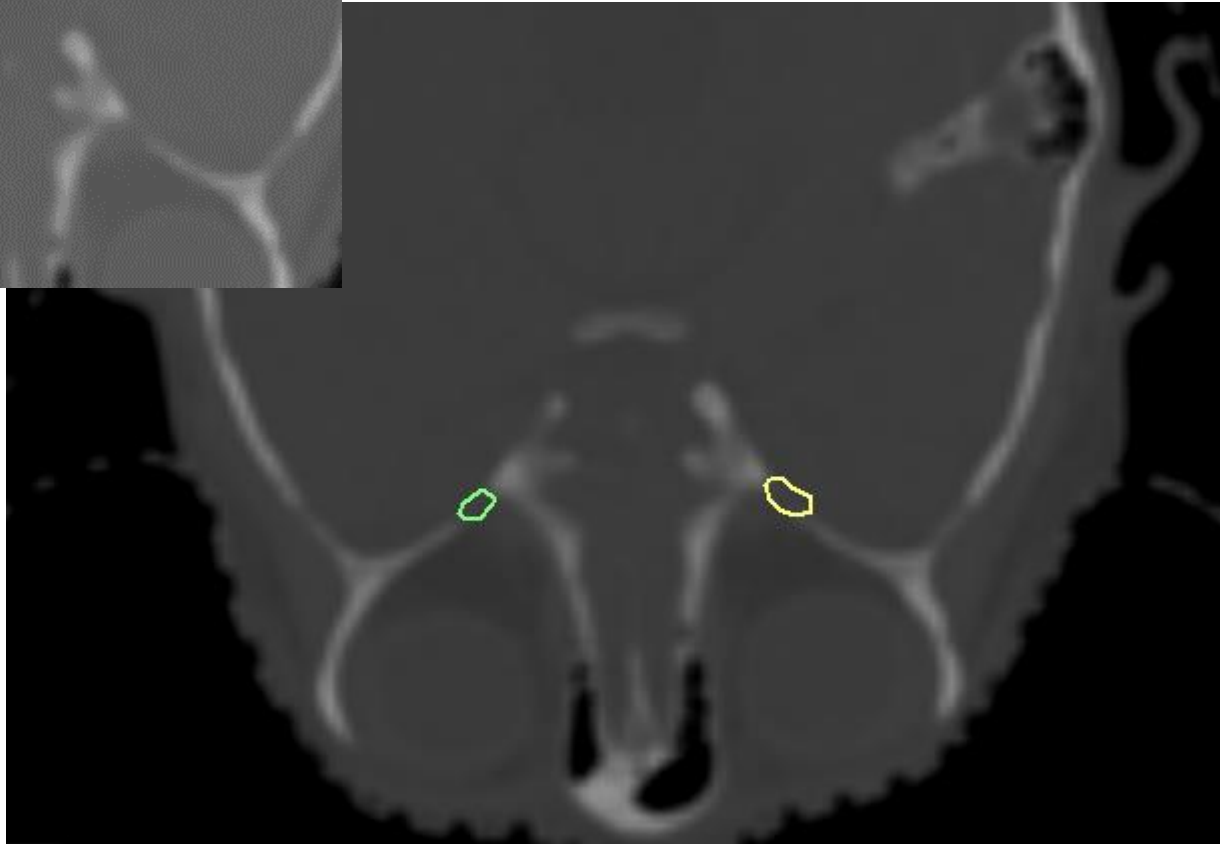
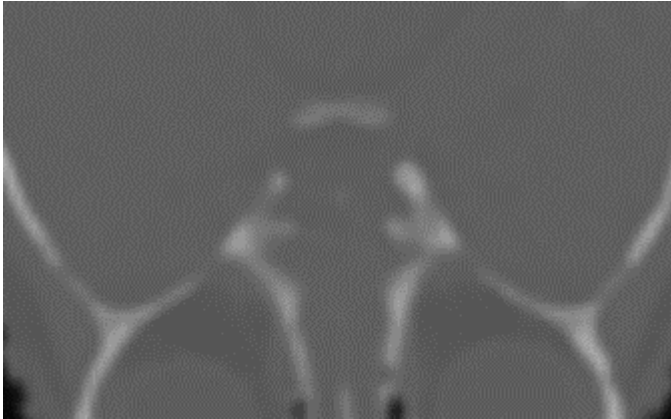
Superior orbital fissure



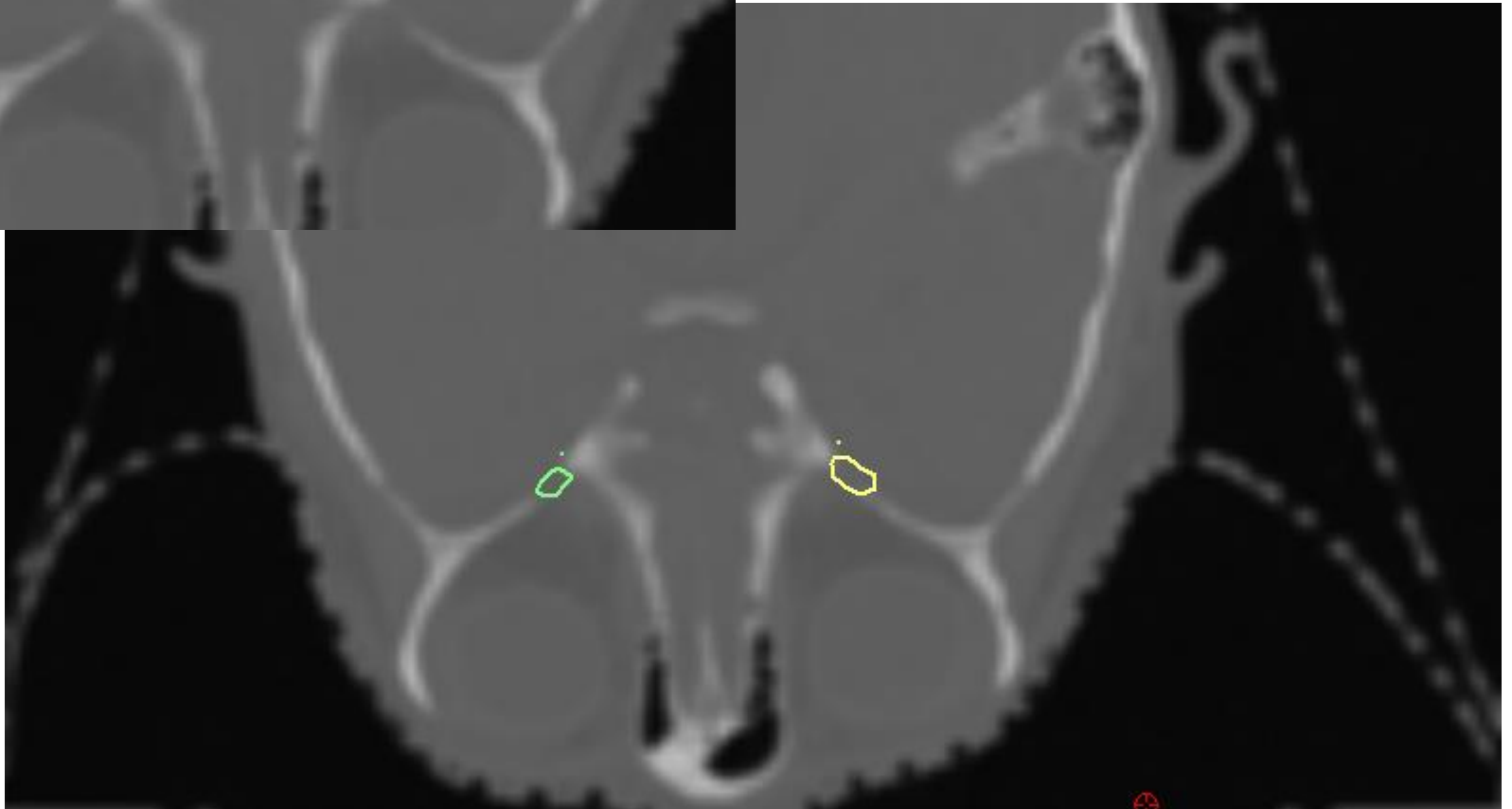
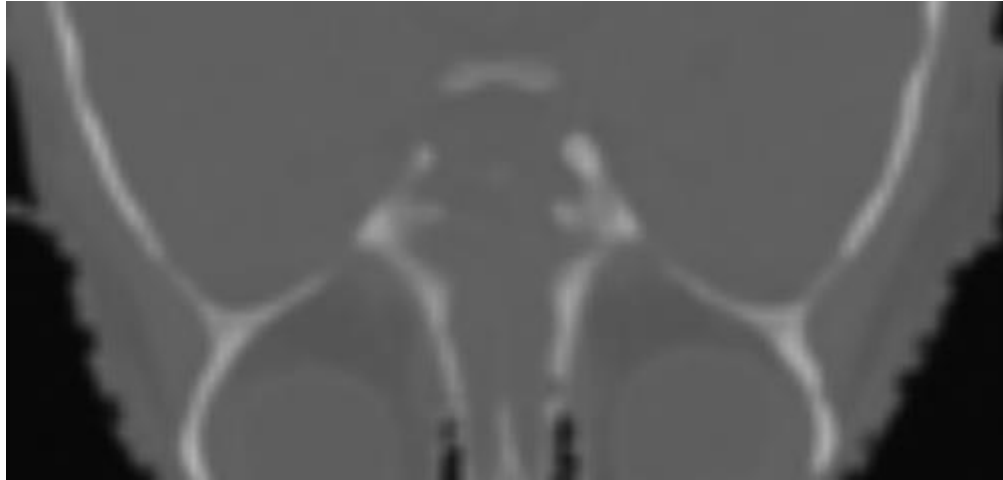
Superior orbital fissure



Superior orbital fissure



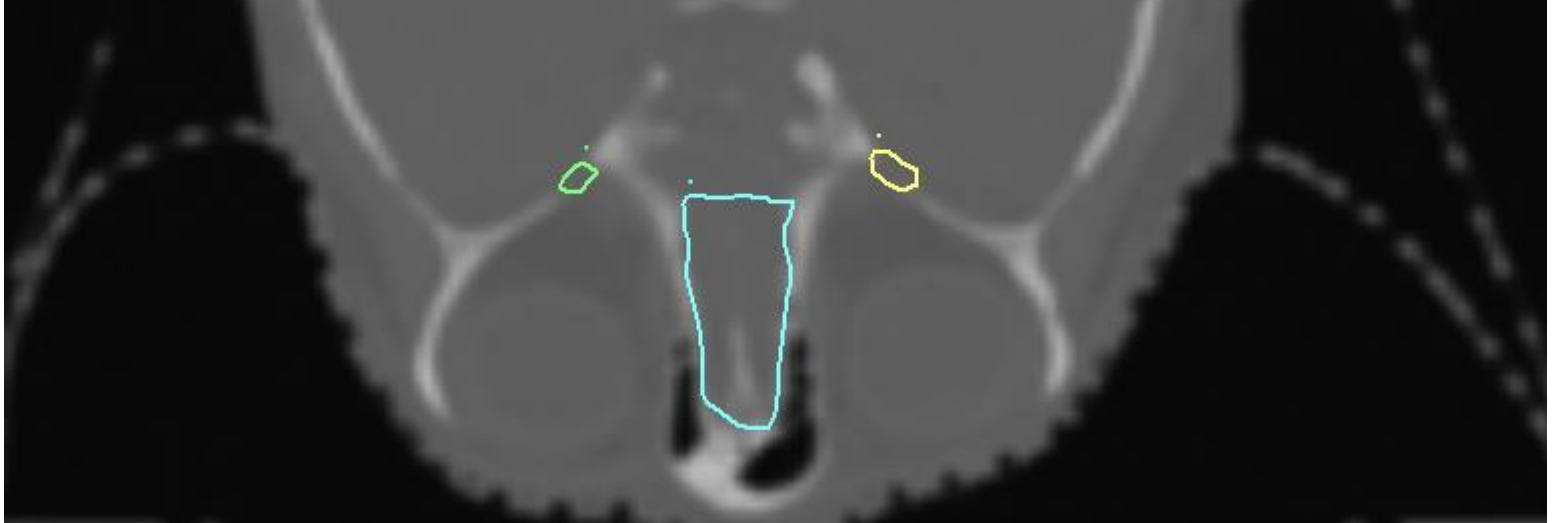
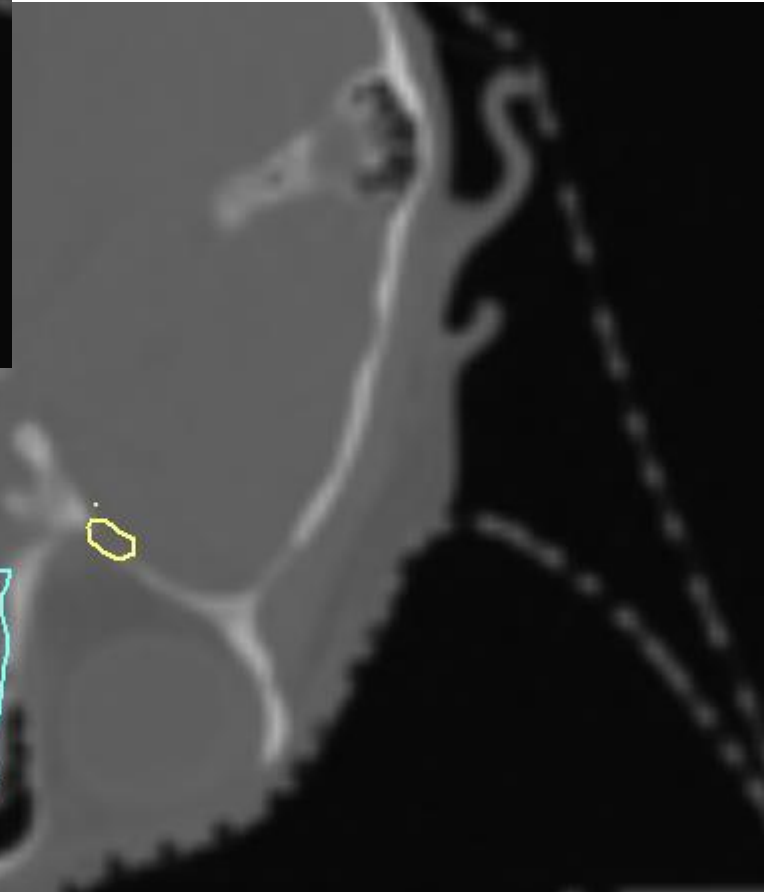
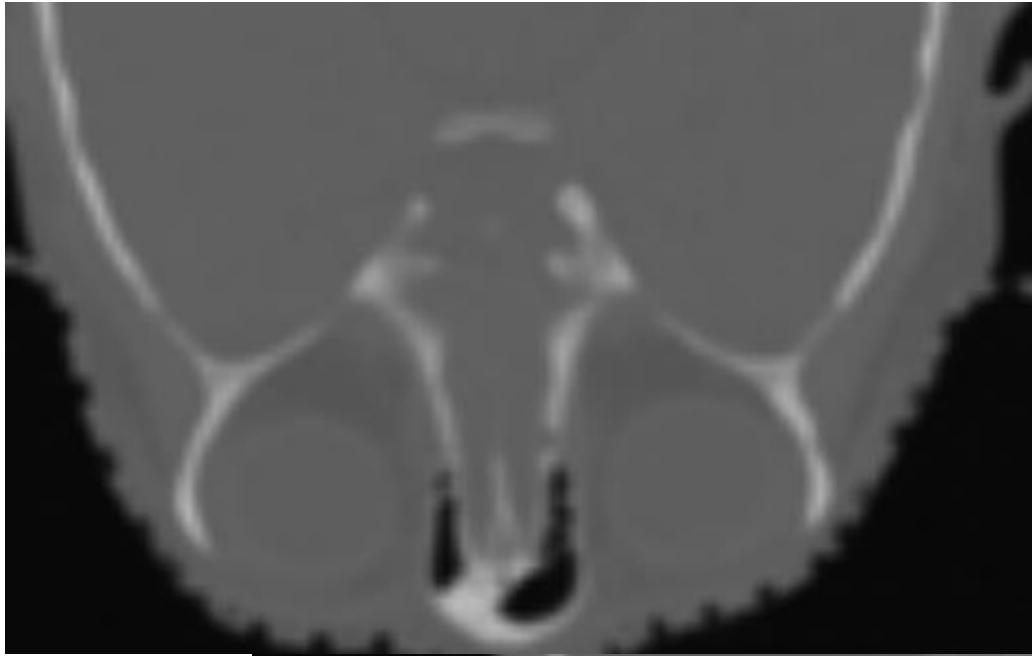
Superior orbital fissure



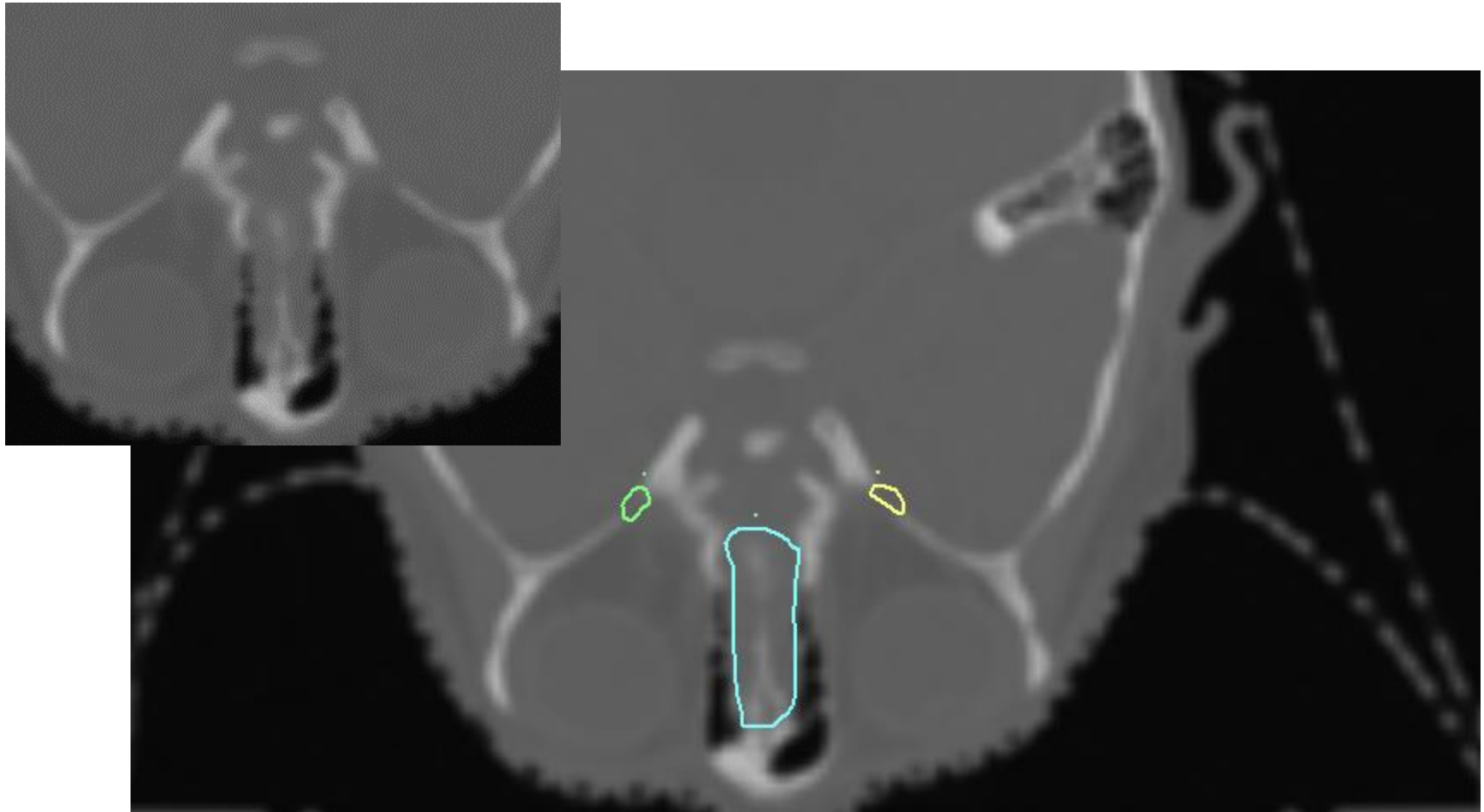
Superior orbital fissure & Cribriform plate



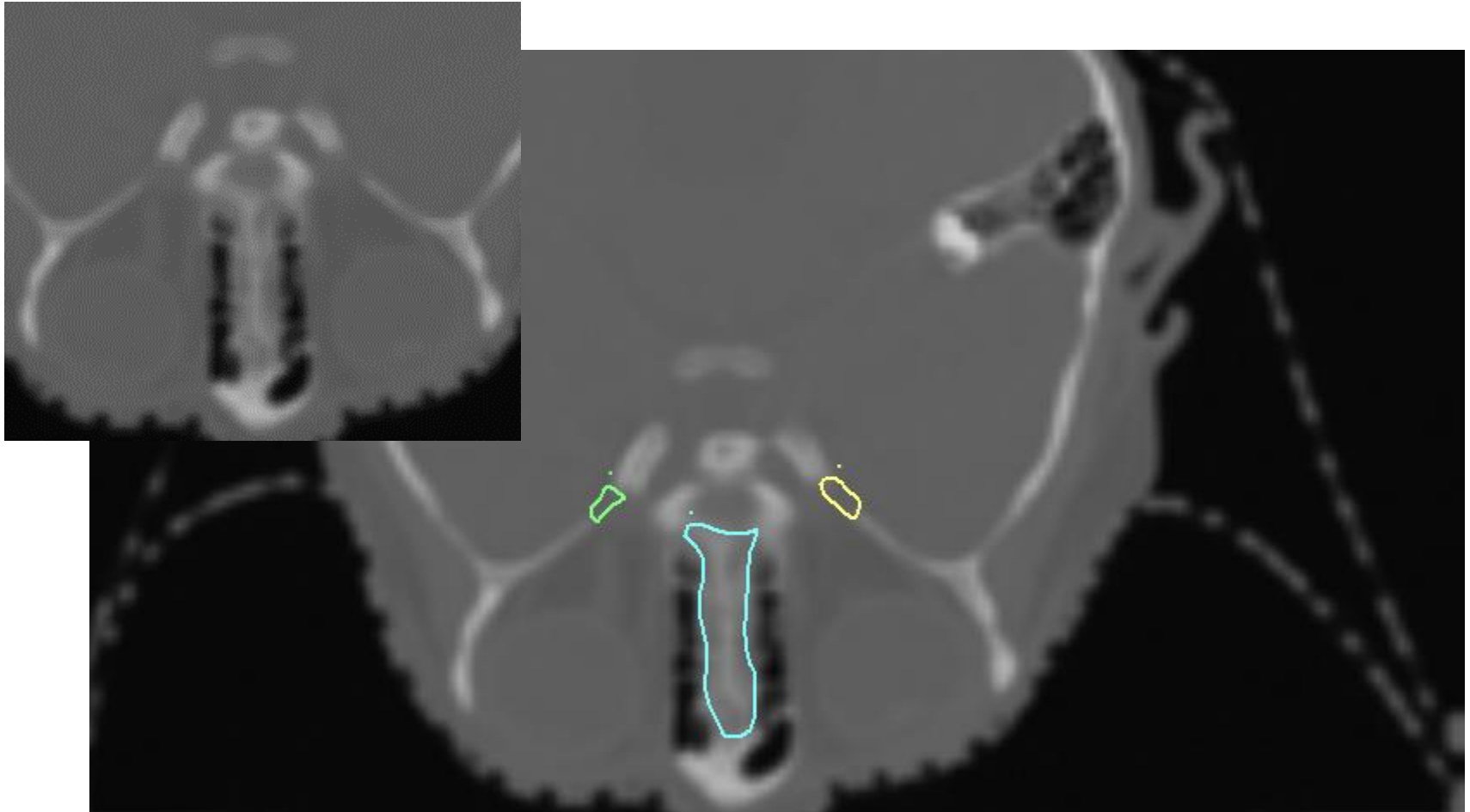
Superior orbital fissure & Cribriform plate



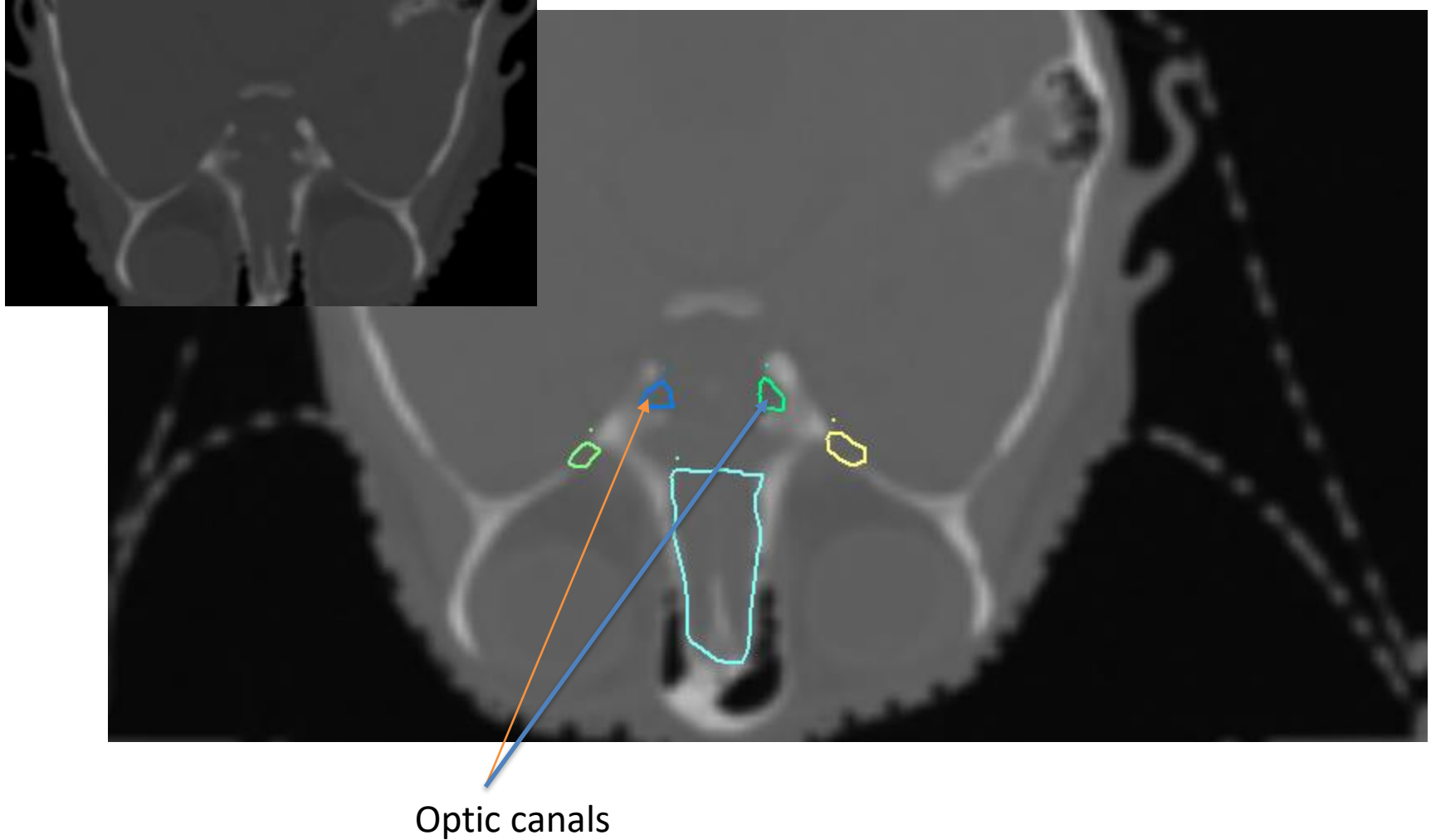
Superior orbital fissure & Cribriform plate



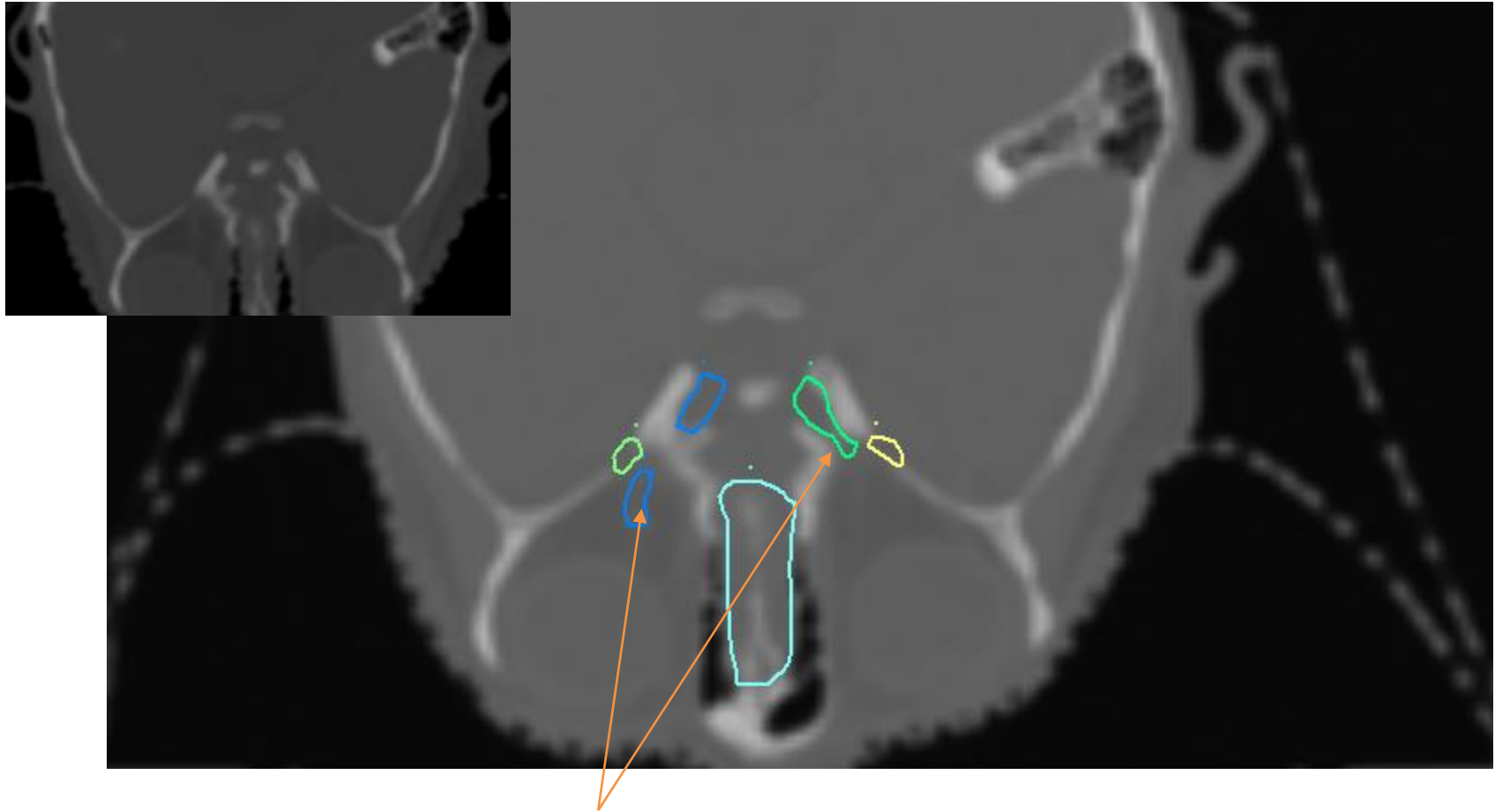
Superior orbital fissure & Cribriform plate



Superior orbital fissure, Cribriform plate, Optic Canal

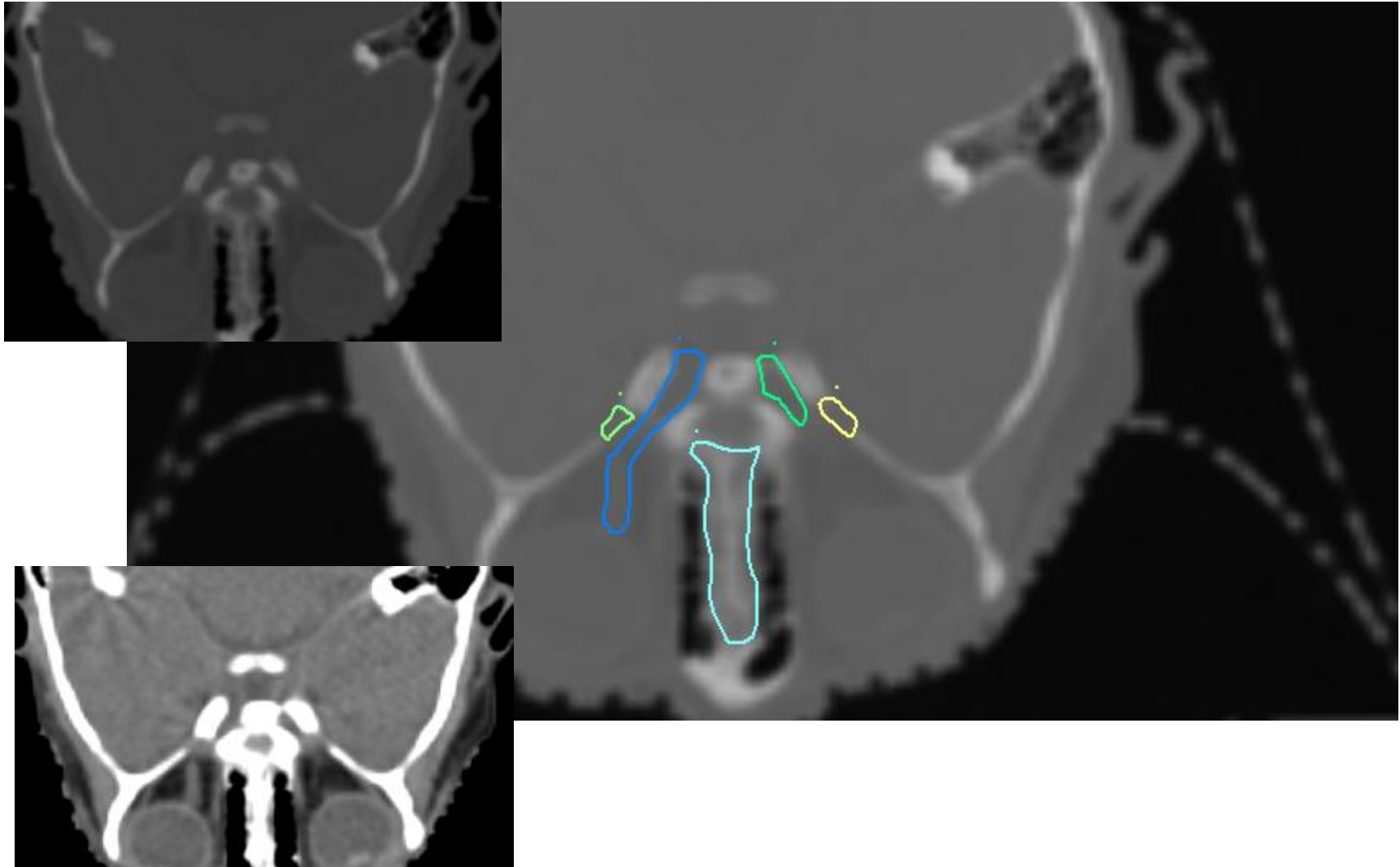


Superior orbital fissure, Cribriform plate, optic canal, optic nerve

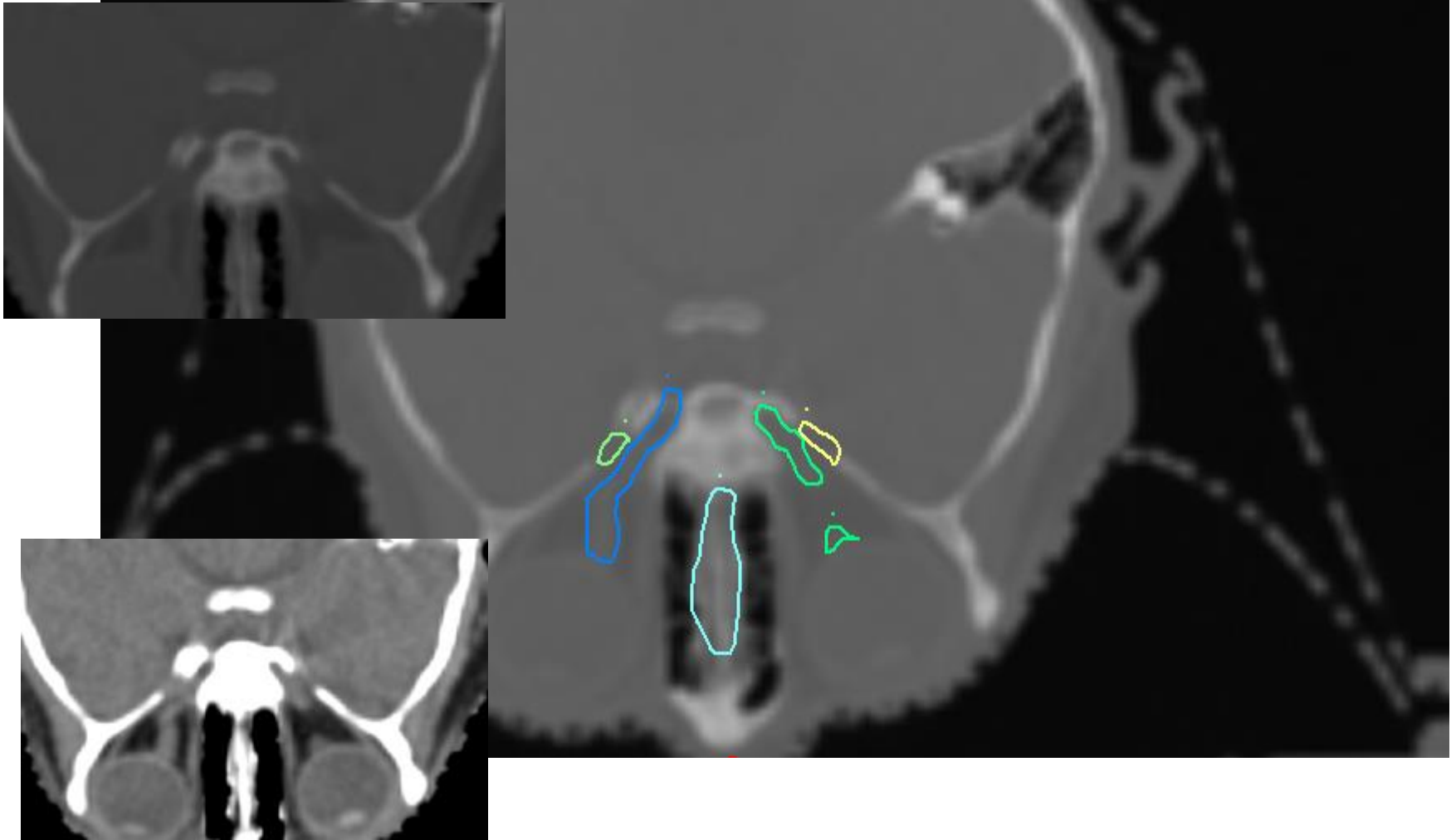


Optic nerve

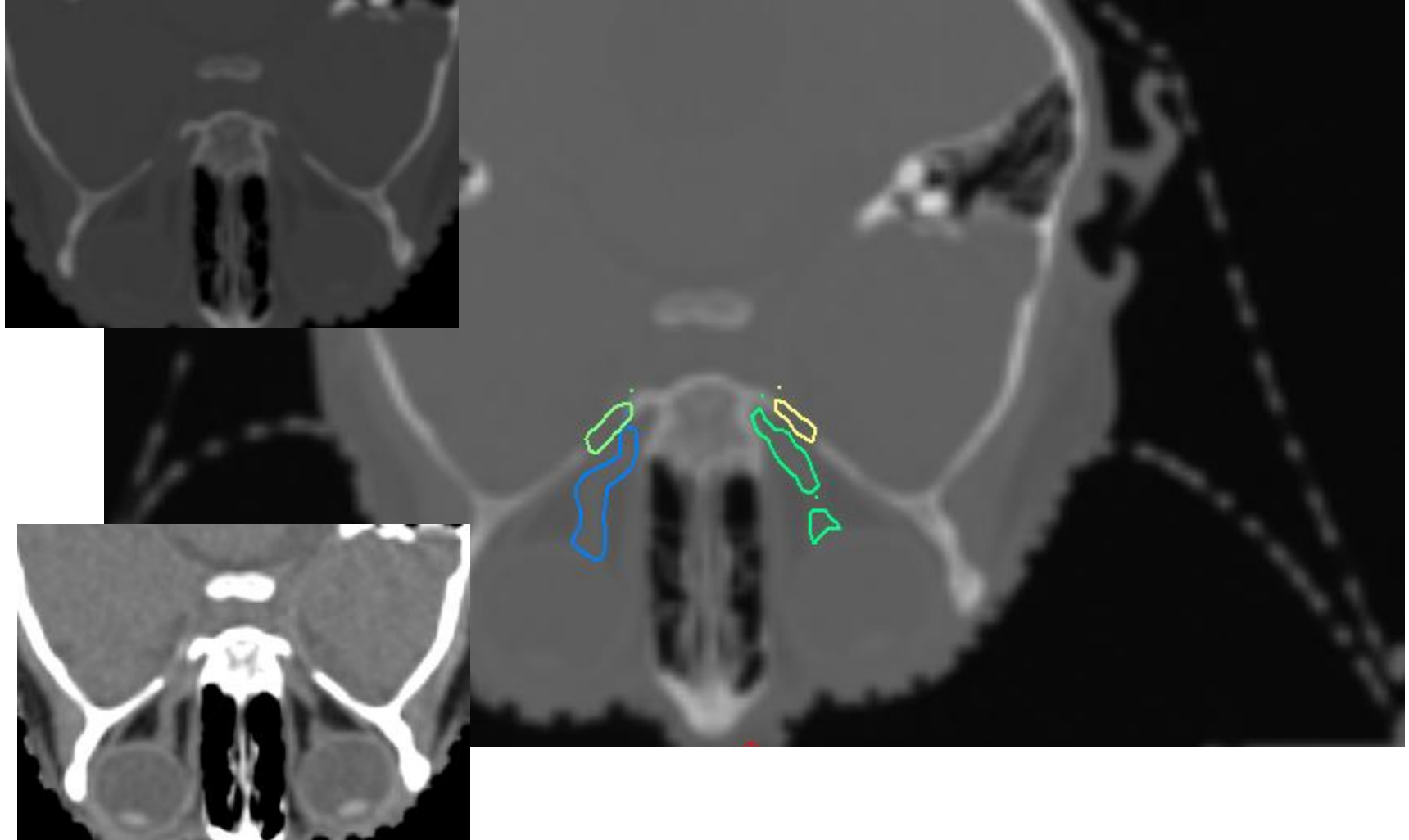
Superior orbital fissures, Cribriform plate, optic canals with optic nerves



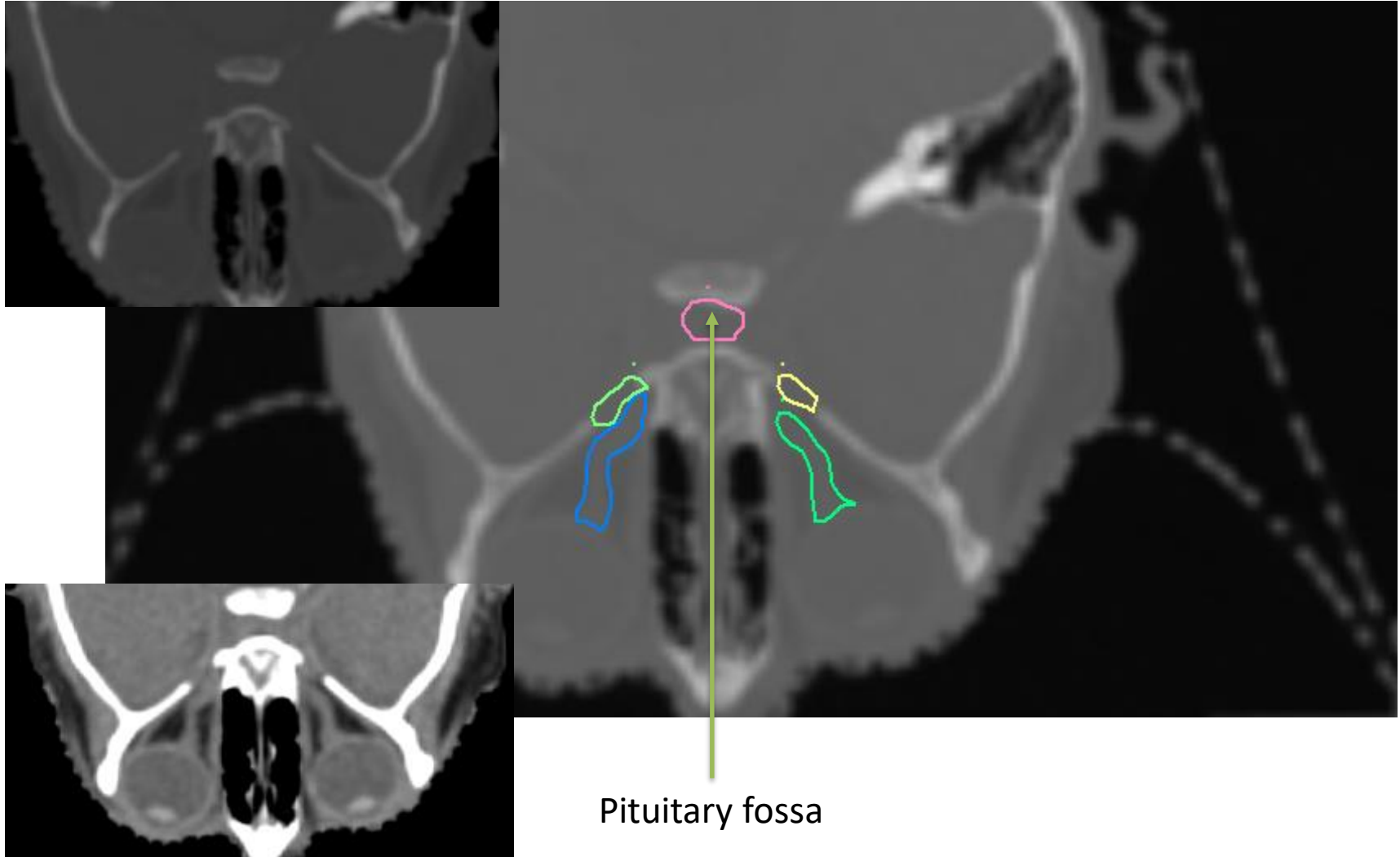
Superior orbital fissure, Cribriform plate, optic canals with optic nerves



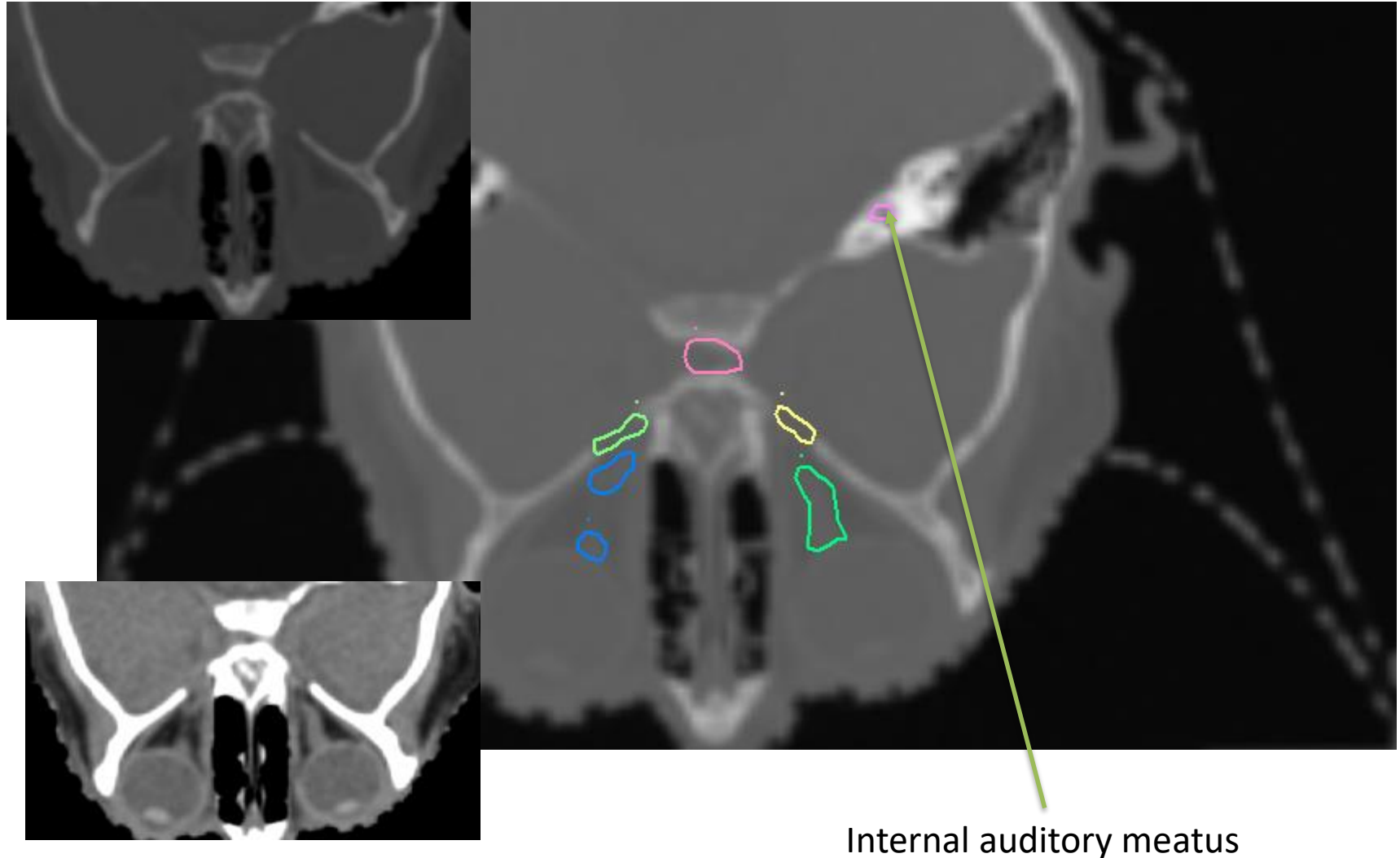
Superior orbital fissures, optic canals with optic nerves



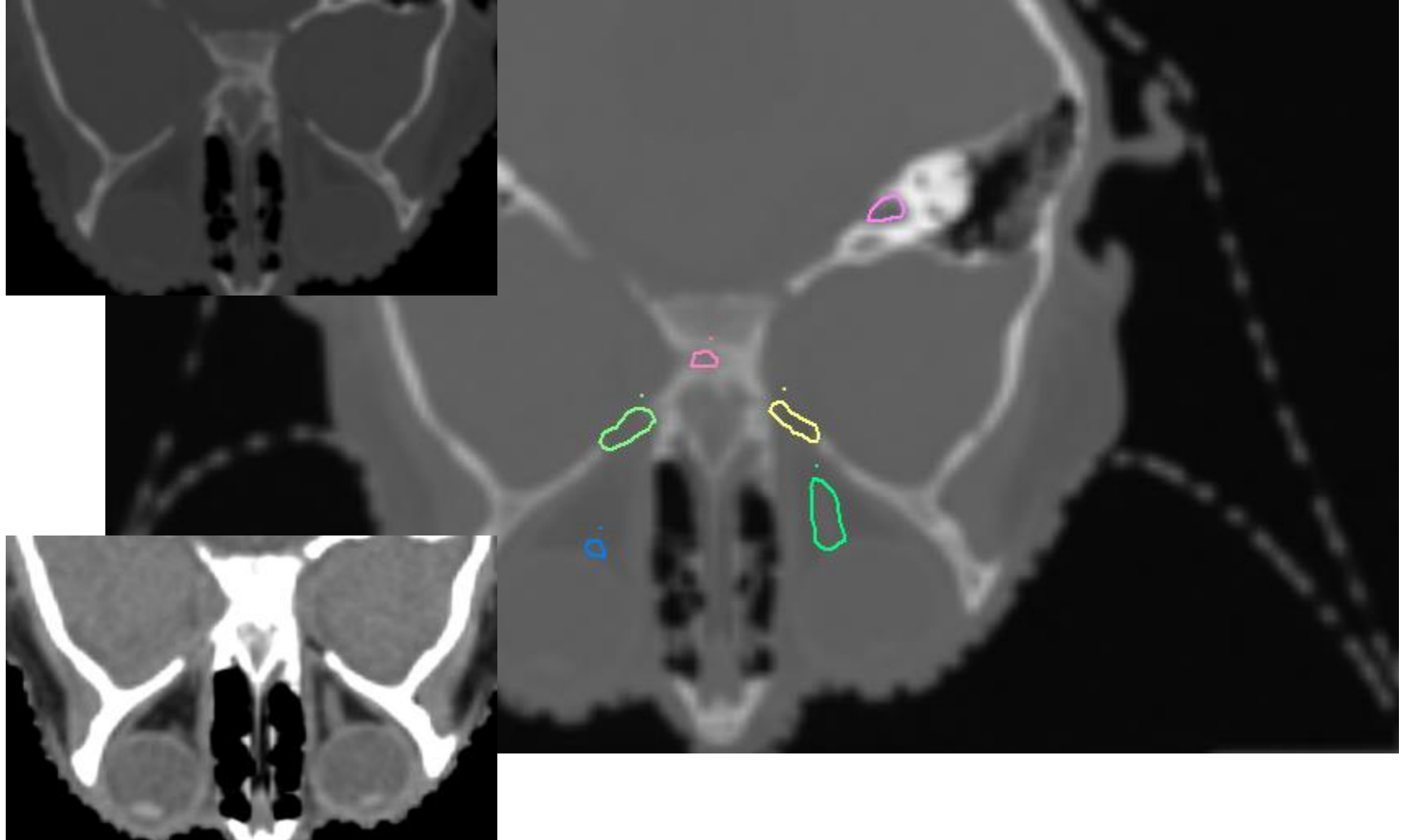
Superior orbital fissures, optic nerves, pituitary fossa



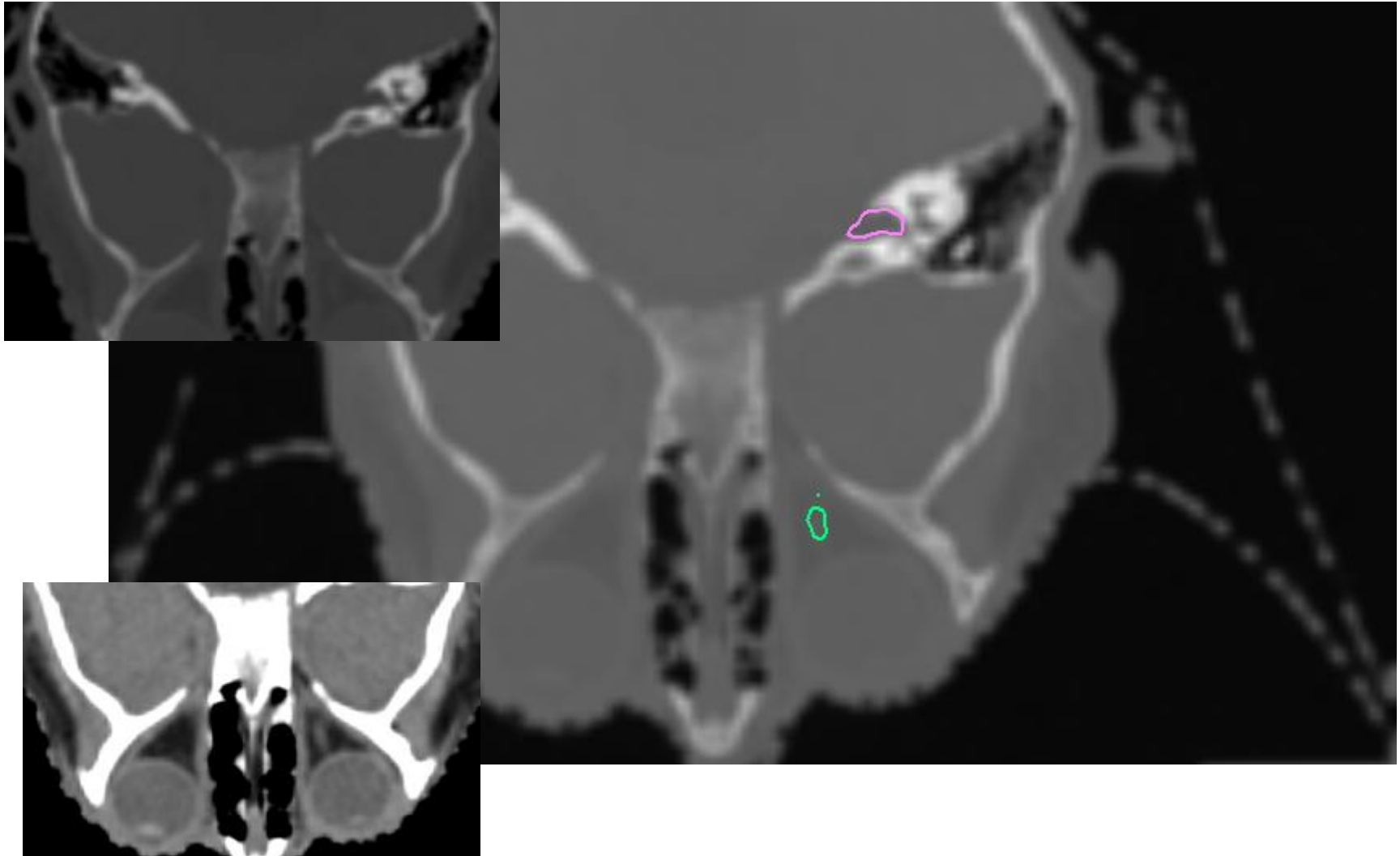
Superior orbital fissure, optic nerves, pituitary fossa, internal auditory meatus



Superior orbital fissure, optic nerves,
pituitary fossa, internal auditory meatus



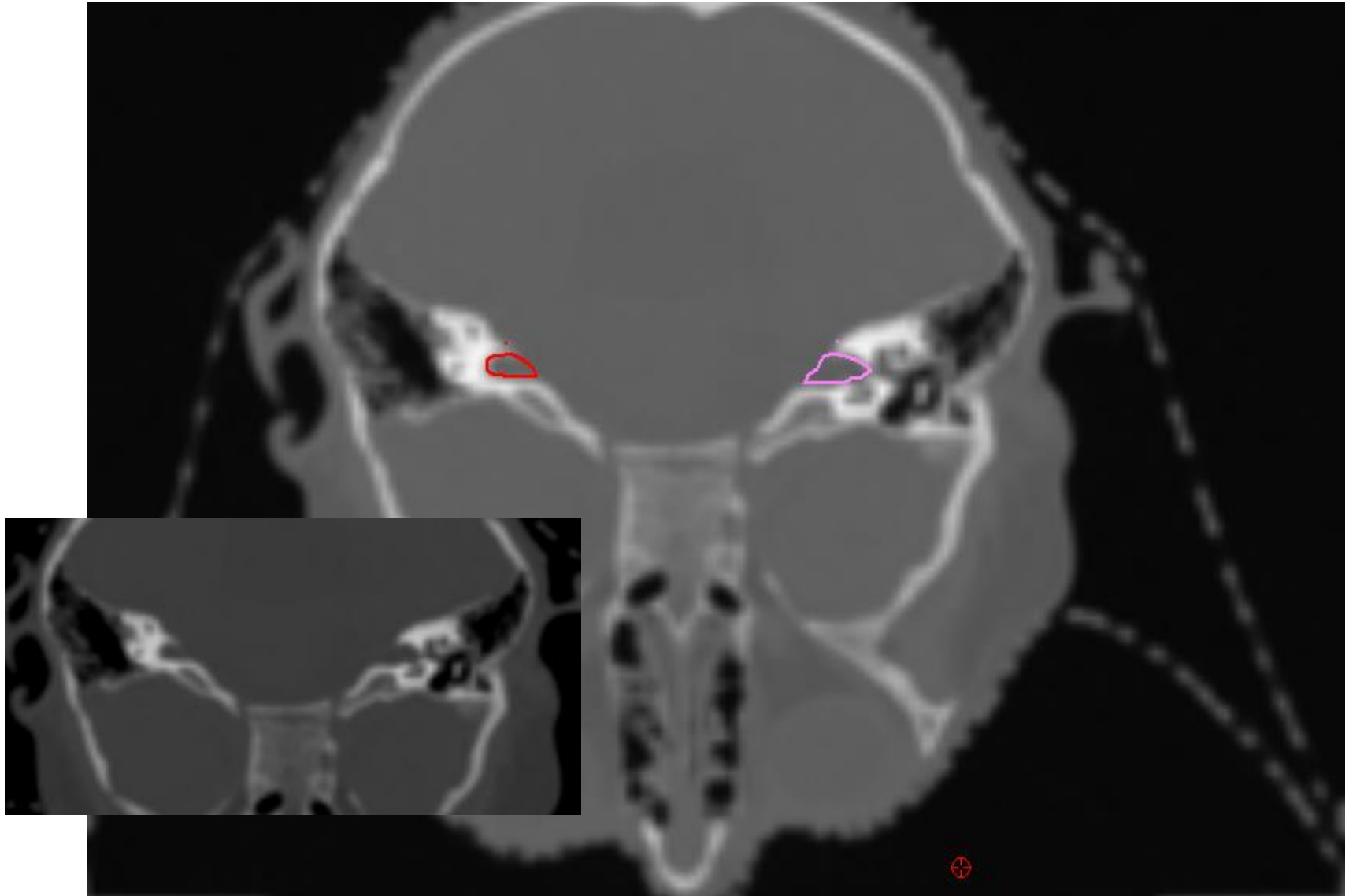
Optic nerve, internal auditory meatus



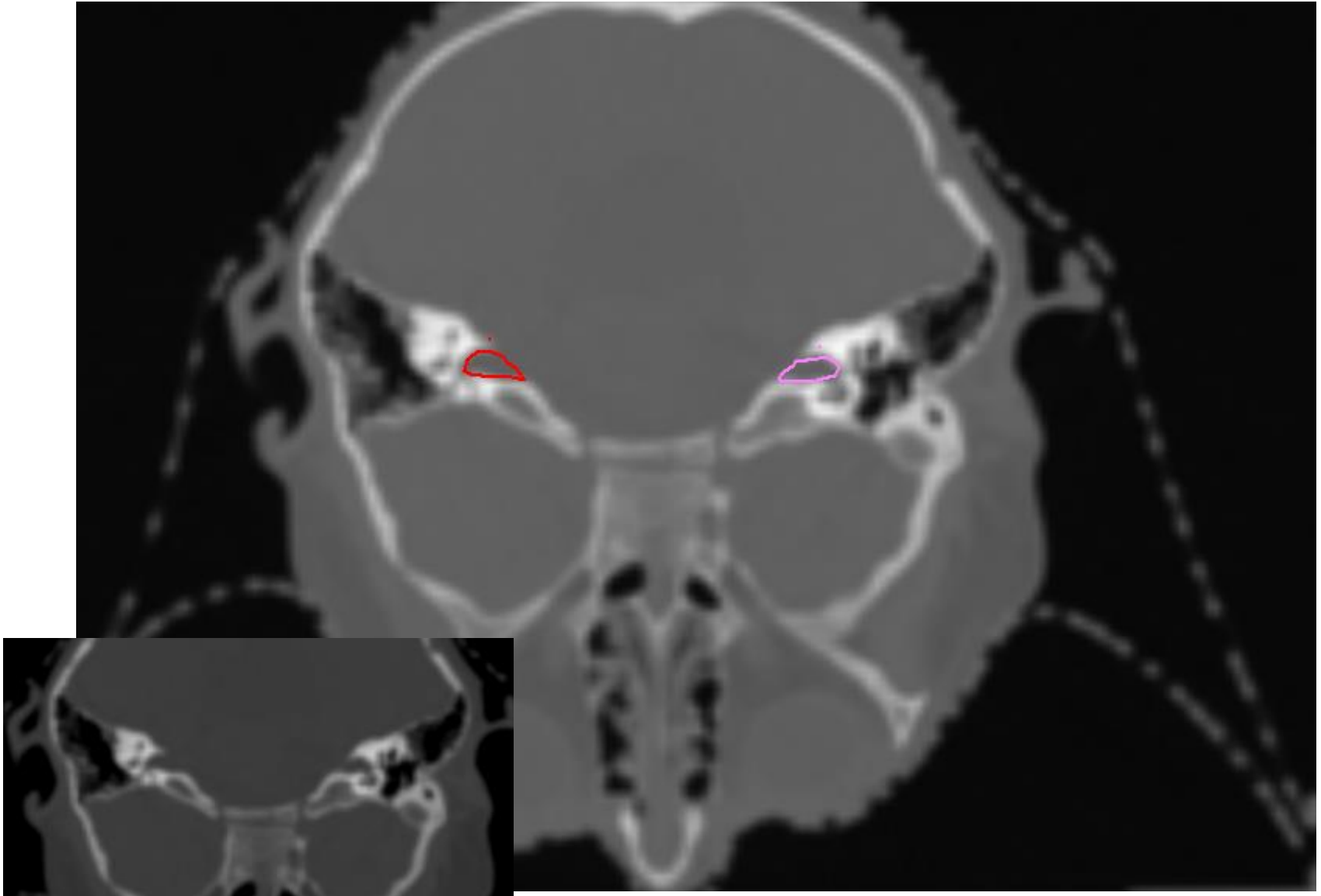
Internal auditory meatus



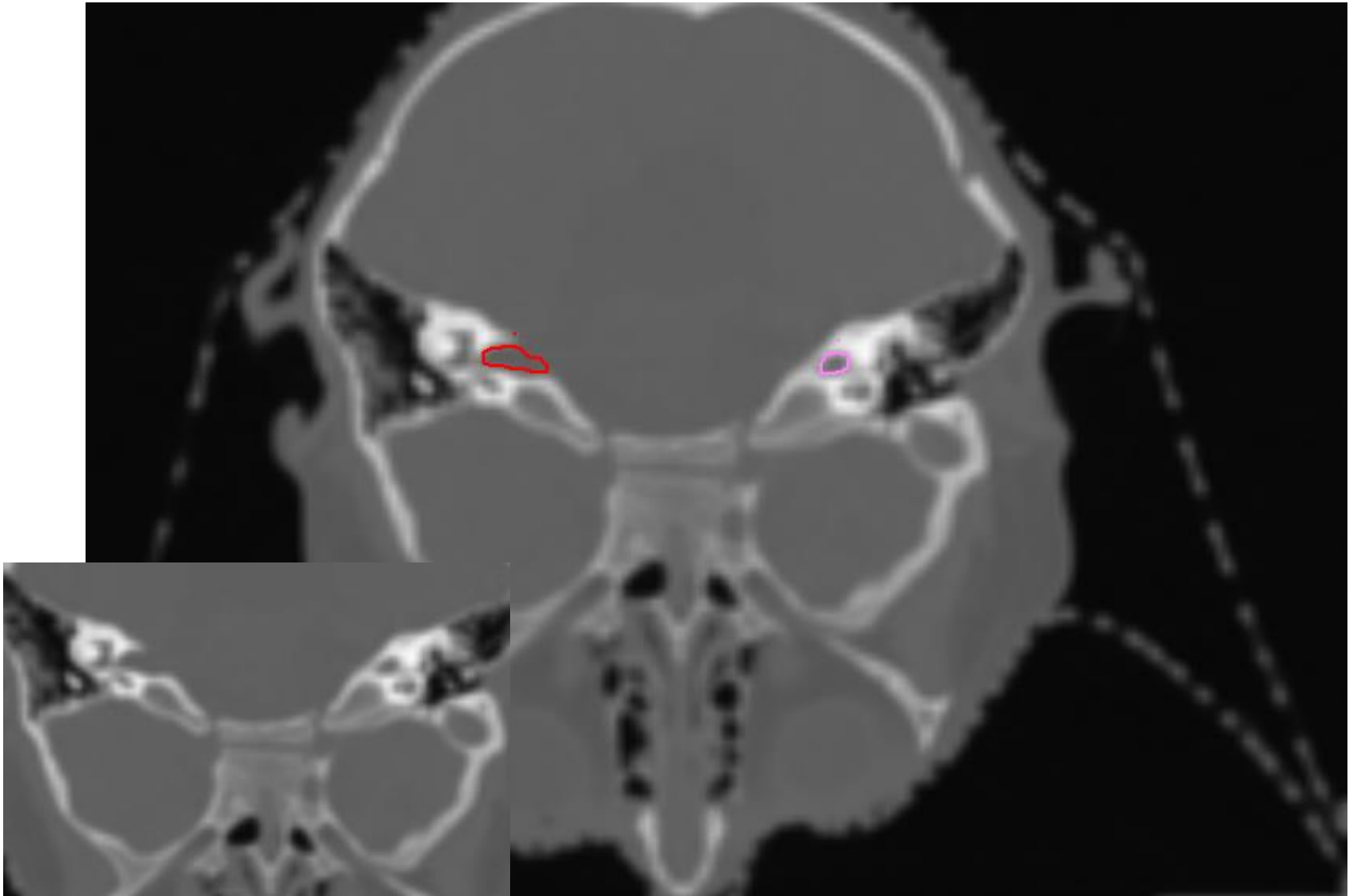
Internal auditory meati



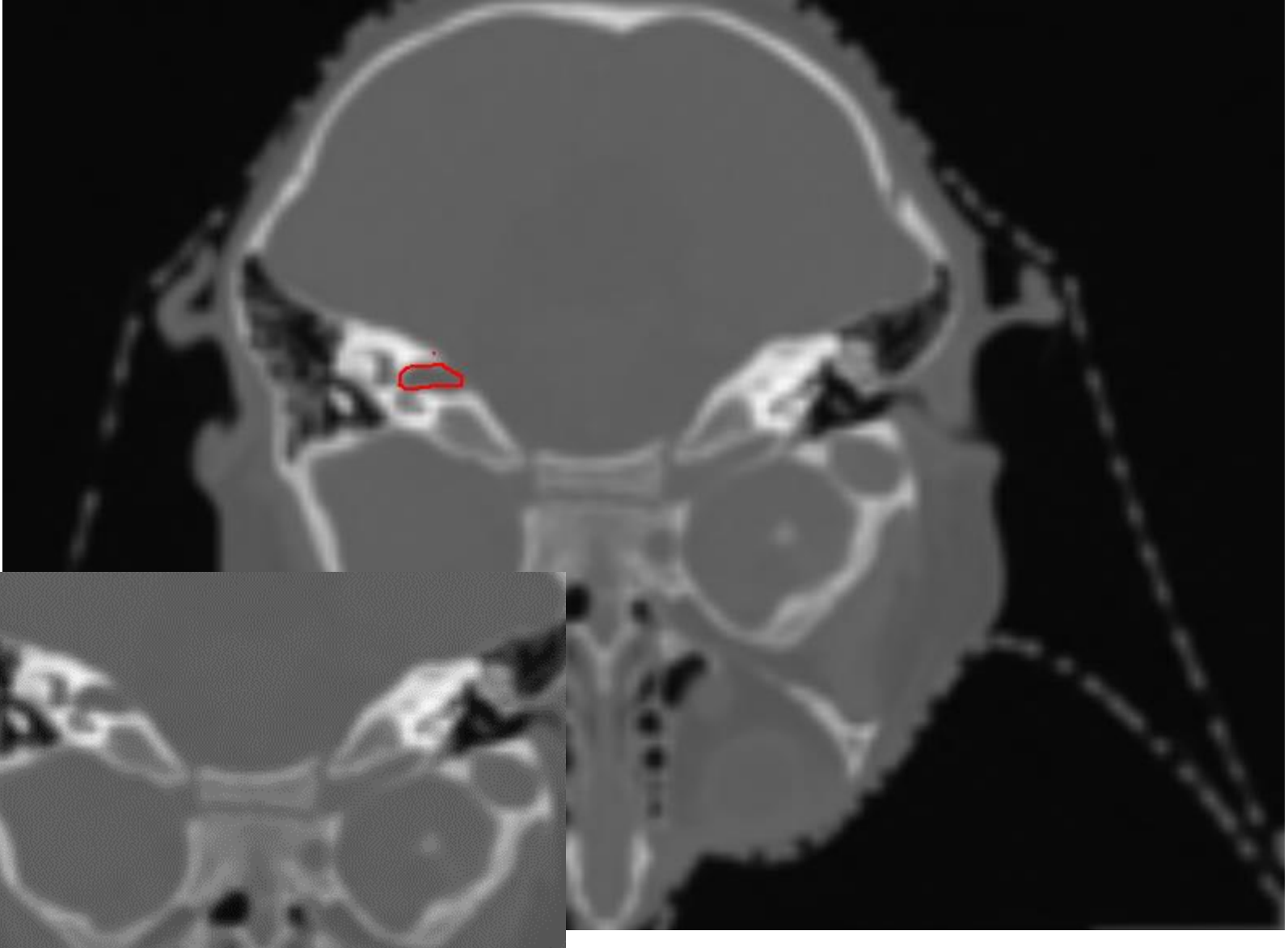
Internal auditory meati



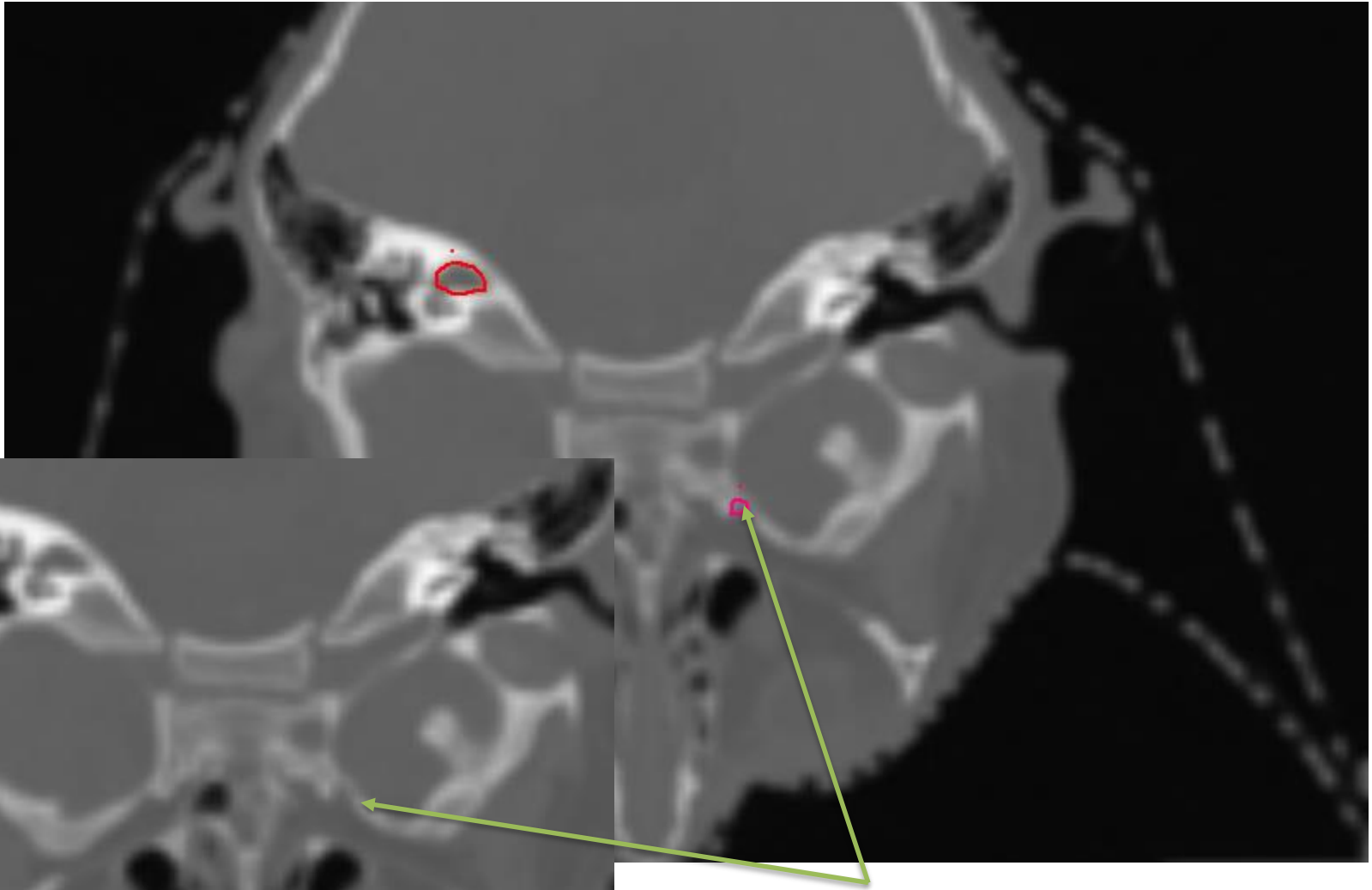
Internal auditory meati



Internal auditory meatus

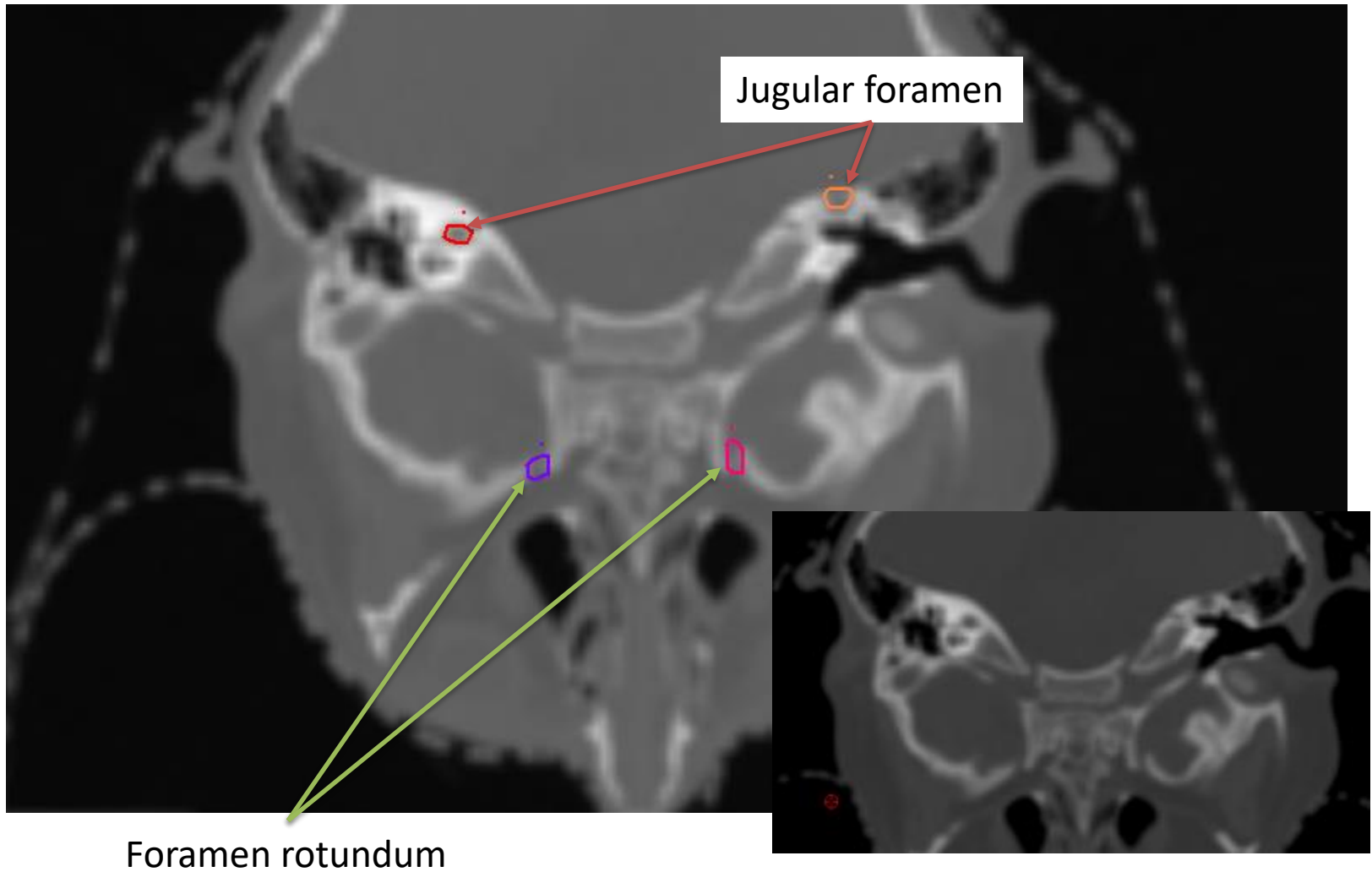


Internal auditory meatus and foramen rotundum

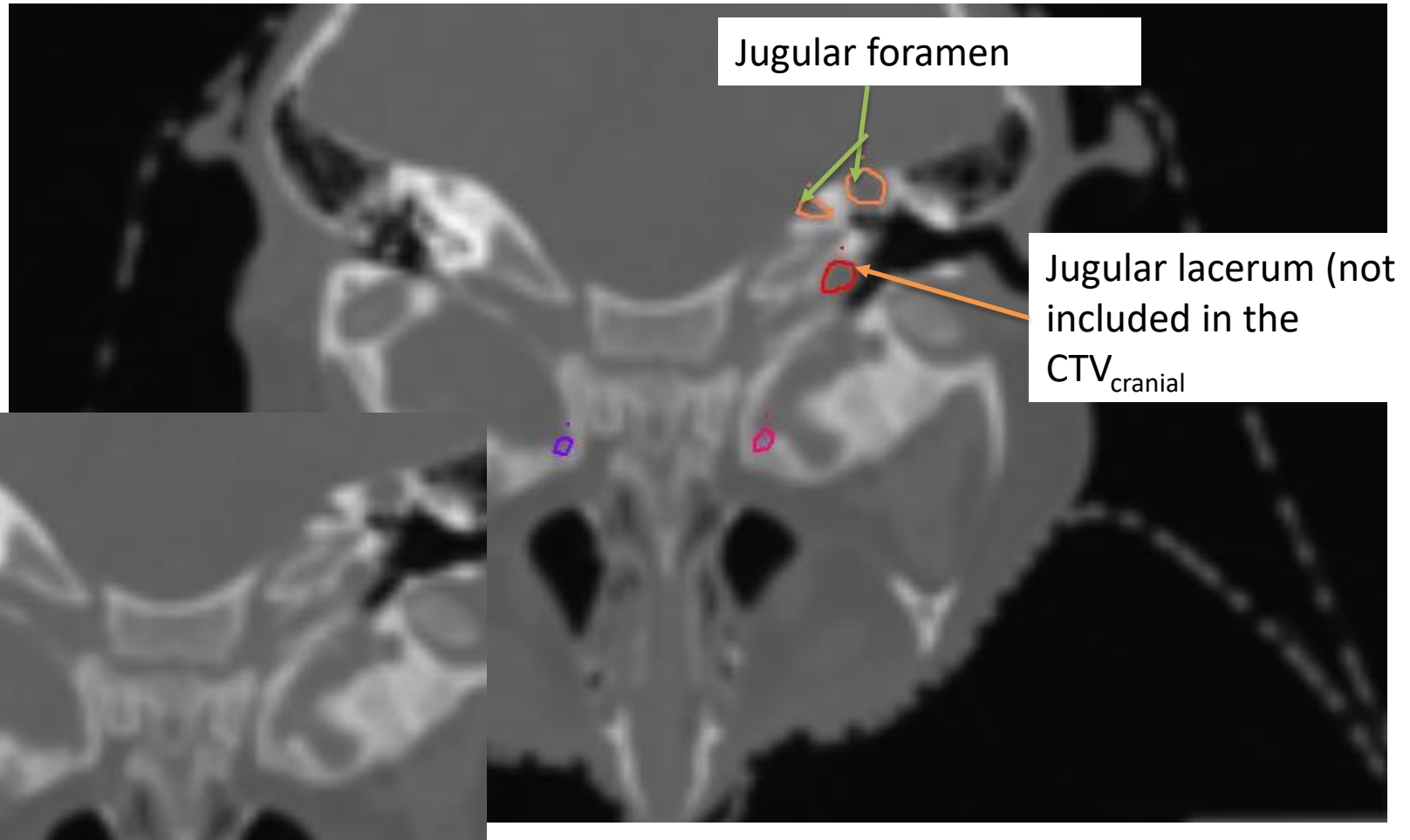


Foramen rotundum

Jugular foramen, foramen rotundum

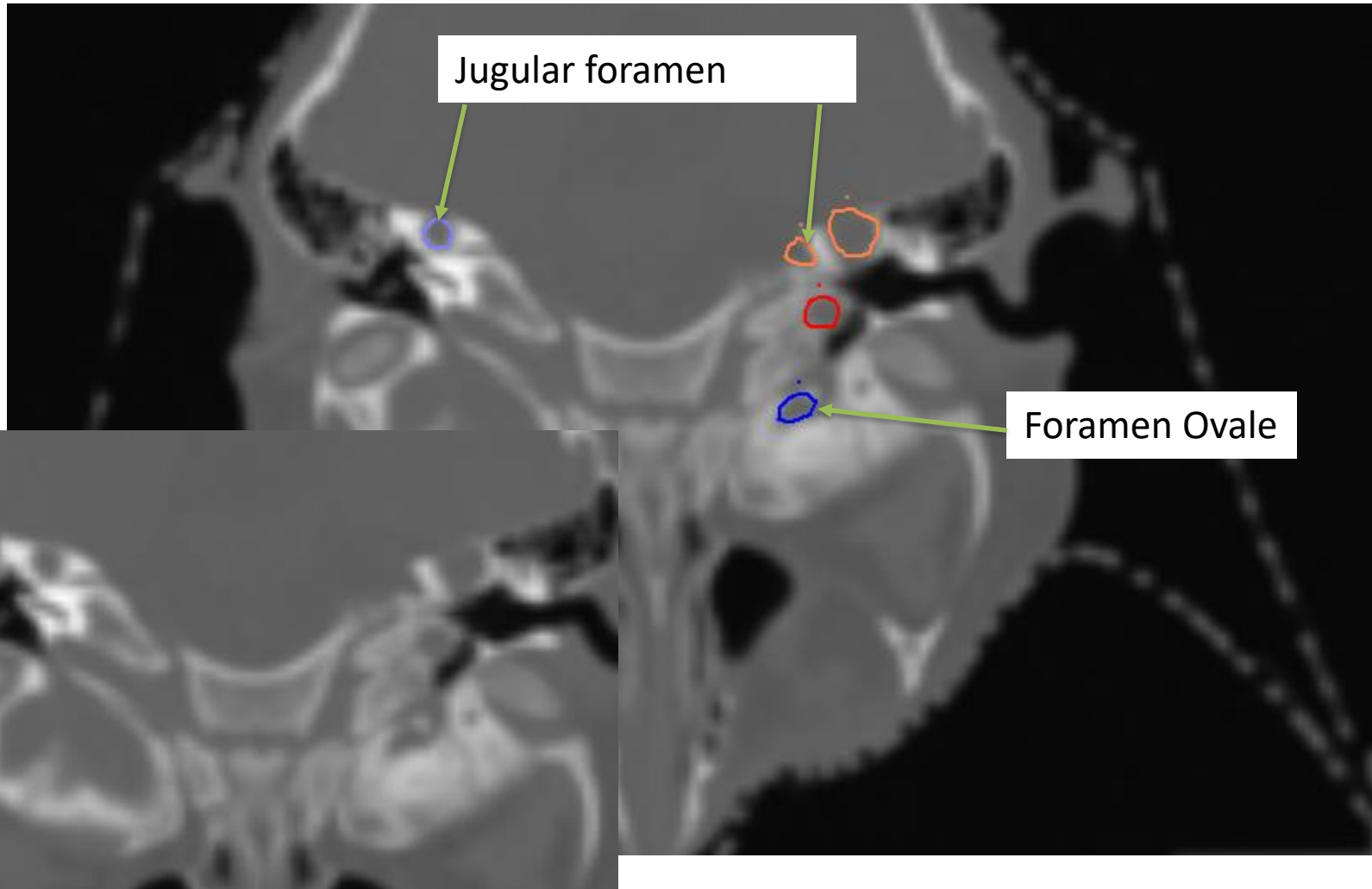


Jugular foramen & foramen rotundum



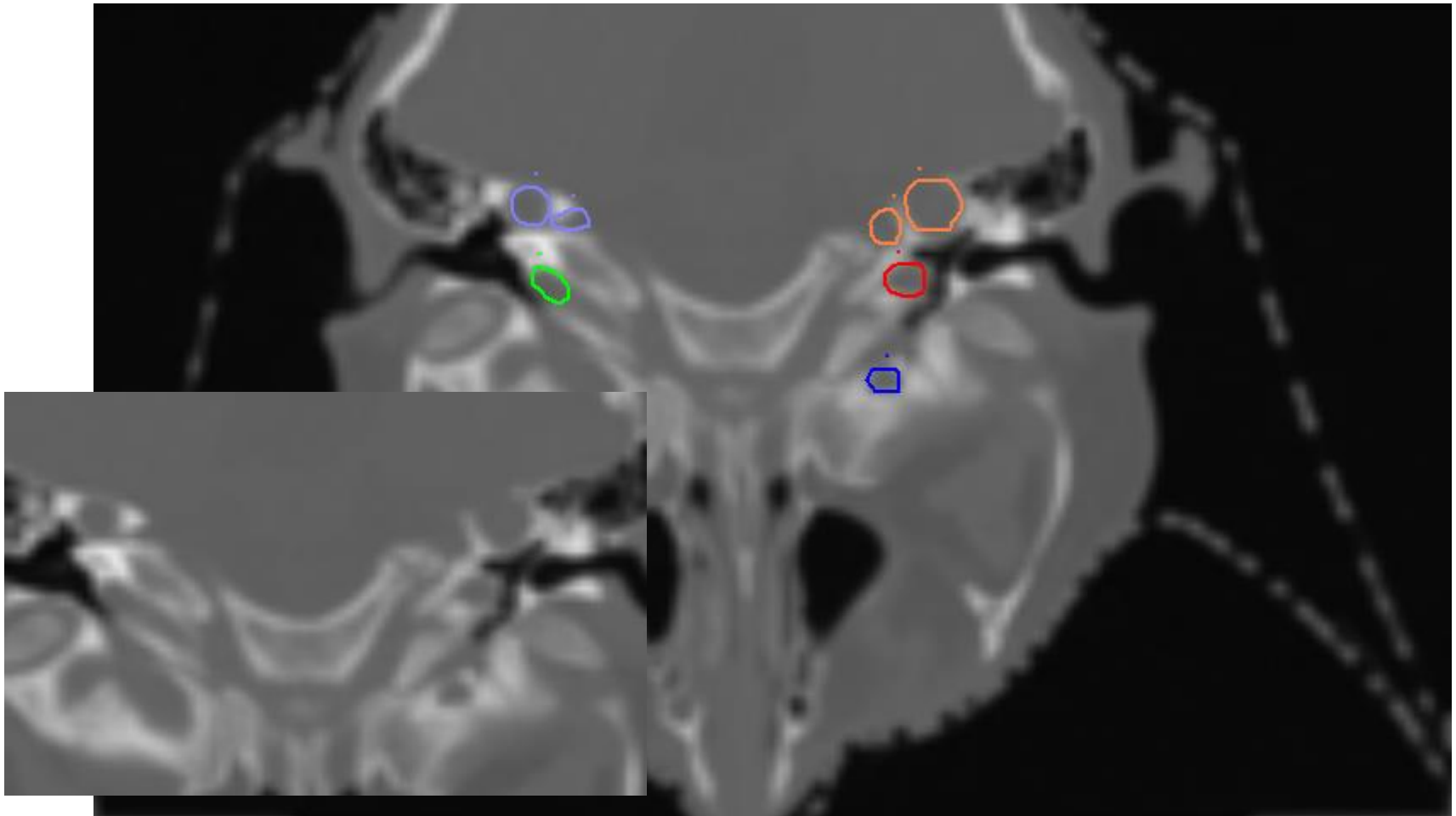
Jugular foramen, foramen ovale

(foramen lacerum also shown)



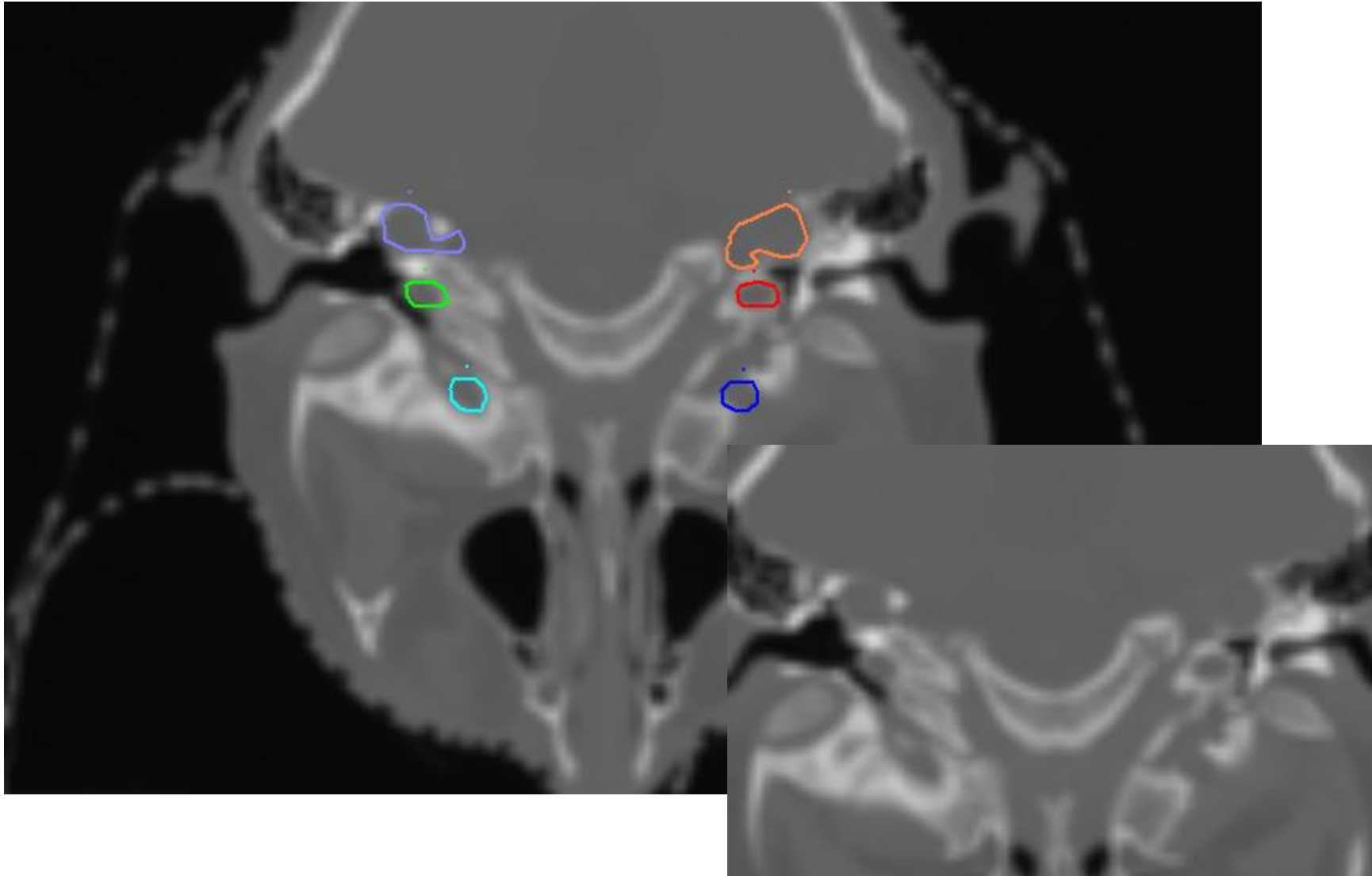
Jugular foramen & foramen ovale

(foramen lacerum also shown)



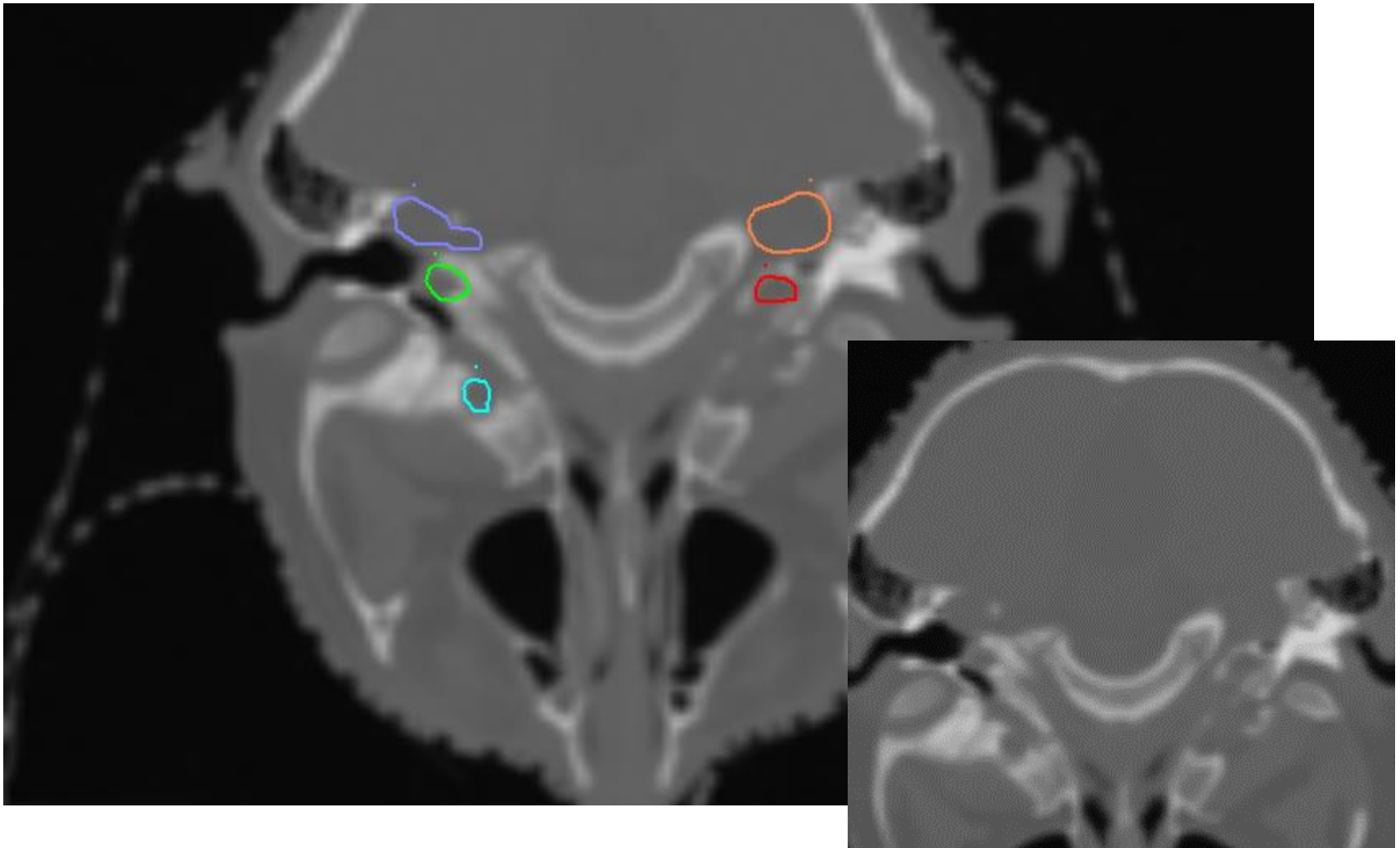
Jugular foramen & foramen ovale

(foramen lacerum also shown)



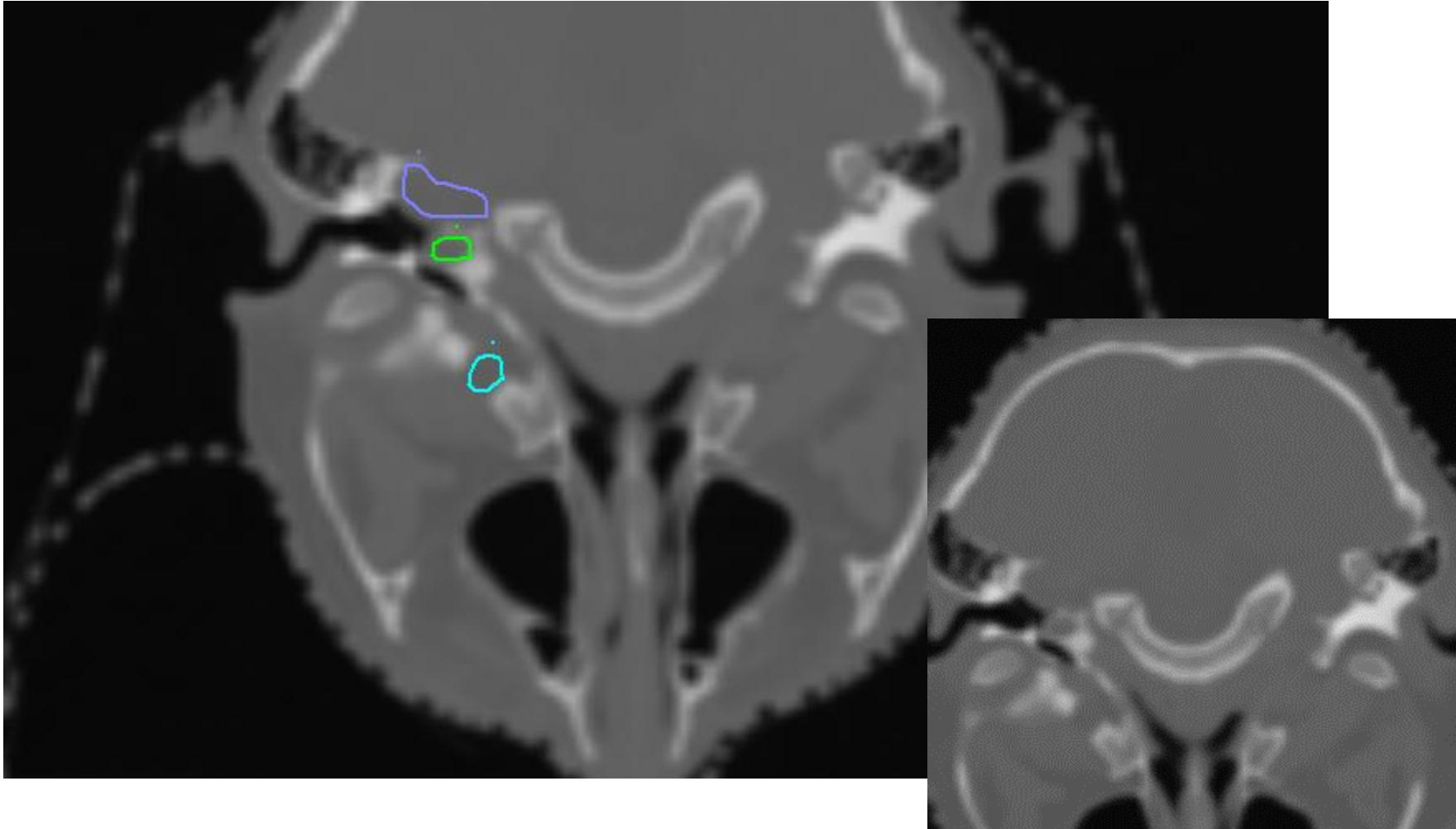
Jugular foramen & foramen ovale

(foramen lacerum also shown)

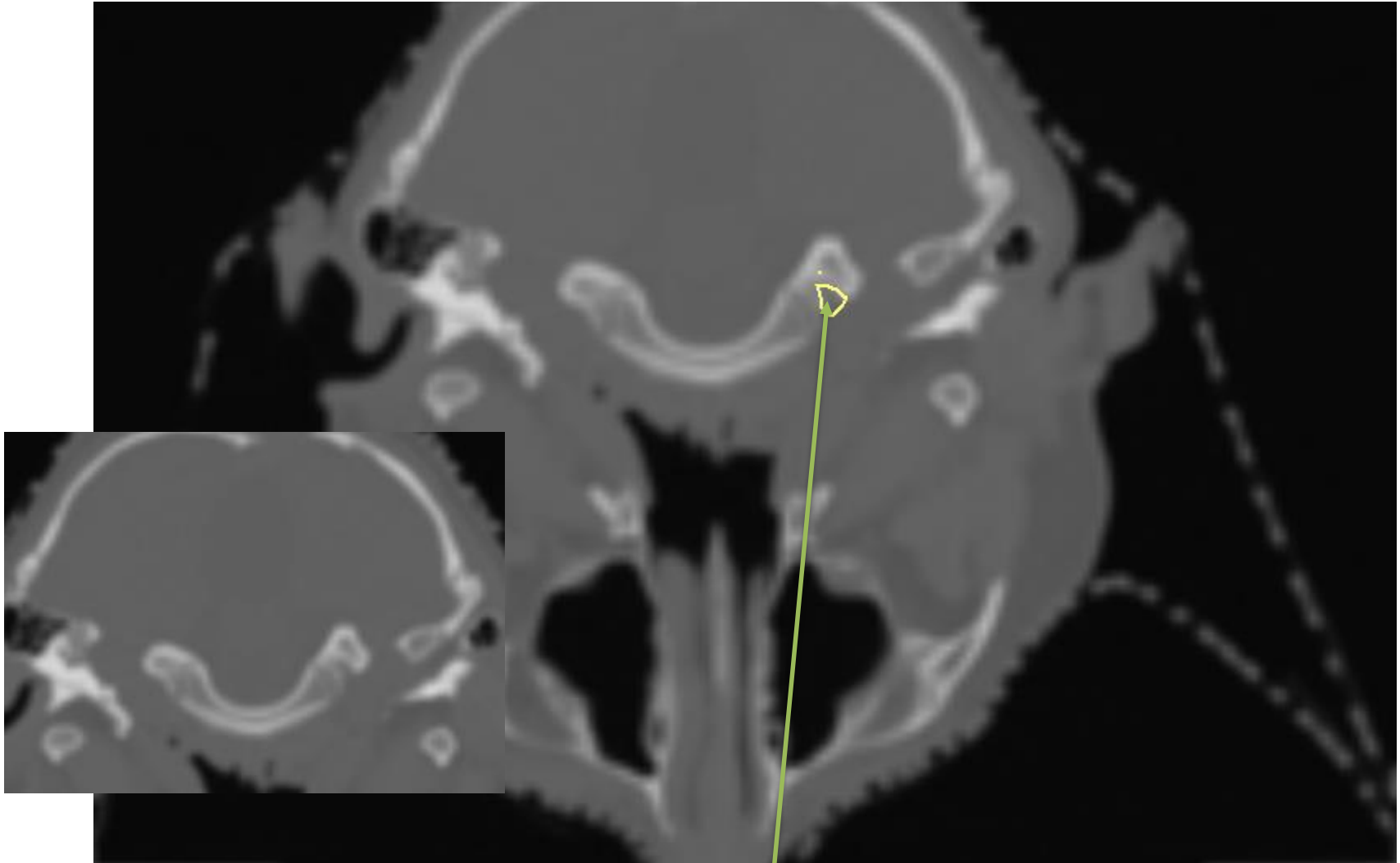


Jugular foramen & foramen ovale

(foramen lacerum also shown)

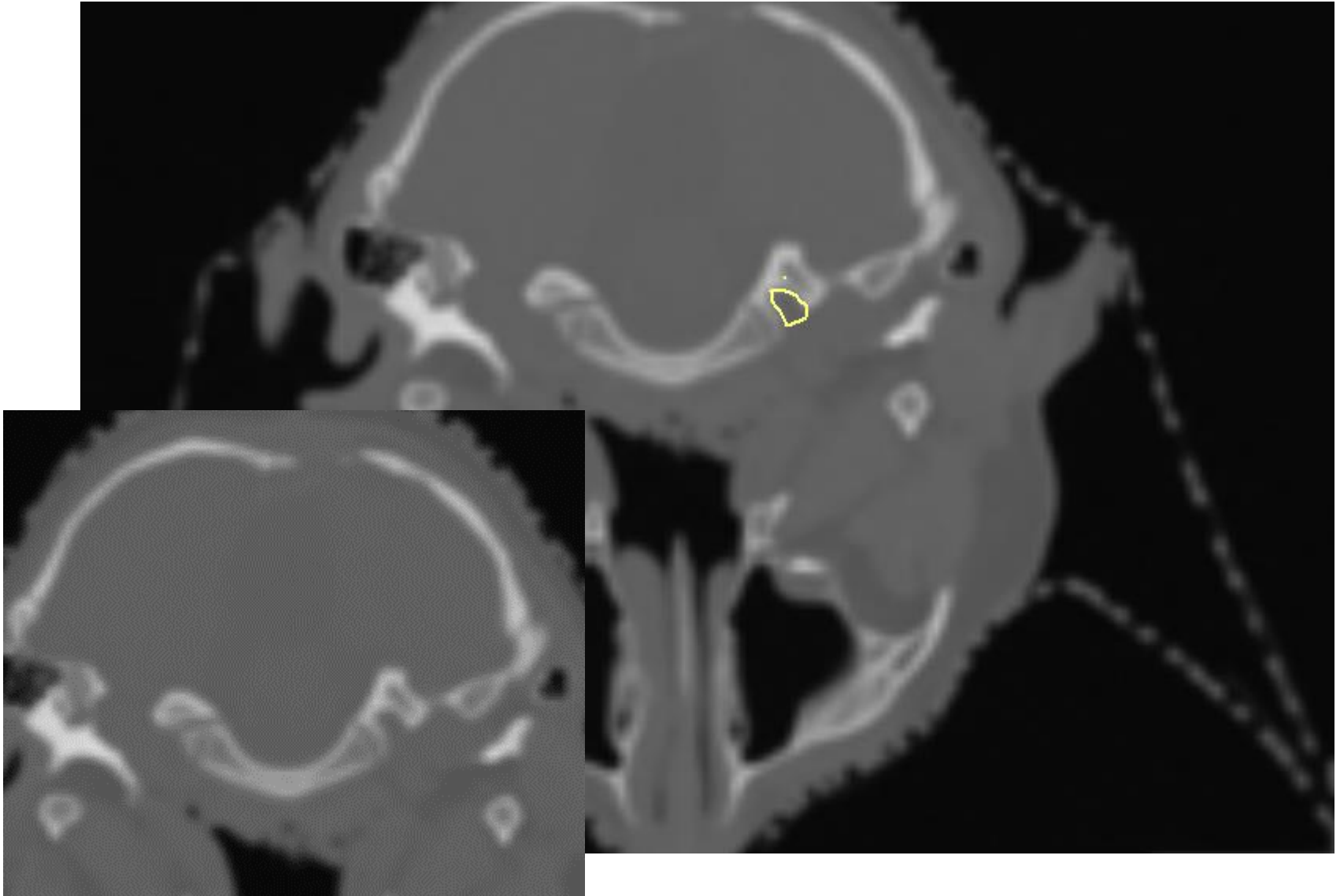


Hypoglossal canal

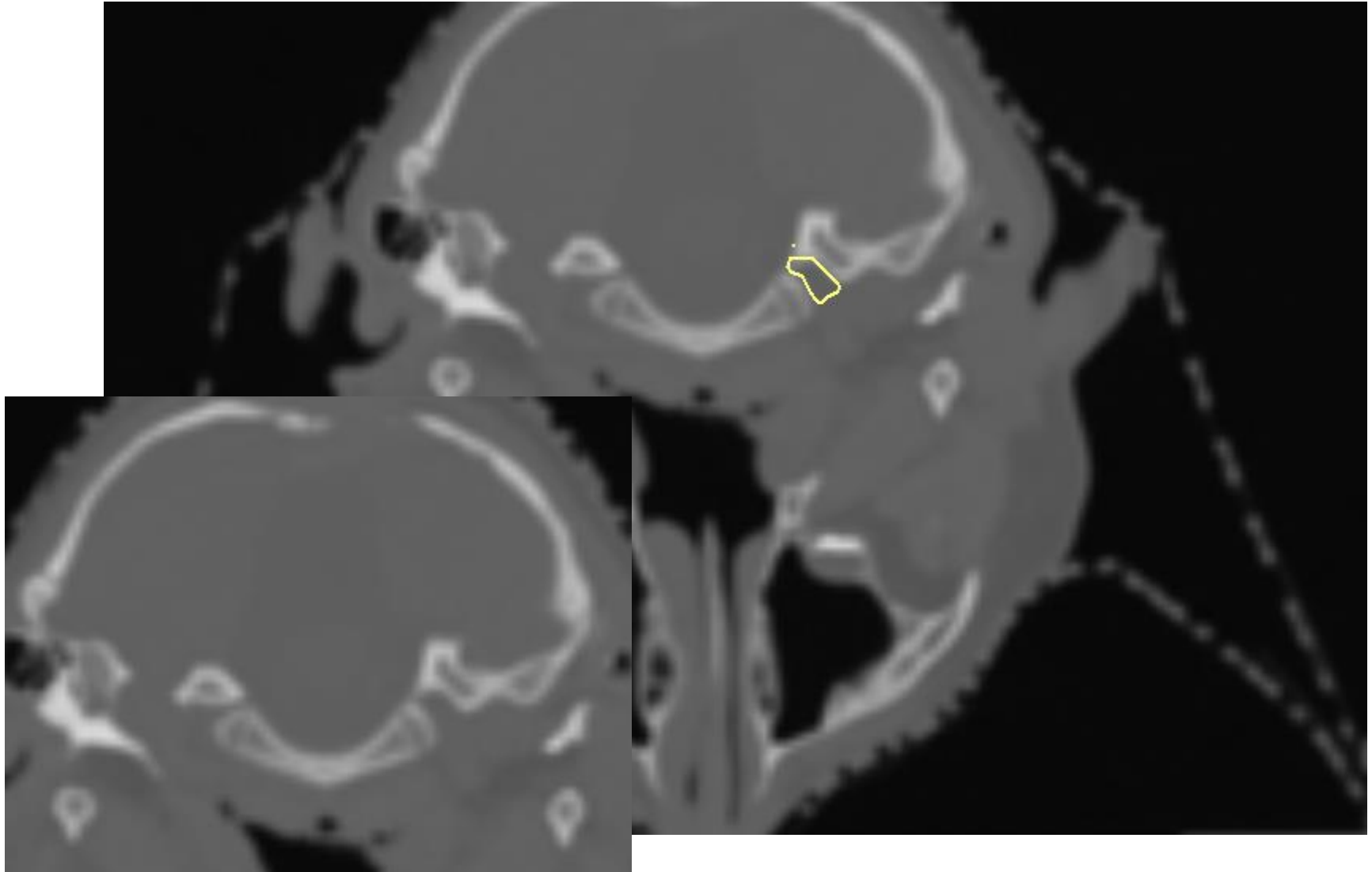


Hypoglossal canal

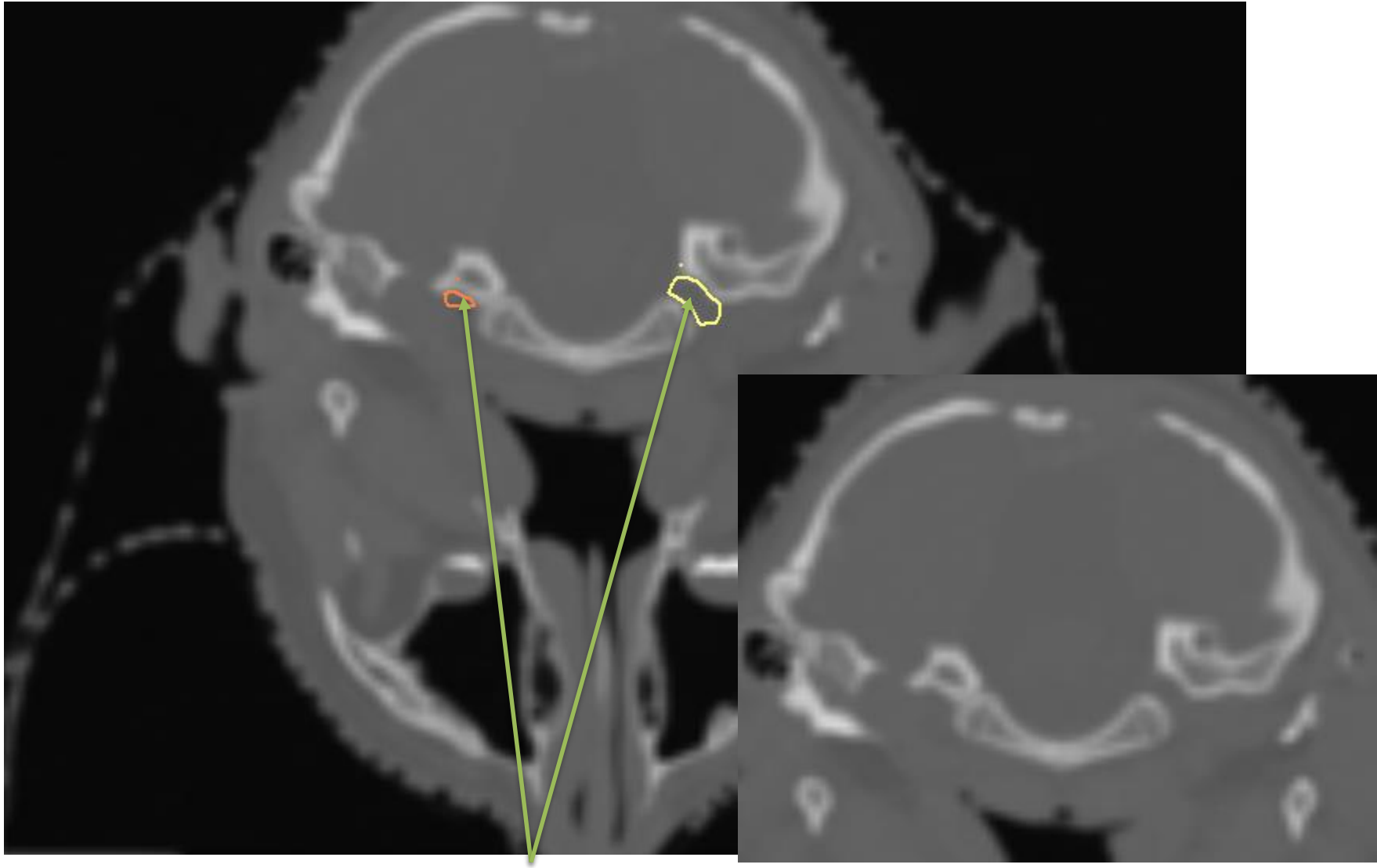
Hypoglossal canal



Hypoglossal canal

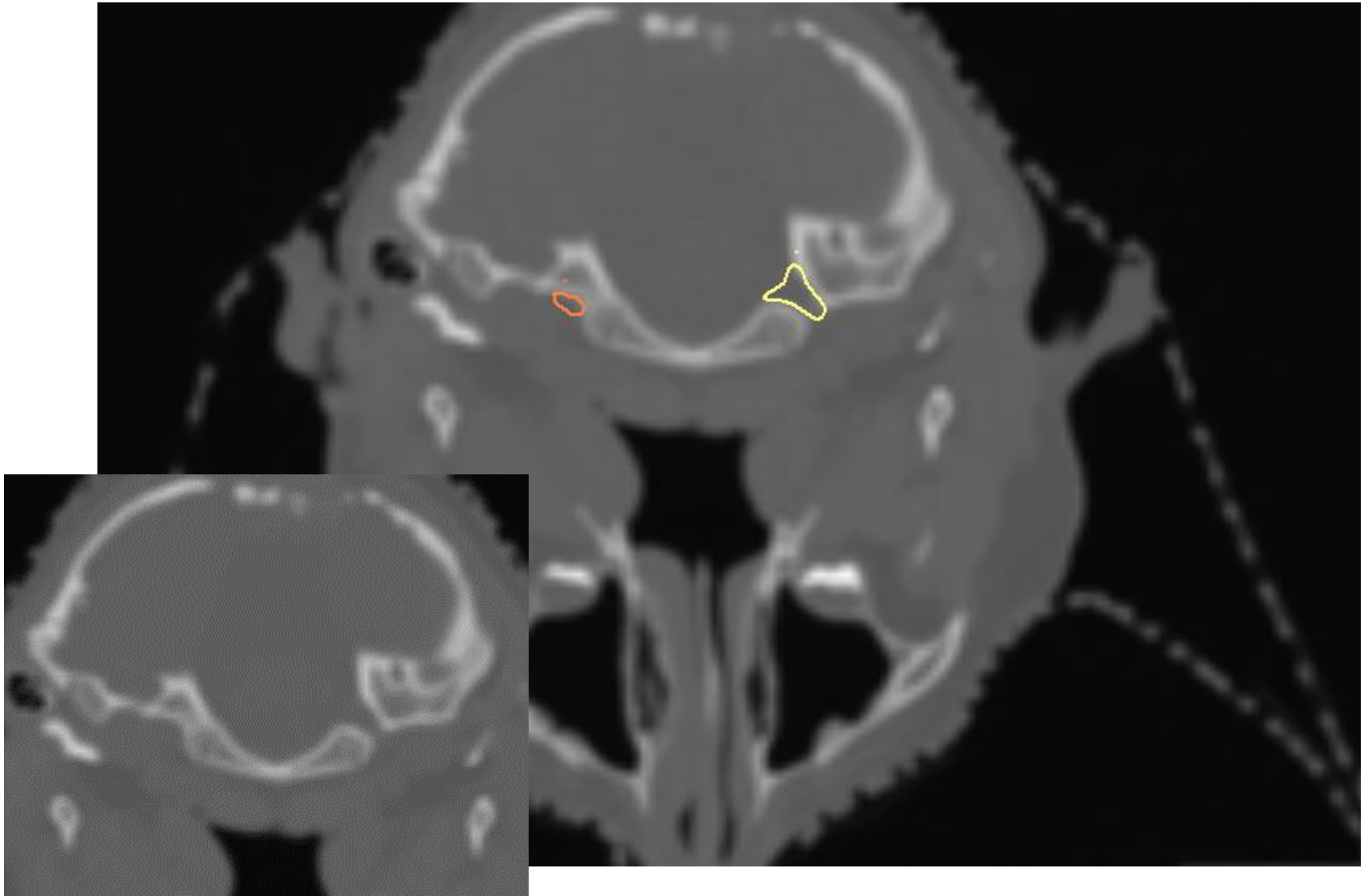


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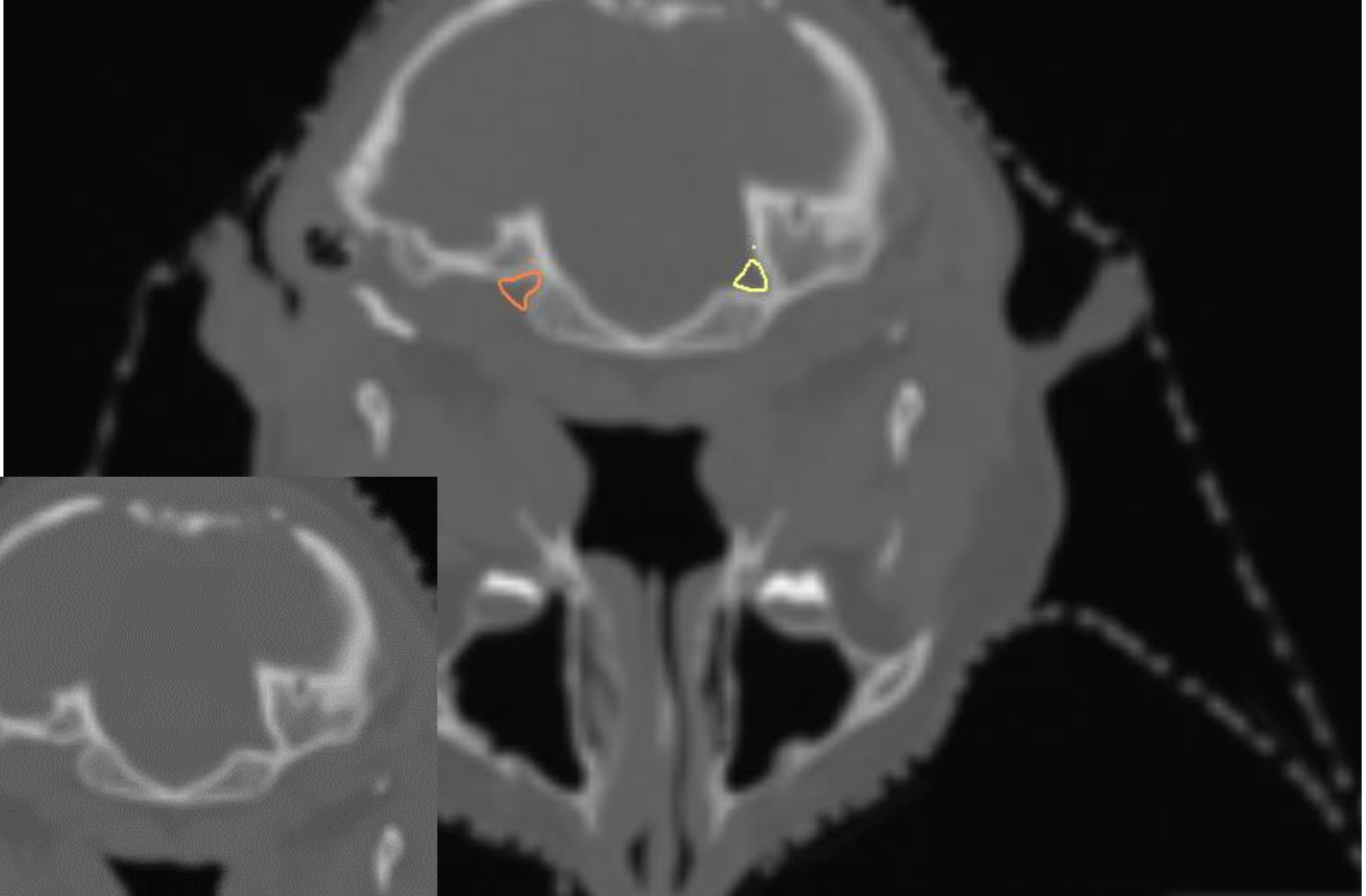


Hypoglossal canals

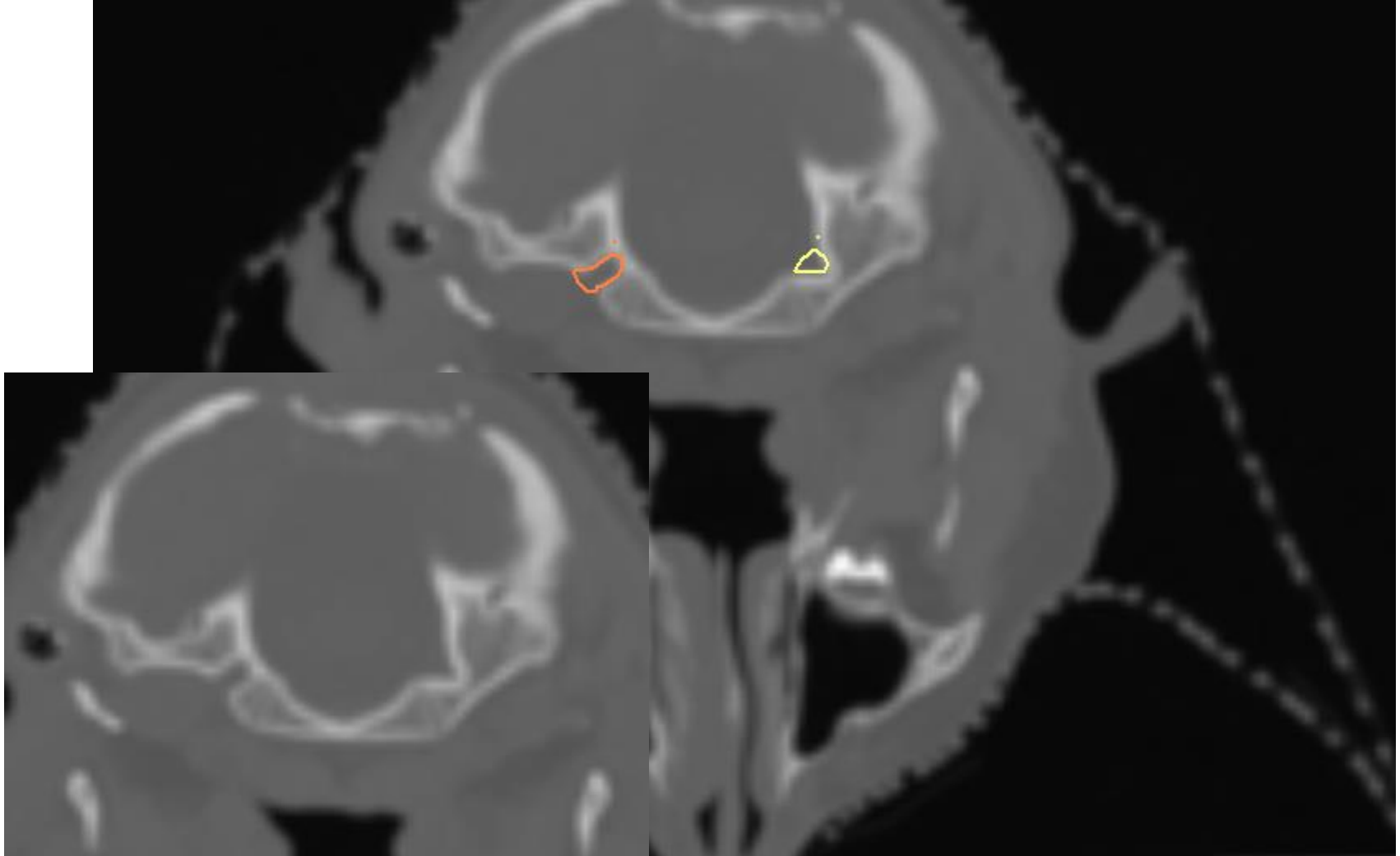
Hypoglossal canal



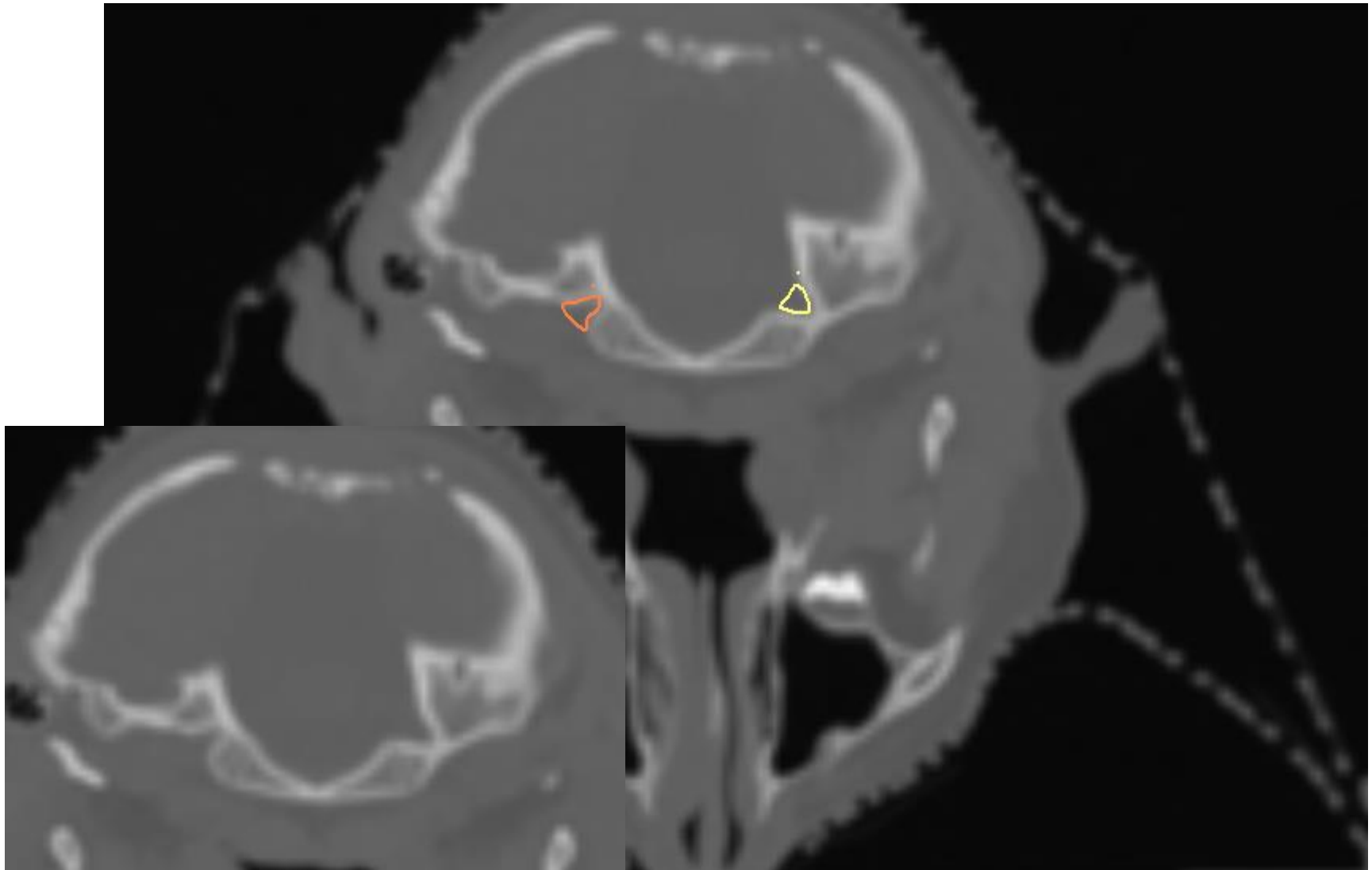
Hypoglossal canals



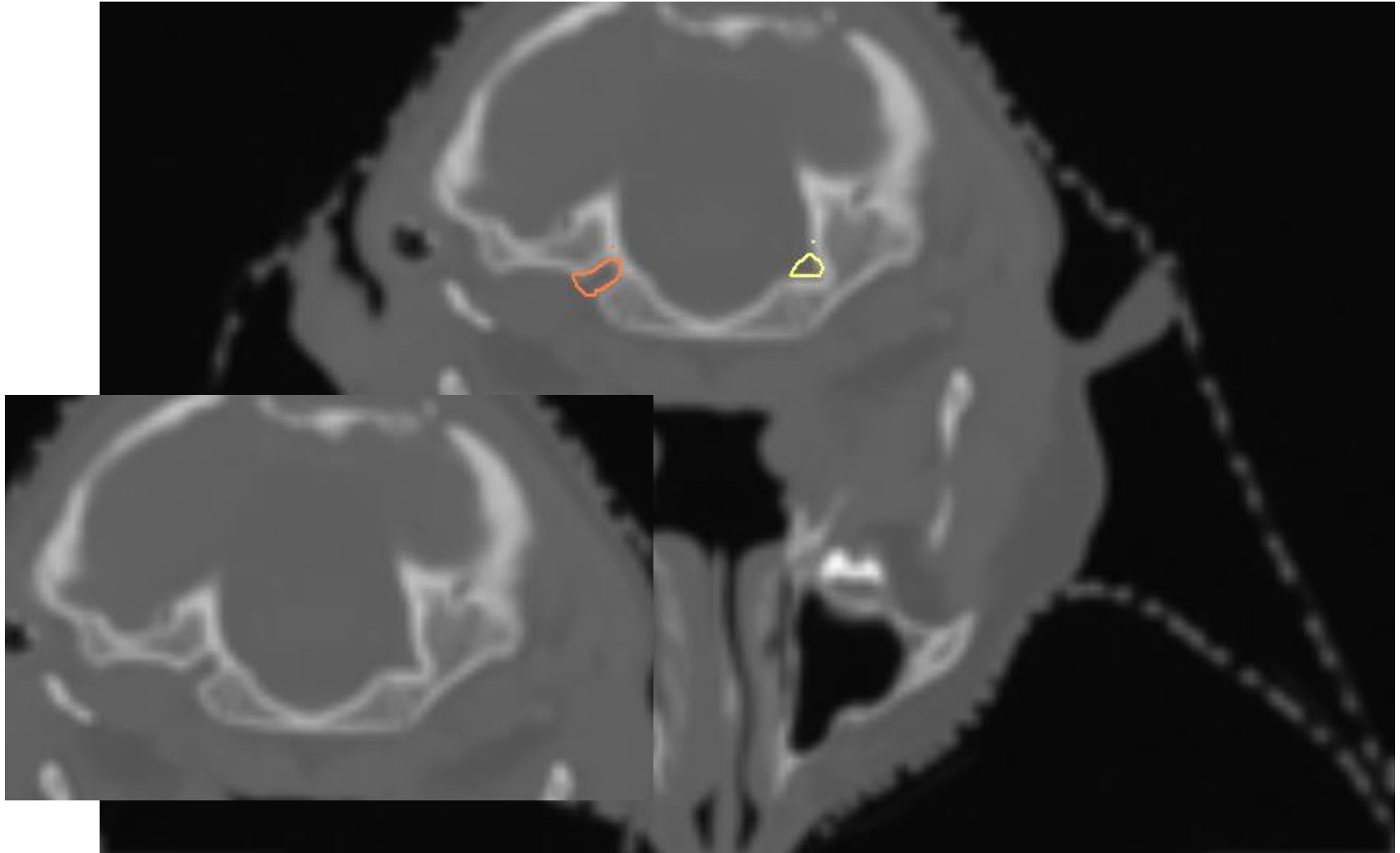
Hypoglossal canals



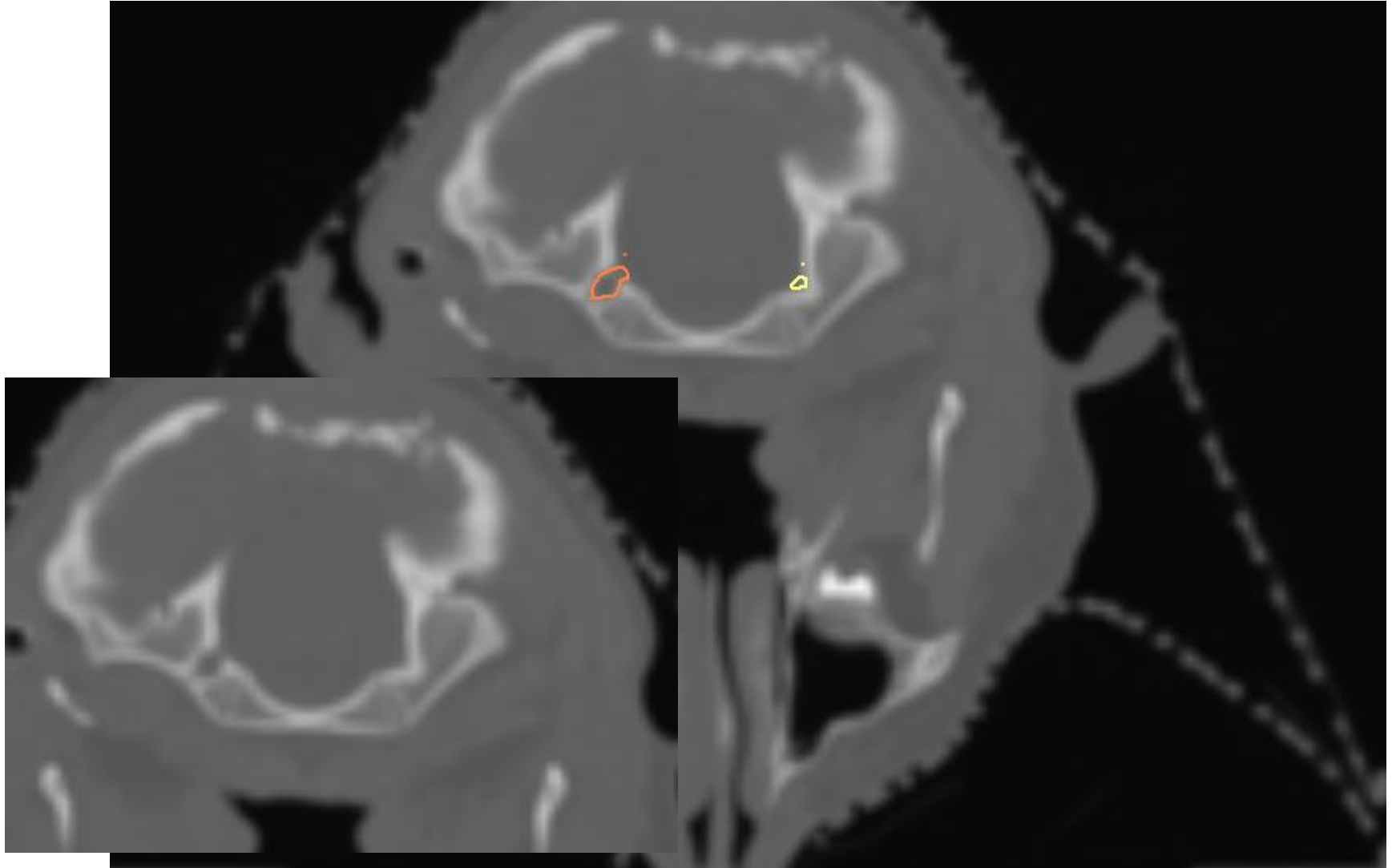
Hypoglossal canal



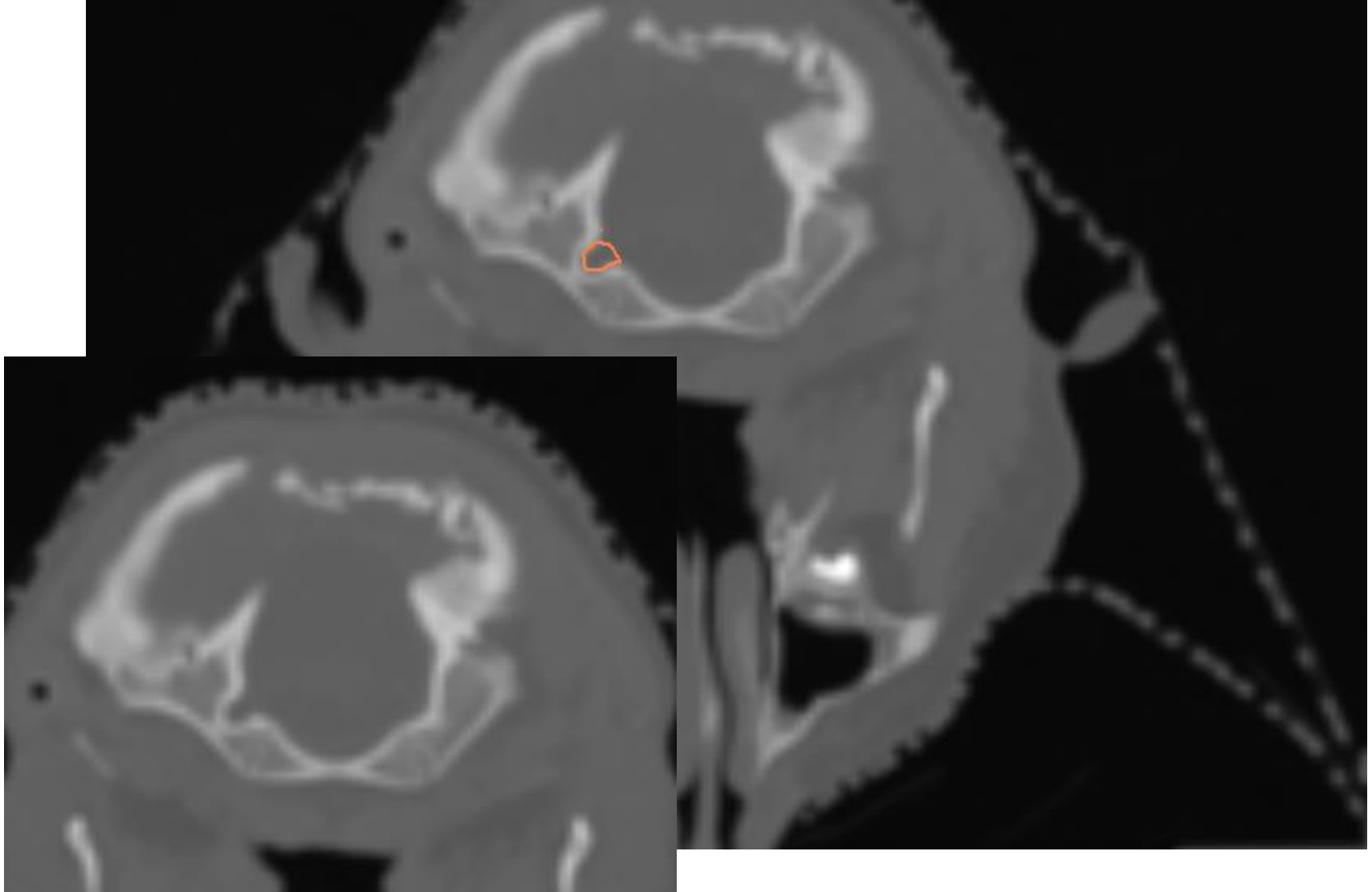
Hypoglossal canal



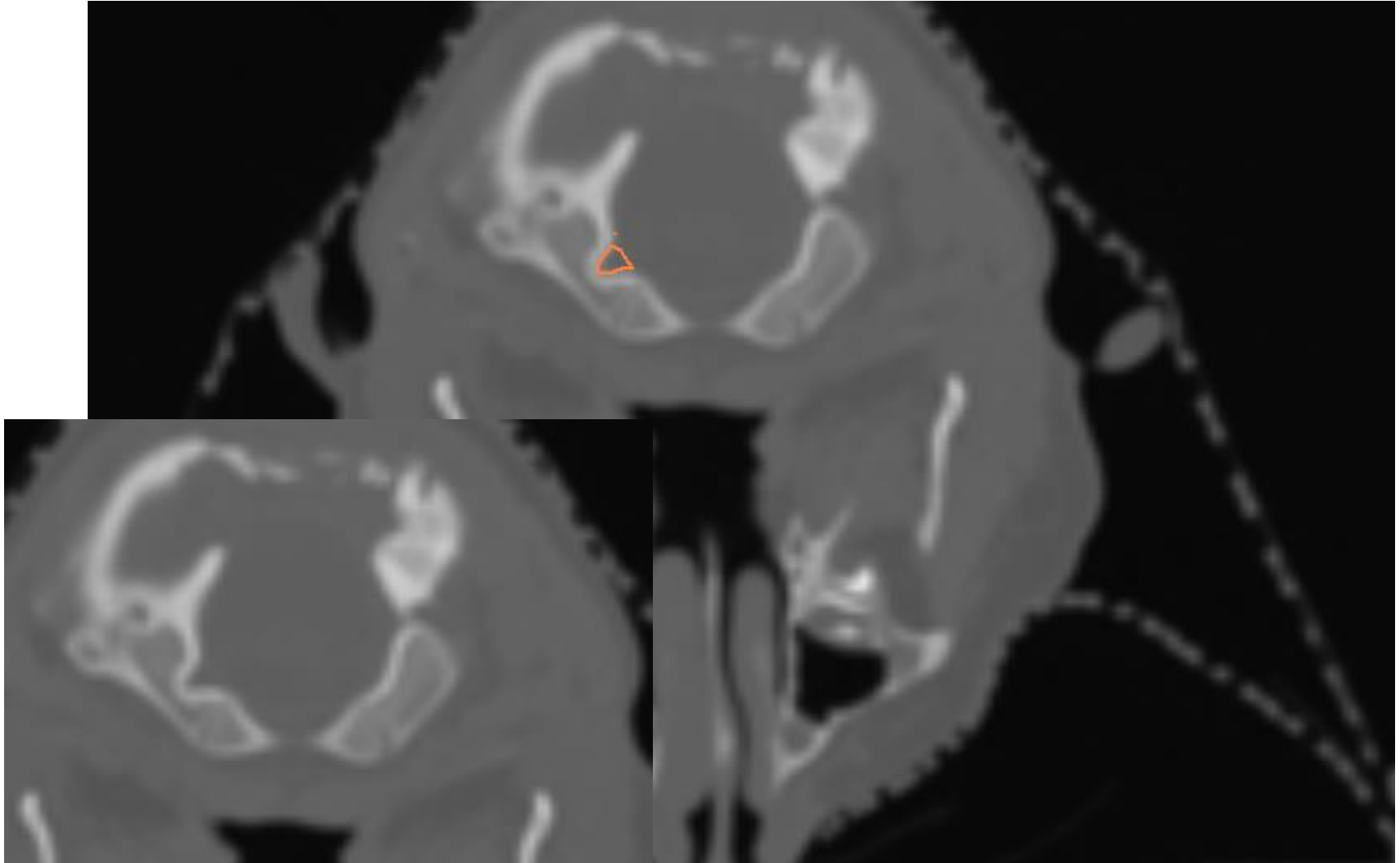
Hypoglossal canal



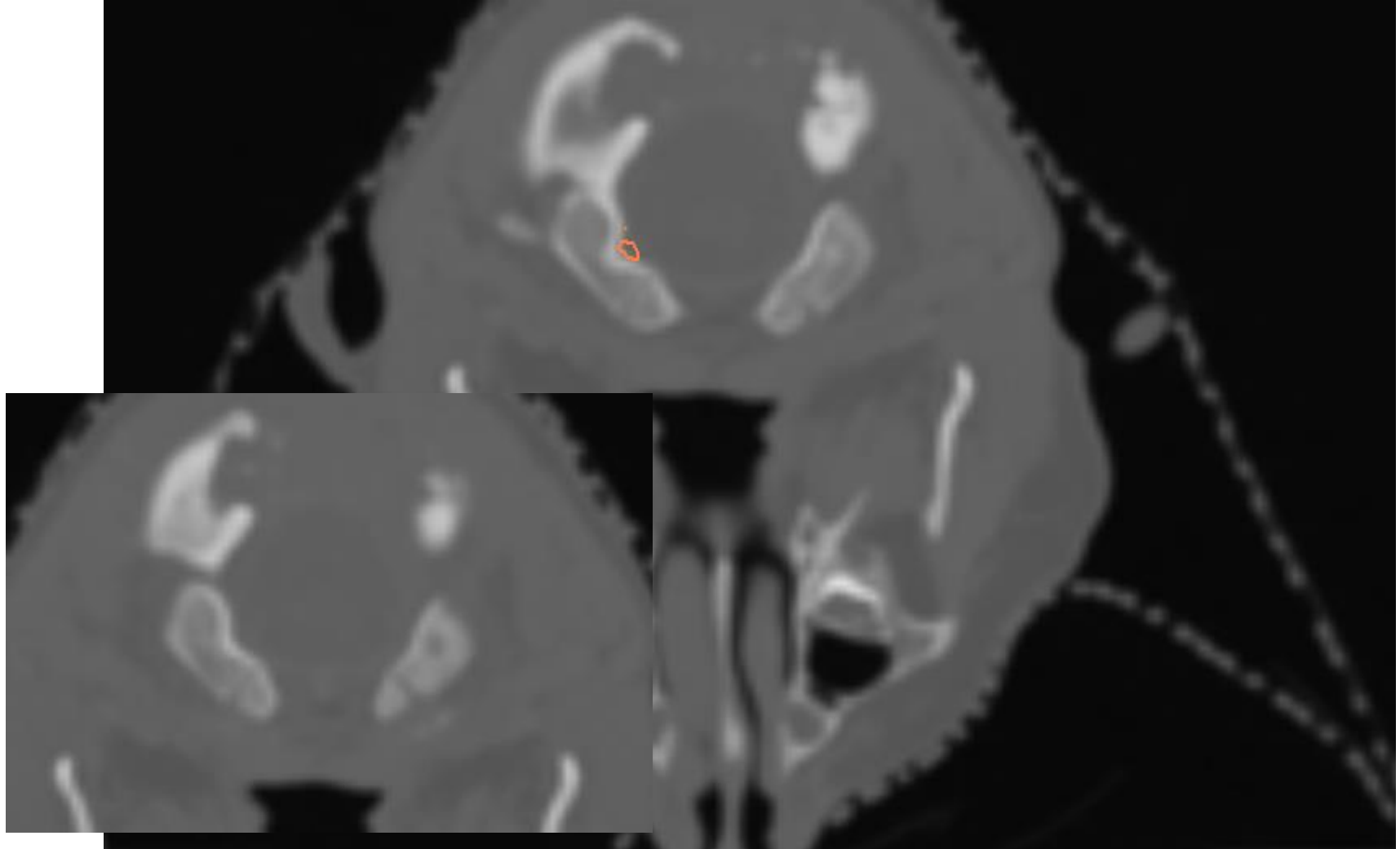
Hypoglossal canal



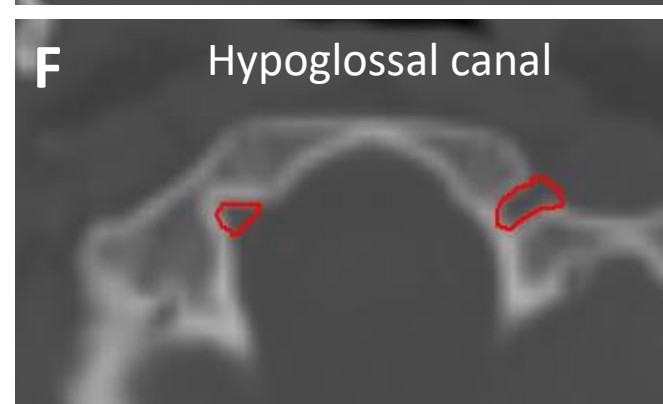
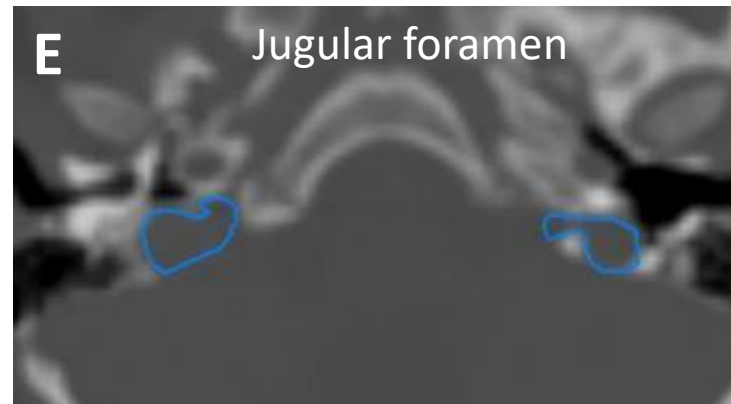
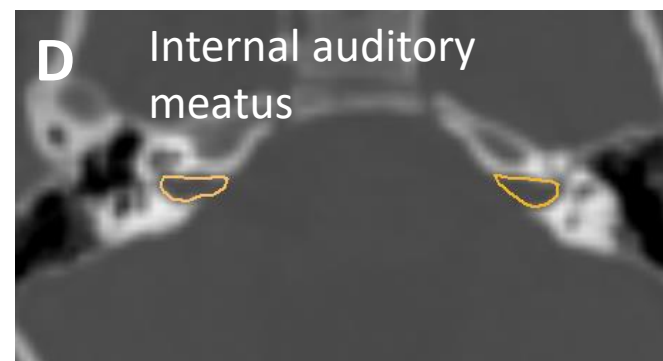
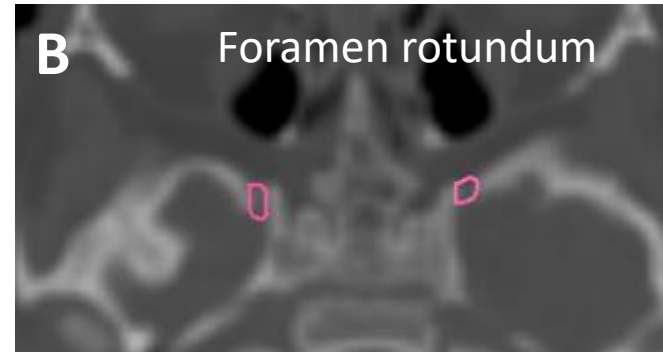
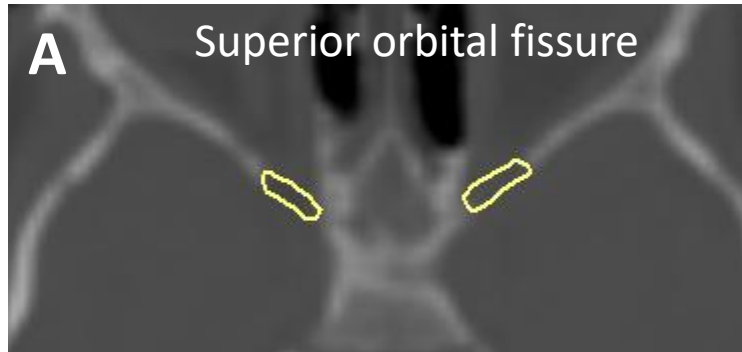
Hypoglossal canal



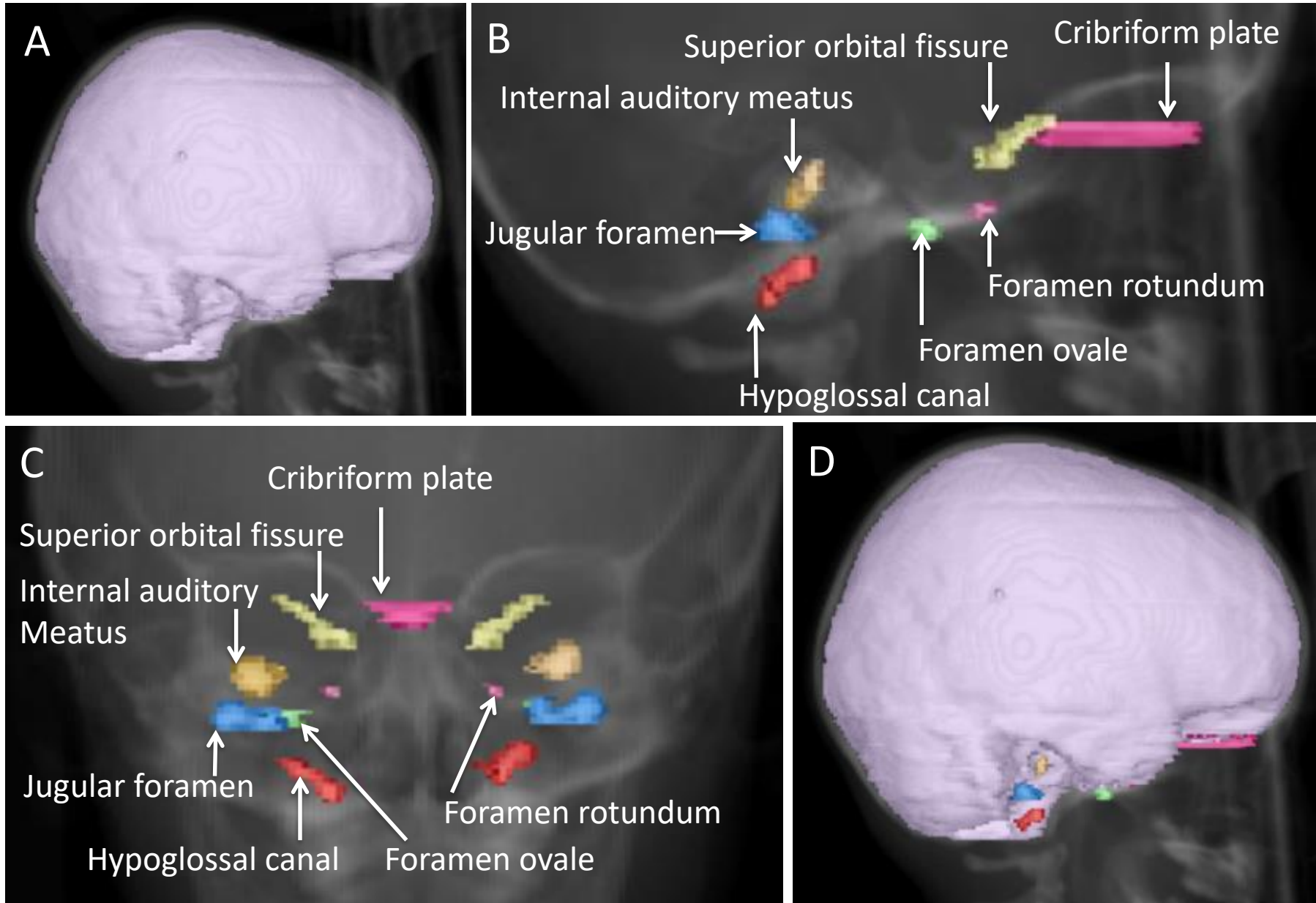
Hypoglossal canal



Skull base foramina included in CTV_{cranial}



Final cranial CTV showing skull base foramen and brain

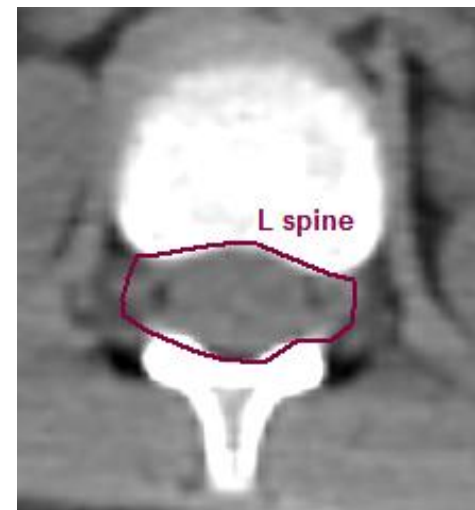
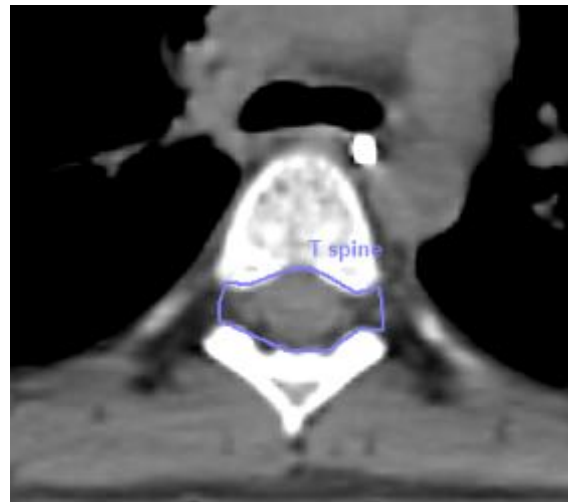


STEP 5

DELINEATION OF SPINAL CTV

Spinal CTV

- The spinal CTV is the spinal subarachnoid space including nerve roots laterally as illustrated below:



Lower end of spinal CTV

- The lower limit of spinal CTV is at the lower limit of thecal sac on the latest MRI scan and there is no need to include sacral nerve root canal in the spinal CTV as illustrated:



- Seek expert neuro-radiological advice if lower limit of thecal sac is unclear

Lower limit of thecal sac

Lower limit of spinal CTV – an illustration



Final Spinal CTV

