



Imaging for Facial Deformity

Dr Dayea Oh

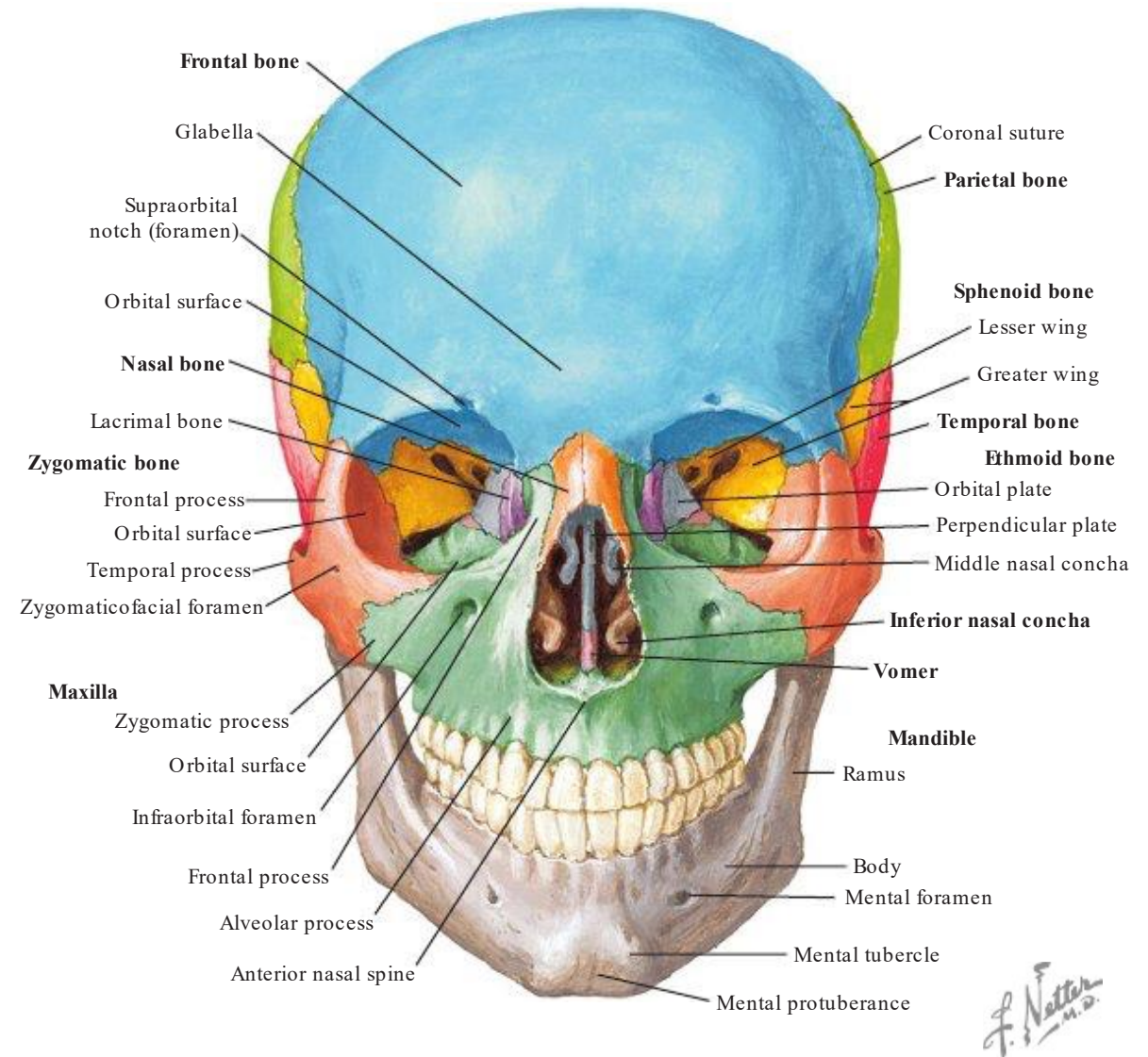
Oral and Maxillofacial Radiologist

Objectives

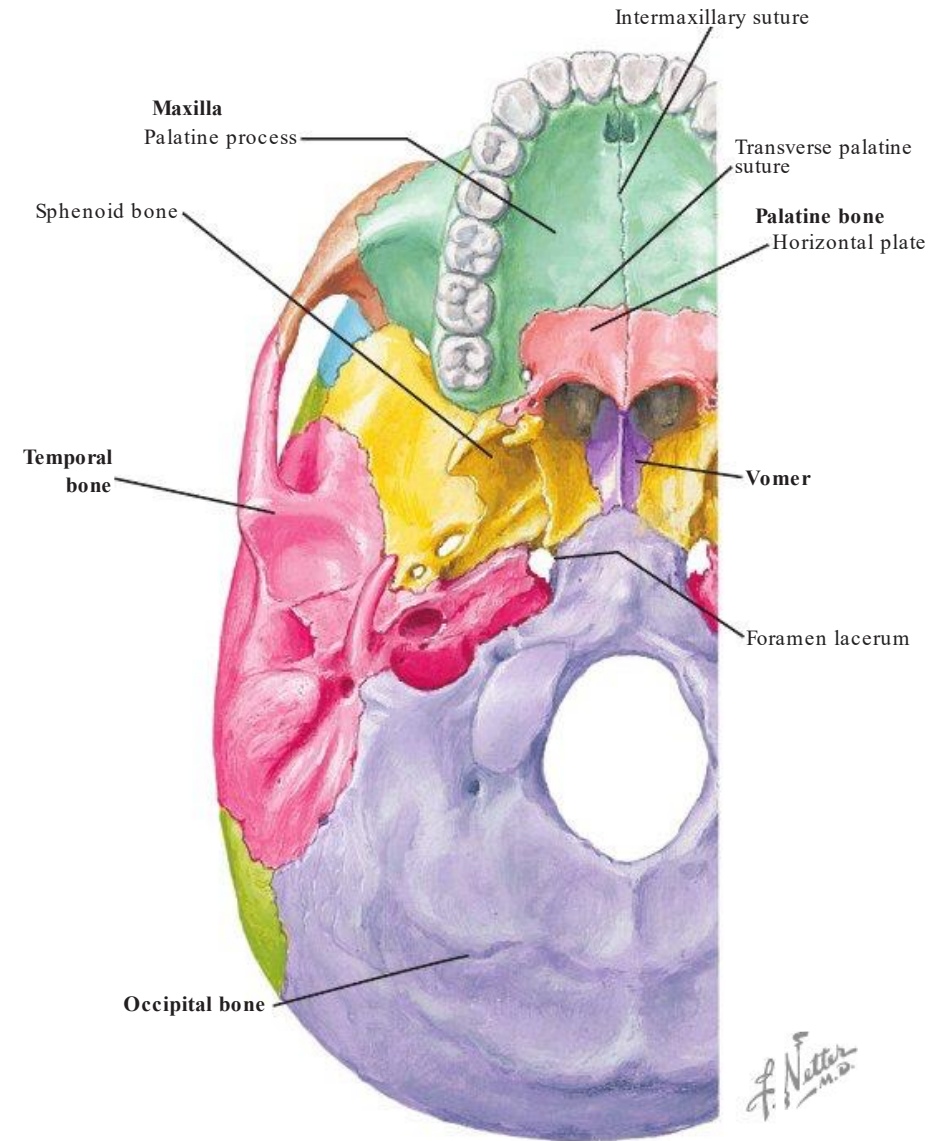
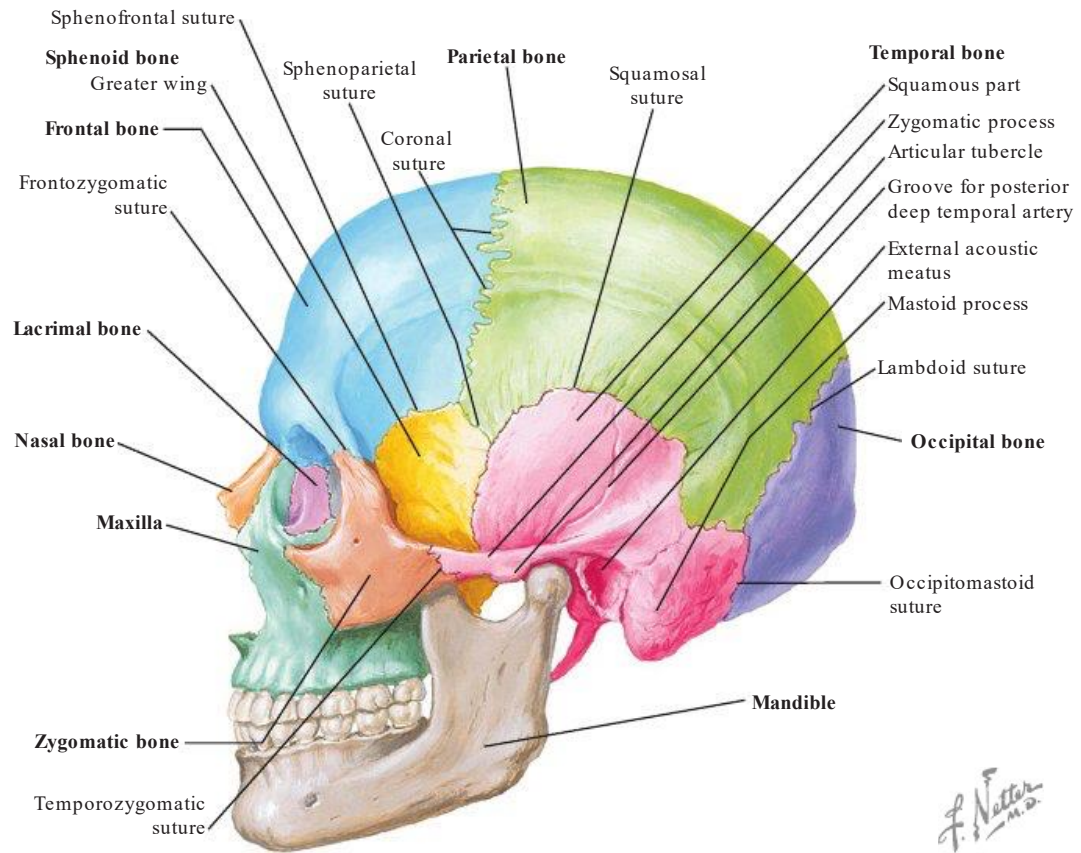
- Understand types of facial deformity
- Compare imaging modalities
- Recognise key radiographic features relevant to treatment planning
- Understand functional and surgical implications

Bones in the Skull

- 11 are paired
 - Parietal
 - Temporal
 - Zygomatic
 - Maxilla
 - Palatine
 - Nasal
 - Lacrimal
 - Inferior nasal concha
 - Malleus
 - Incus
 - Stapes
- 6 are single
 - Frontal
 - Occipital
 - Sphenoid
 - Ethmoid
 - Vomer
 - Mandible

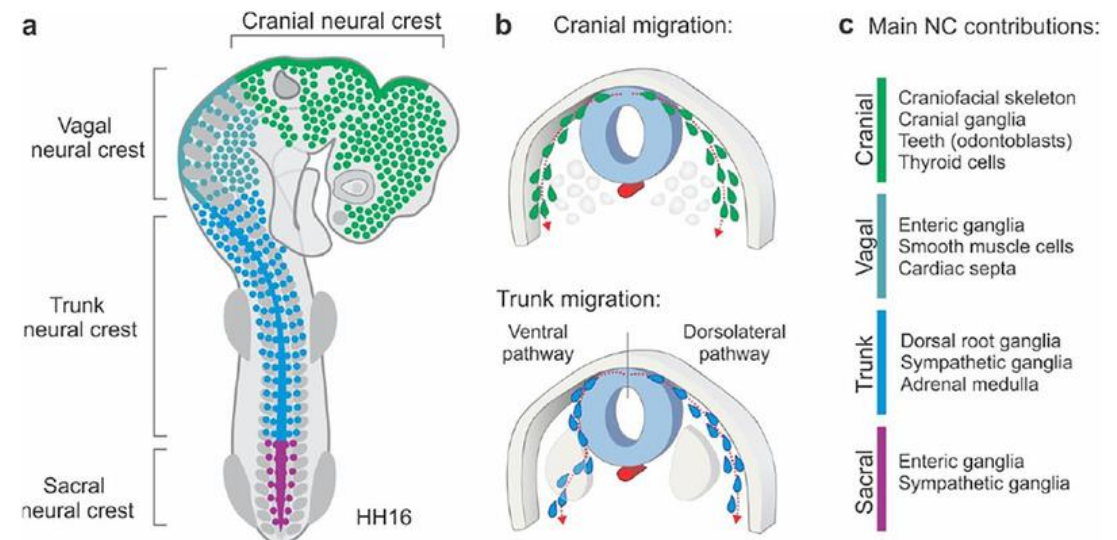


8 cranial bones + 14 facial bones + 6 middle ear bones



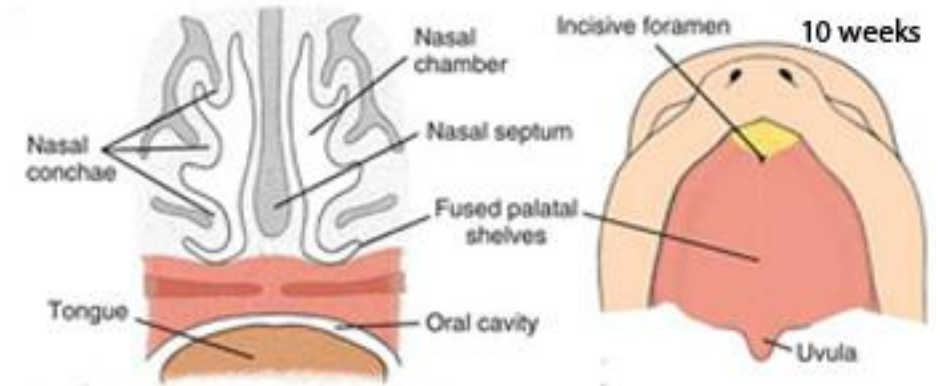
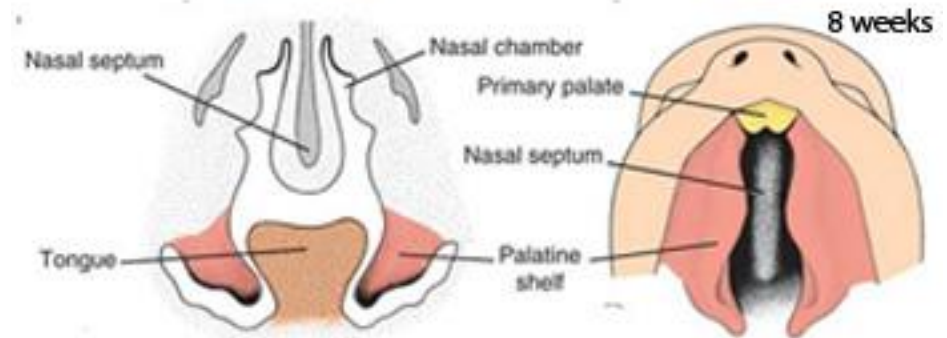
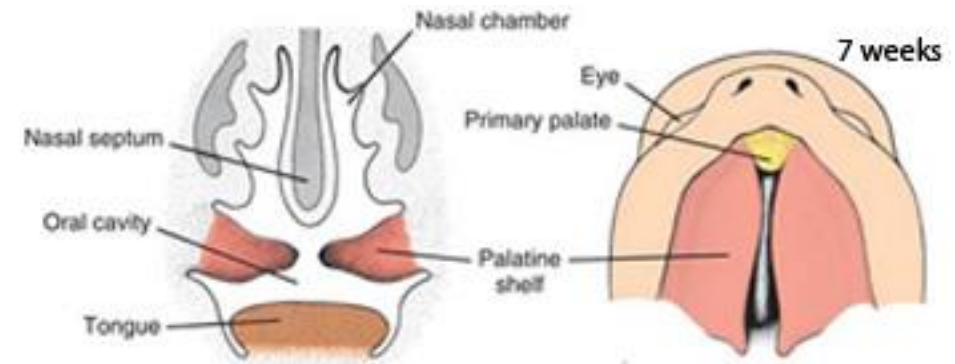
Craniofacial Development

- Migratory cranial neural crest cells
 - Abnormal quantity or migration of NCC cells can result in craniofacial syndromes
- External facial structures develop between 4th and 6th week
- Palate develops between 6th and 8th week, and completes at the 12th week



Facial Deformity

- *Hard tissue only, Soft tissue only or BOTH*
- **Congenital**
 - Birth defects eg. cleft palate & various craniofacial syndromes
- **Developmental**
 - Growth-related eg. bilateral or unilateral hypoplasia & hyperplasia (of the jaws)
- **Acquired**
 - Trauma, cysts, tumours, bone dysplasias, post-surgery etc.



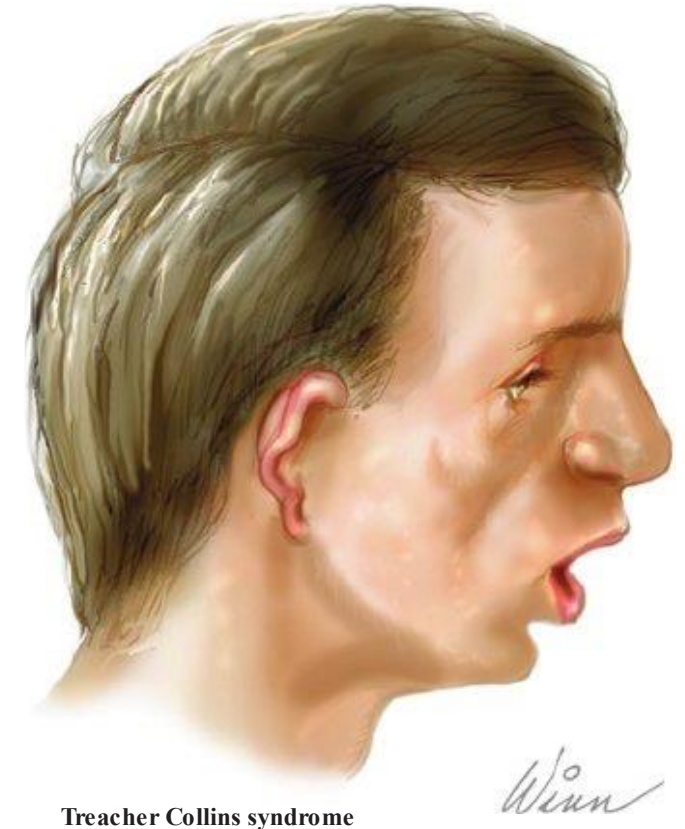
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failure of the medial and lateral nasal processes to fuse with the maxillary process

Craniofacial Syndromes

- Many are branchial arch syndromes related to **first and second** branchial/pharyngeal arches →
 - Hemifacial Microsomia (Goldenhar)
 - Treacher Collins
- Manifest a spectrum of hypoplasia and aplasia of the structures composing the facial bones and ear
- Severity depends on the alteration of gene-expression profiles

Origins	Adult Structure(s)
1st pharyngeal arch <i>Maxillary process</i>	Maxilla
	Temporal bone
	Zygoma
	Palatine
	Lacrimal
	Vomer
	Nasal
1st pharyngeal arch <i>Mandibular process</i>	Inferior nasal concha
	Mandible
	Malleus
2nd pharyngeal arch	Incus
	Styloid process
	Stapes
	Hyoid



Treacher Collins syndrome

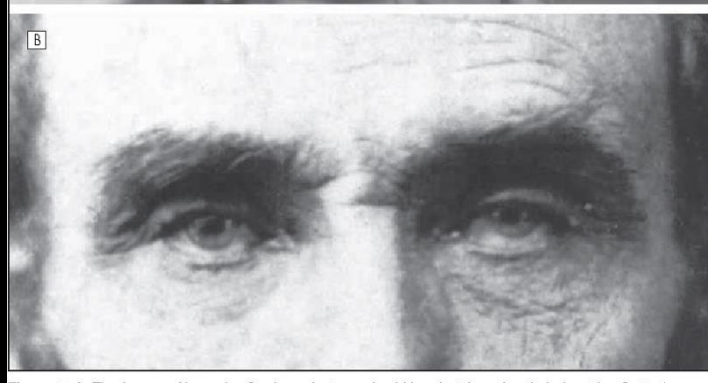
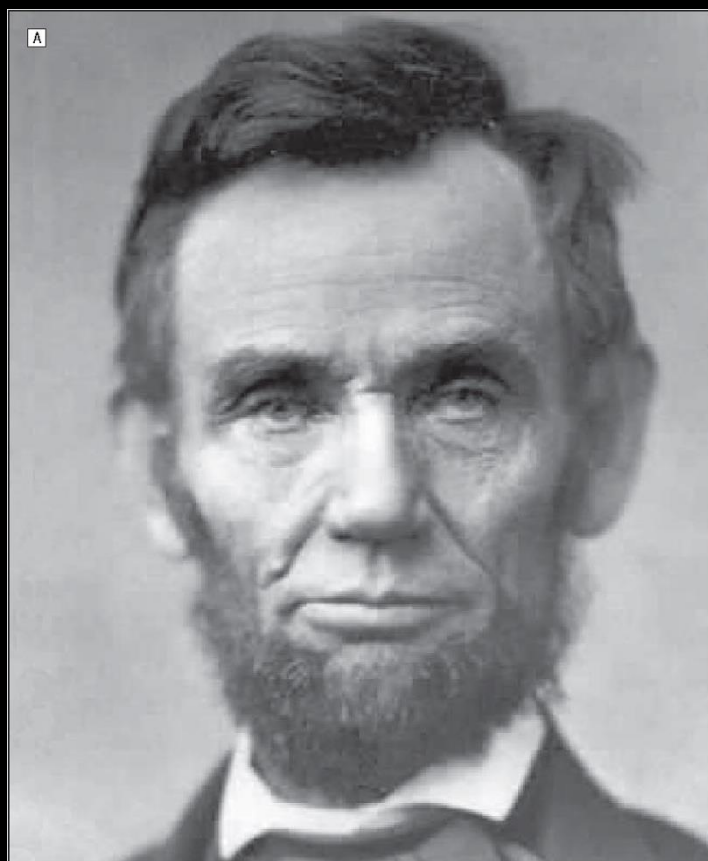


Figure 5. A. The famous Abraham Lincoln photograph of himself taken shortly before the Gettysburg

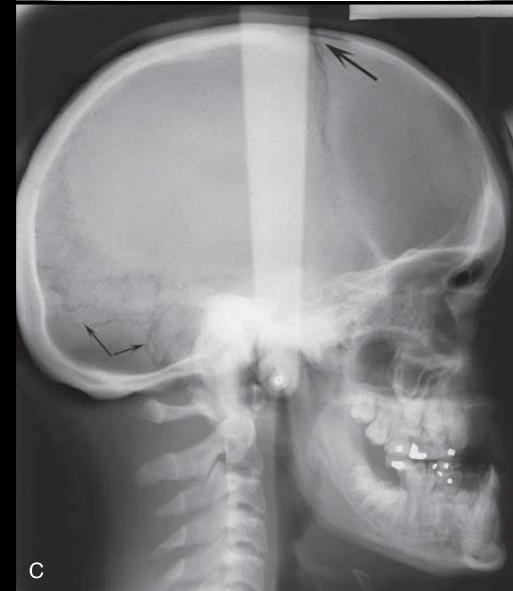
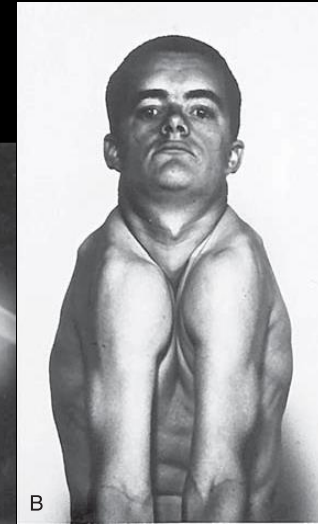
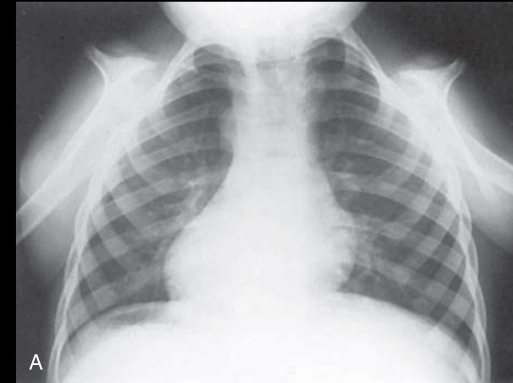
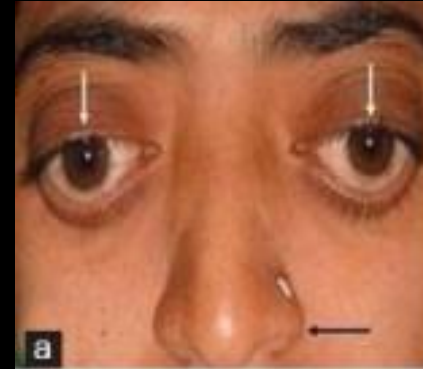
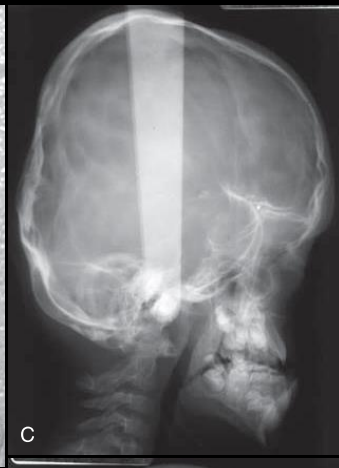
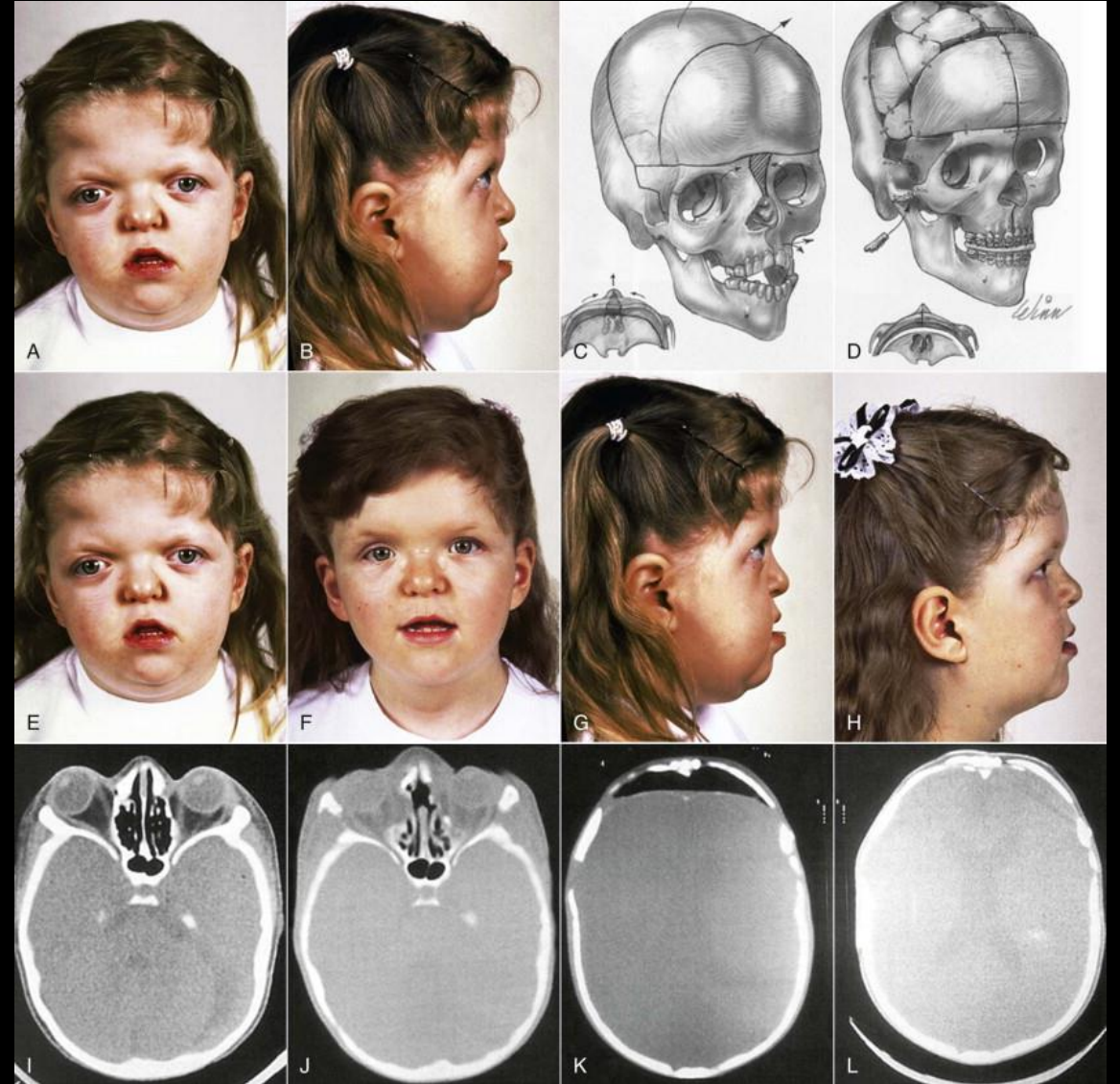
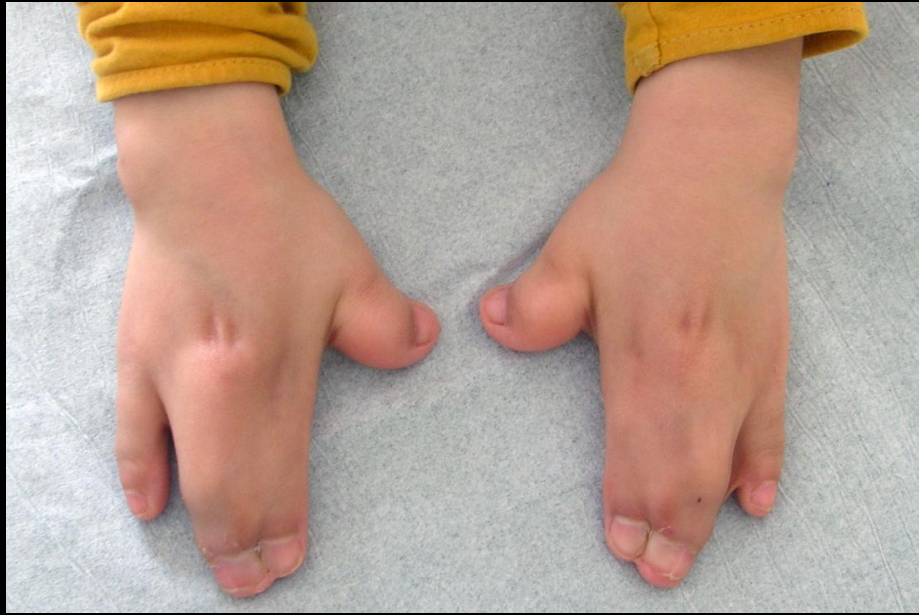


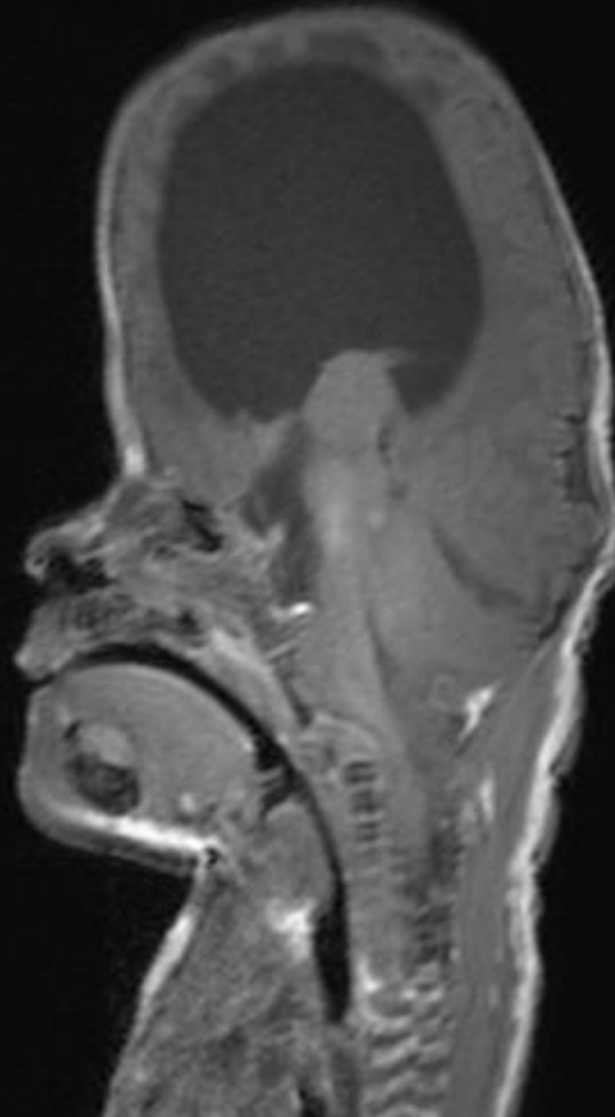
FIG. 30-6 Cleidocranial dysplasia. **A**, Chest radiograph; note the absence of clavicles. **B**, The result is excessive mobility of the shoulders. Note also the frontal bossing and underdeveloped maxilla. **C**, On a lateral radiograph, note the wormian (sutural) bones in the occipital region (arrows) and the open fontanel (large arrow). **D**, A lateral skull film showing a lack of development of the parietal bones (arrows). *Continued*



Crouzon syndrome



Apert Syndrome

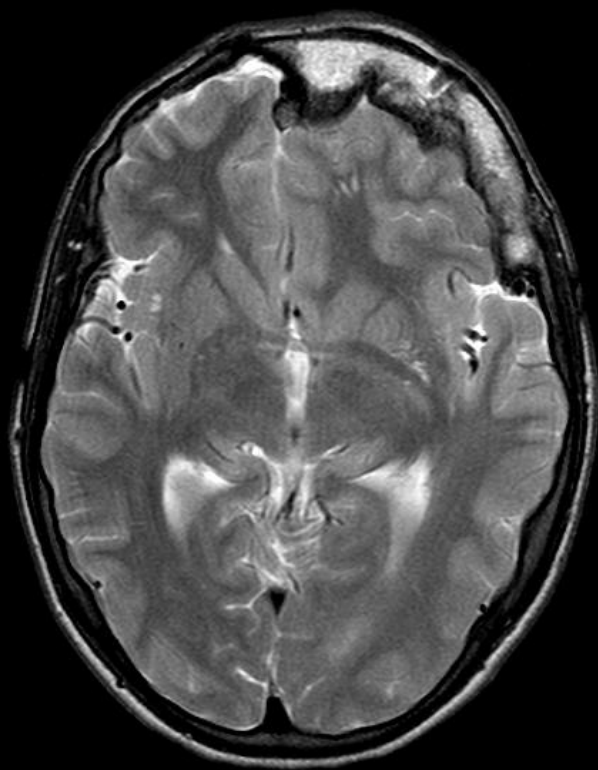


Pfieffer



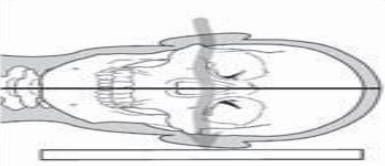
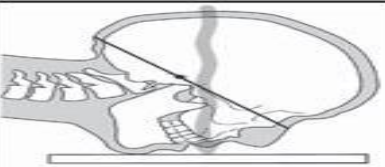
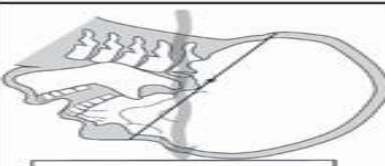
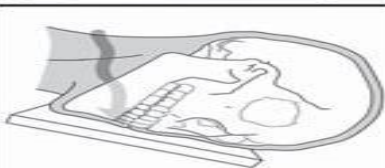
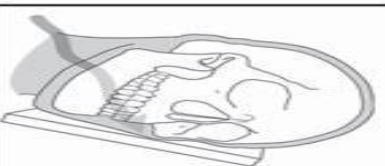
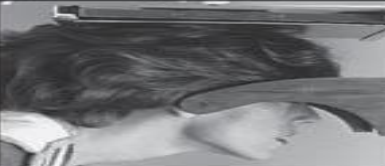
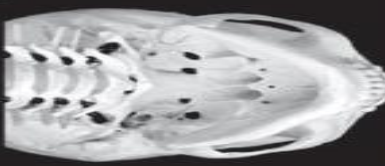
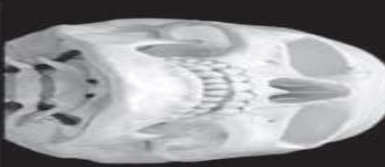
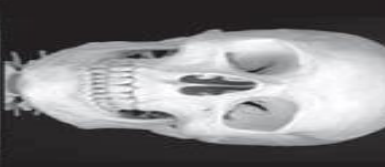
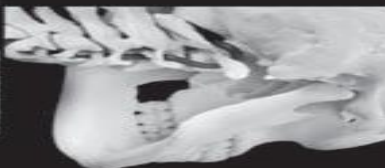
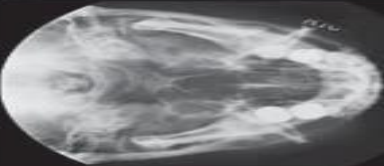
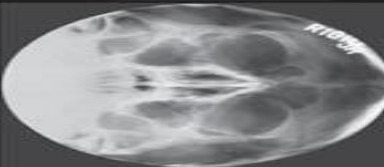
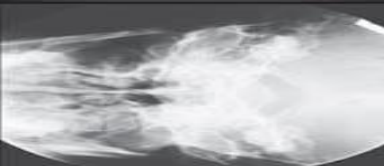
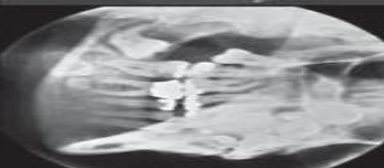
Proteus syndrome





Imaging for Congenital Facial Deformity

- Craniofacial syndromes involve multiple structures with varying degrees of severity and symptoms
- **CT +/- MRI** are the imaging modality of choice
 - Detailed assessment of hard & soft tissues in 3D, especially pre-surgery
 - Assess for any intracranial abnormalities
- OPG may be useful for overview of dental complications

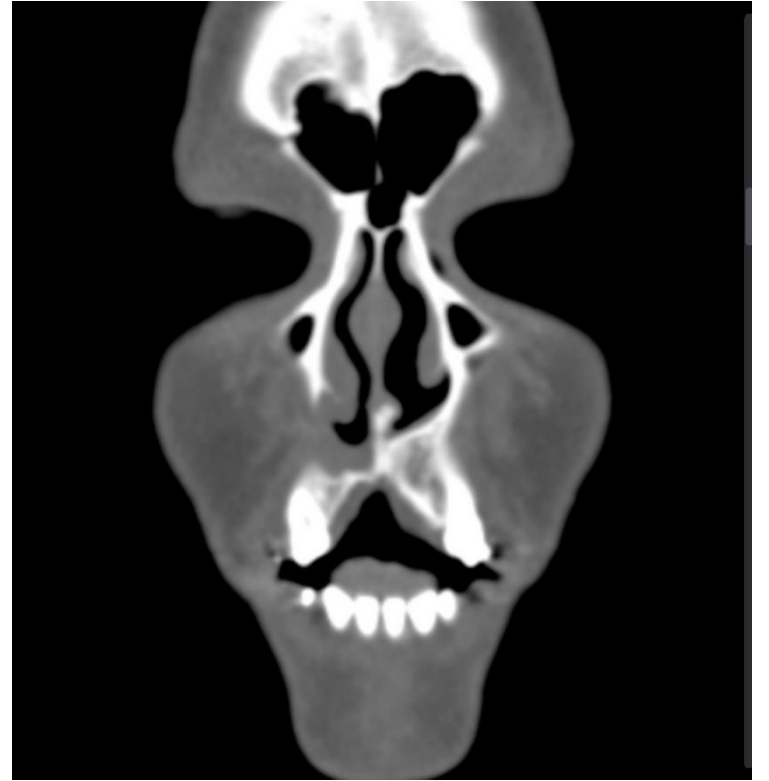
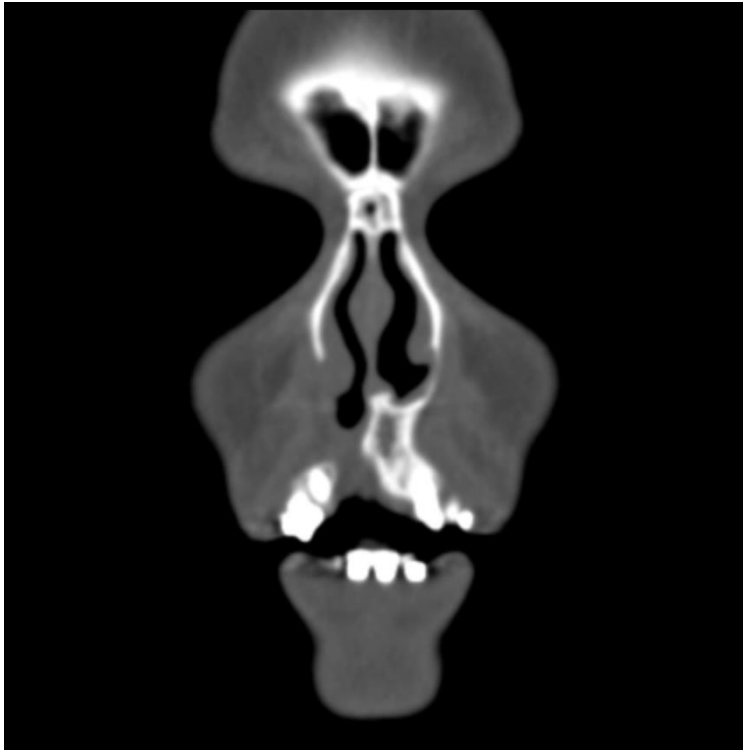
Lateral		SMV		Waters		PA		Reverse		Oblique Lateral	
Ceph						Ceph		Towne		Body	Ramus
Patient placement	Film parallel to midsagittal plane	Carthomeatal line parallel to film	Carthomeatal line at 37° with film	Carthomeatal line at 10° with film	Carthomeatal line at -30° with film	Film in contact with cheek at molar area	Film in contact with cheek at ramus area				
Central beam	Beam perpendicular to film	Beam perpendicular to film	Beam perpendicular to film	Beam perpendicular to film	Beam perpendicular to film	Beam aims at the molar area	Beam aims at the ramus area				
Diagram of patient placement											
Illustration of patient placement											
Skull view											
Resultant image											

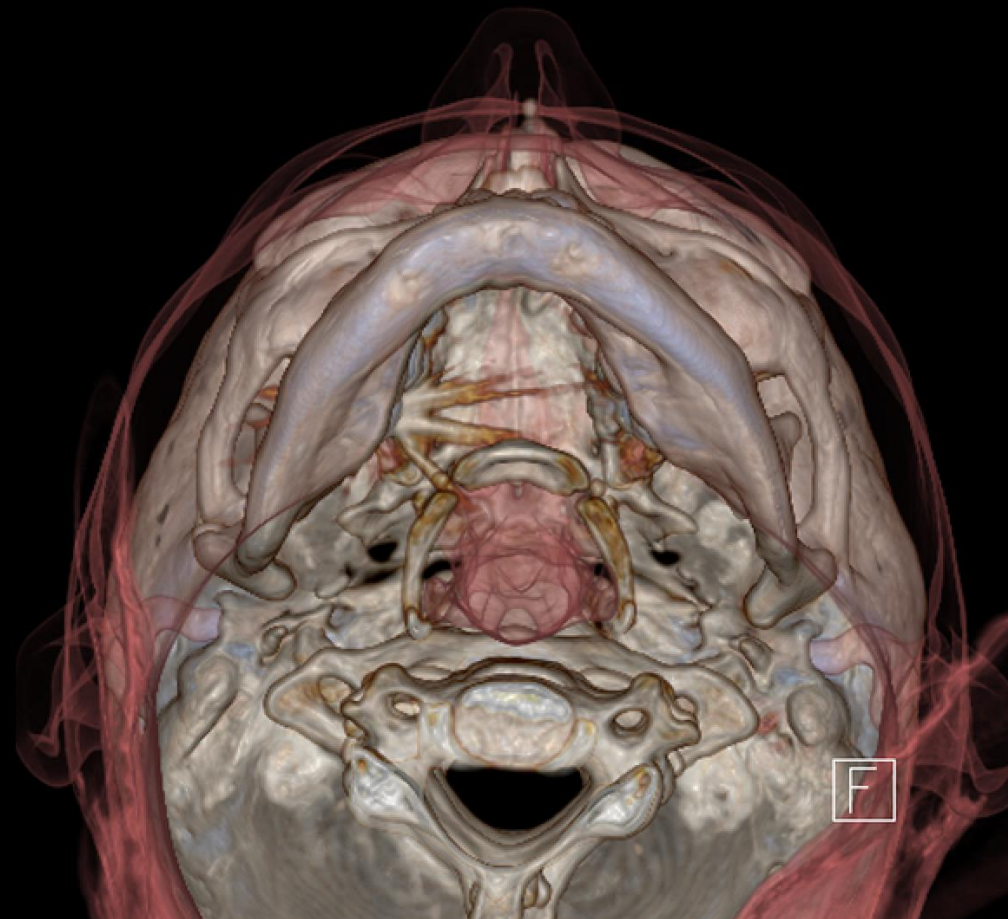
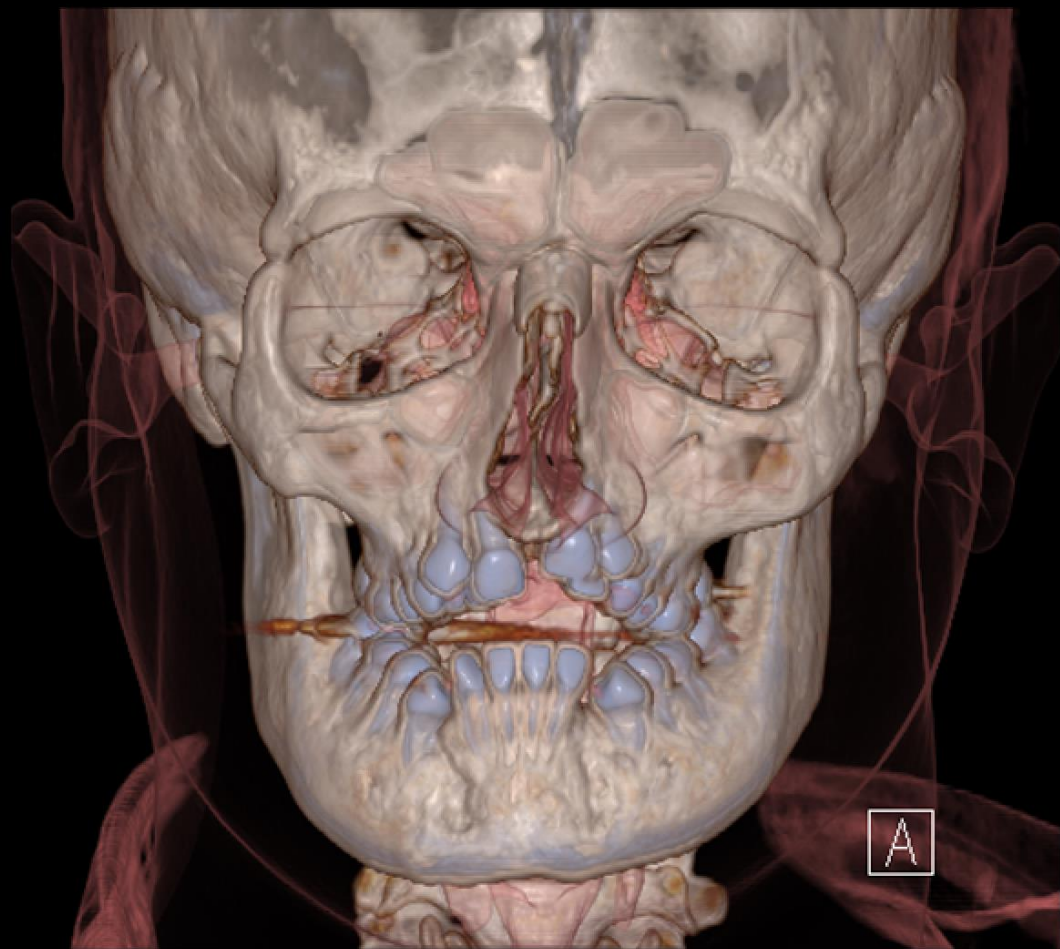
Cases

Imaging of Facial Deformity



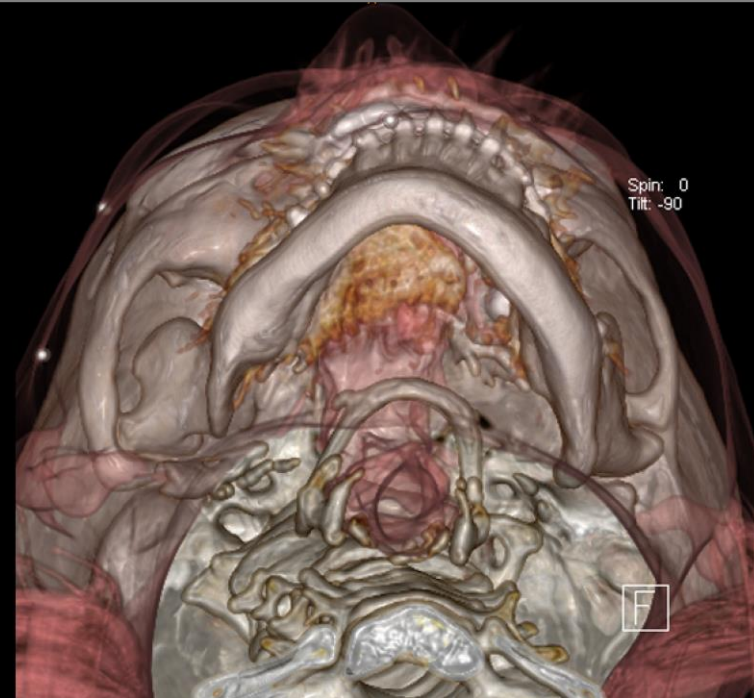
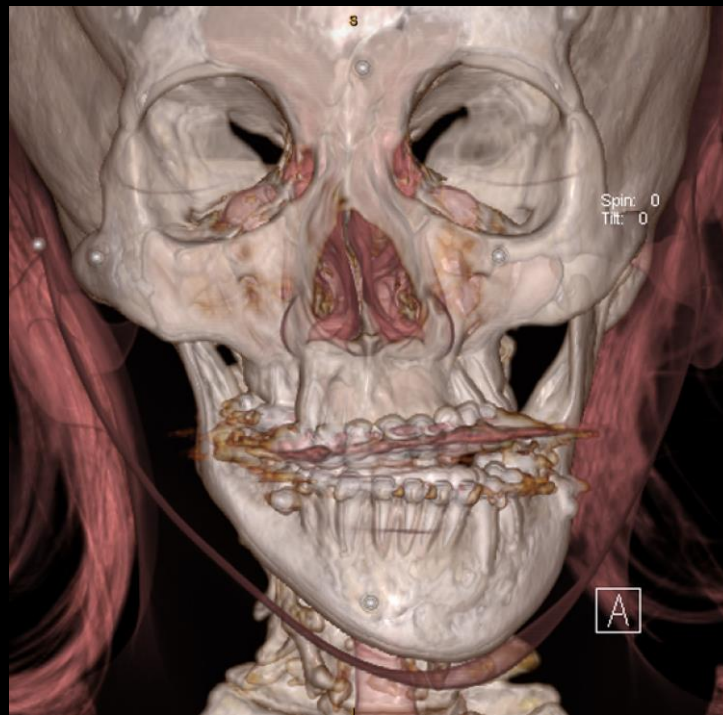
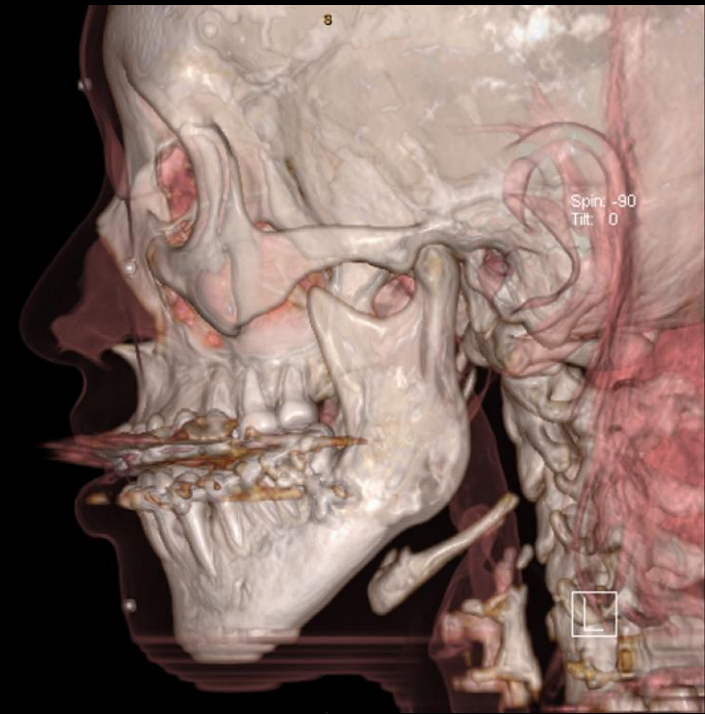
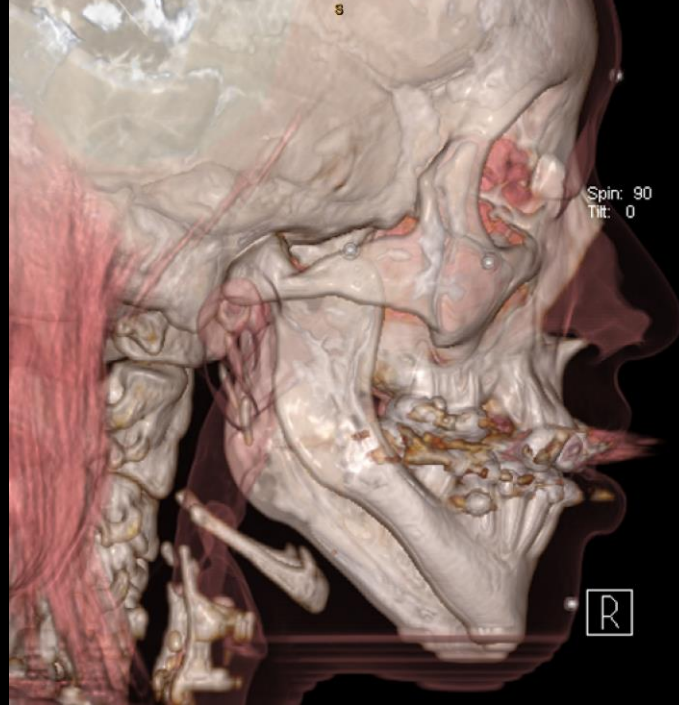


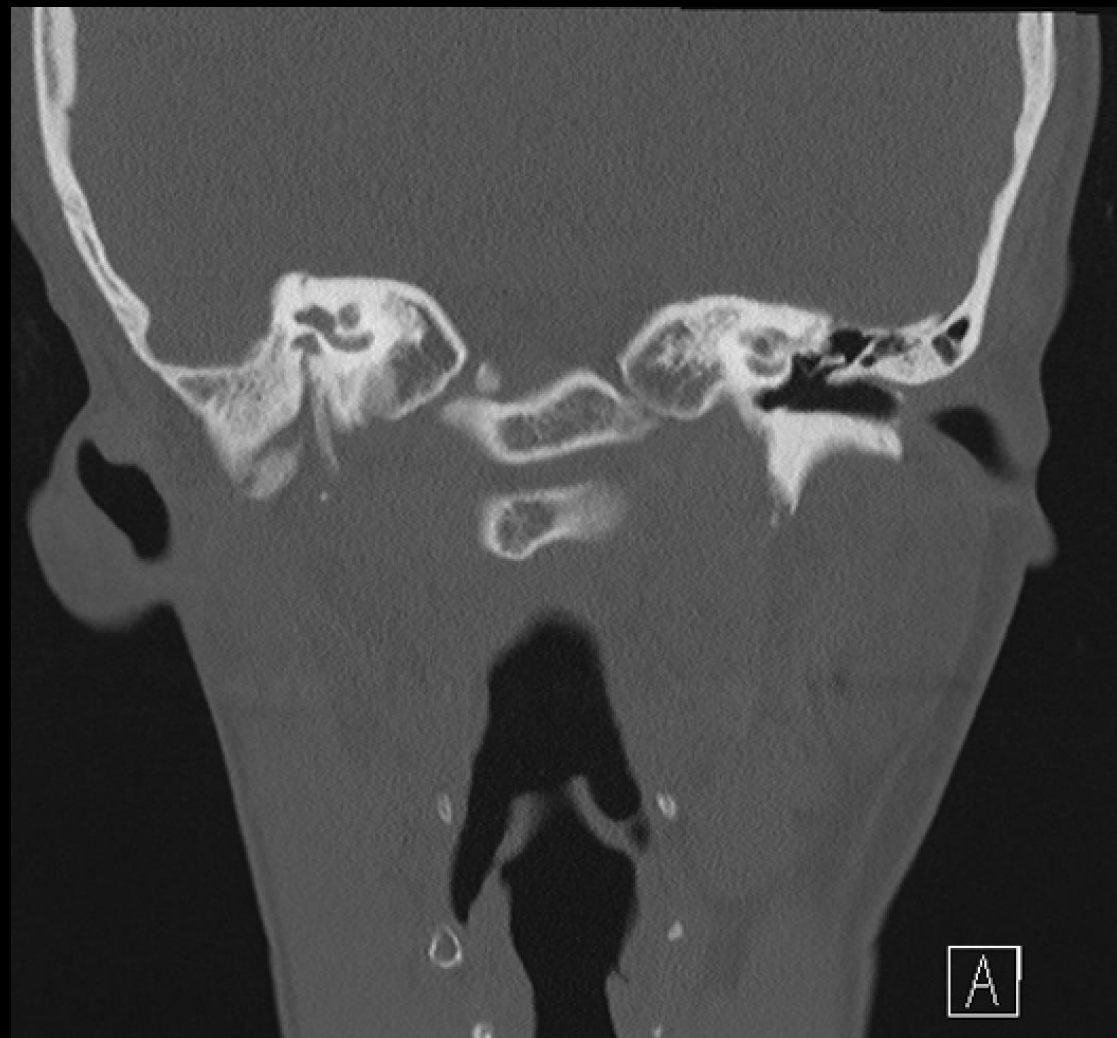
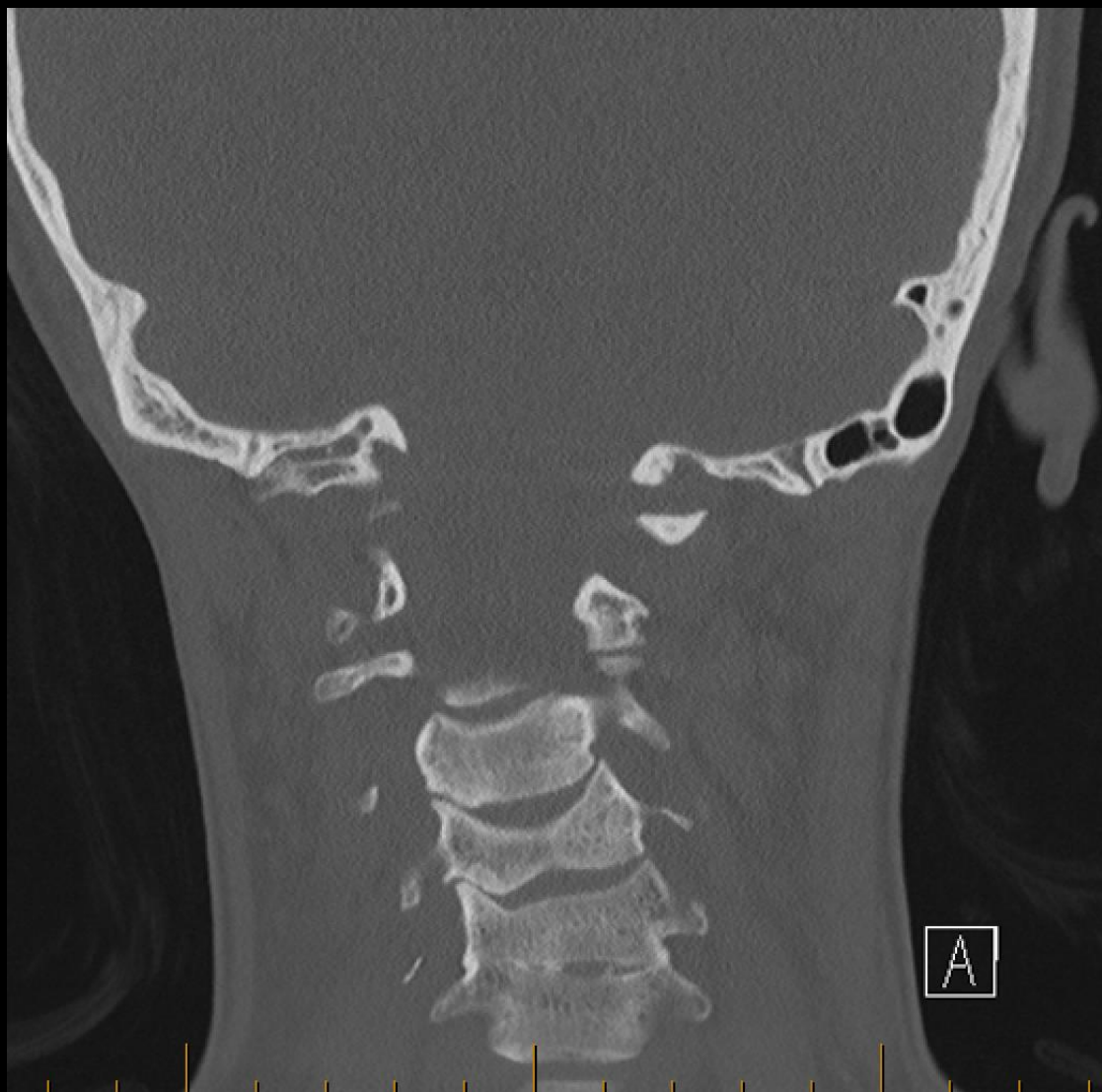


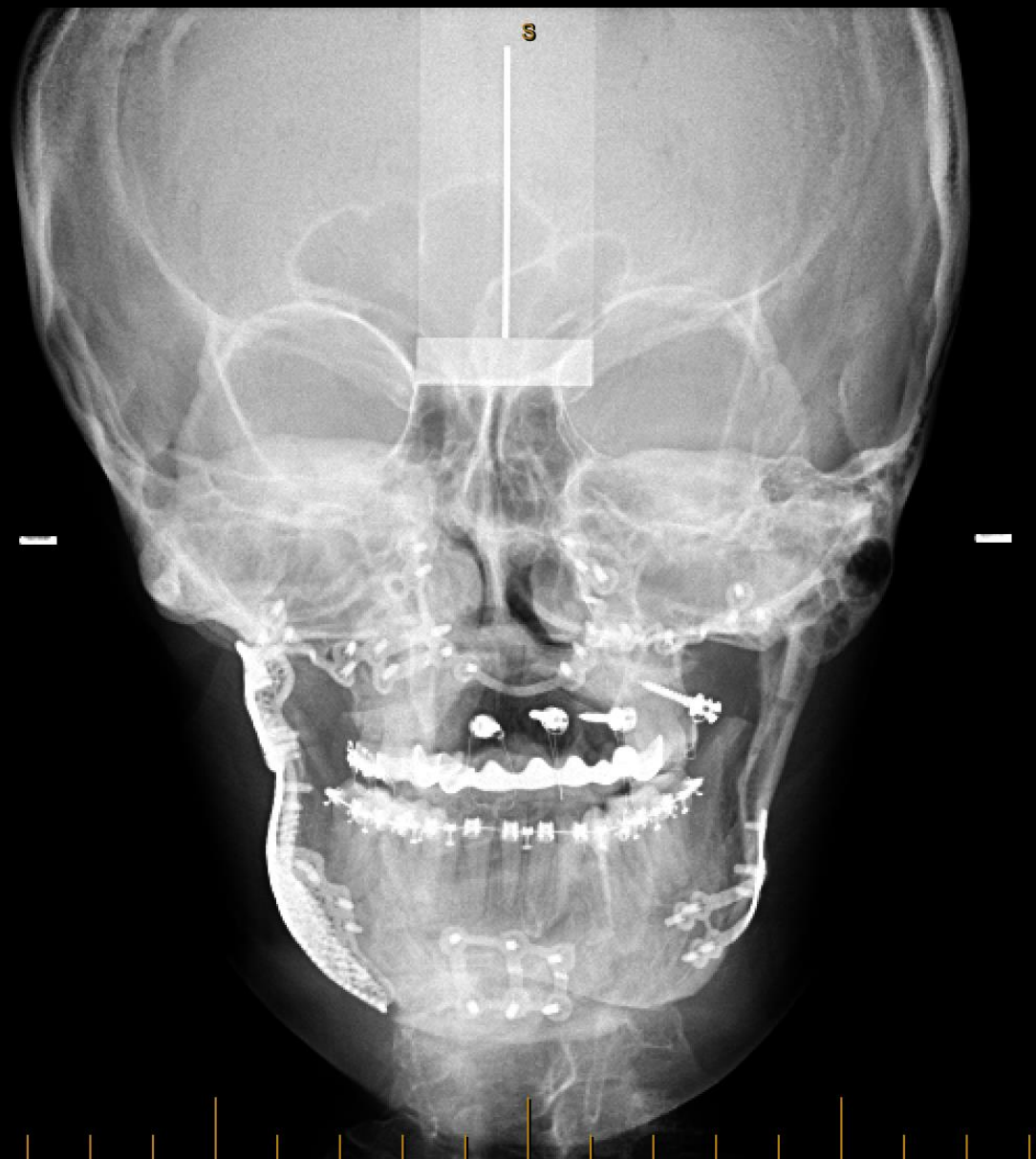
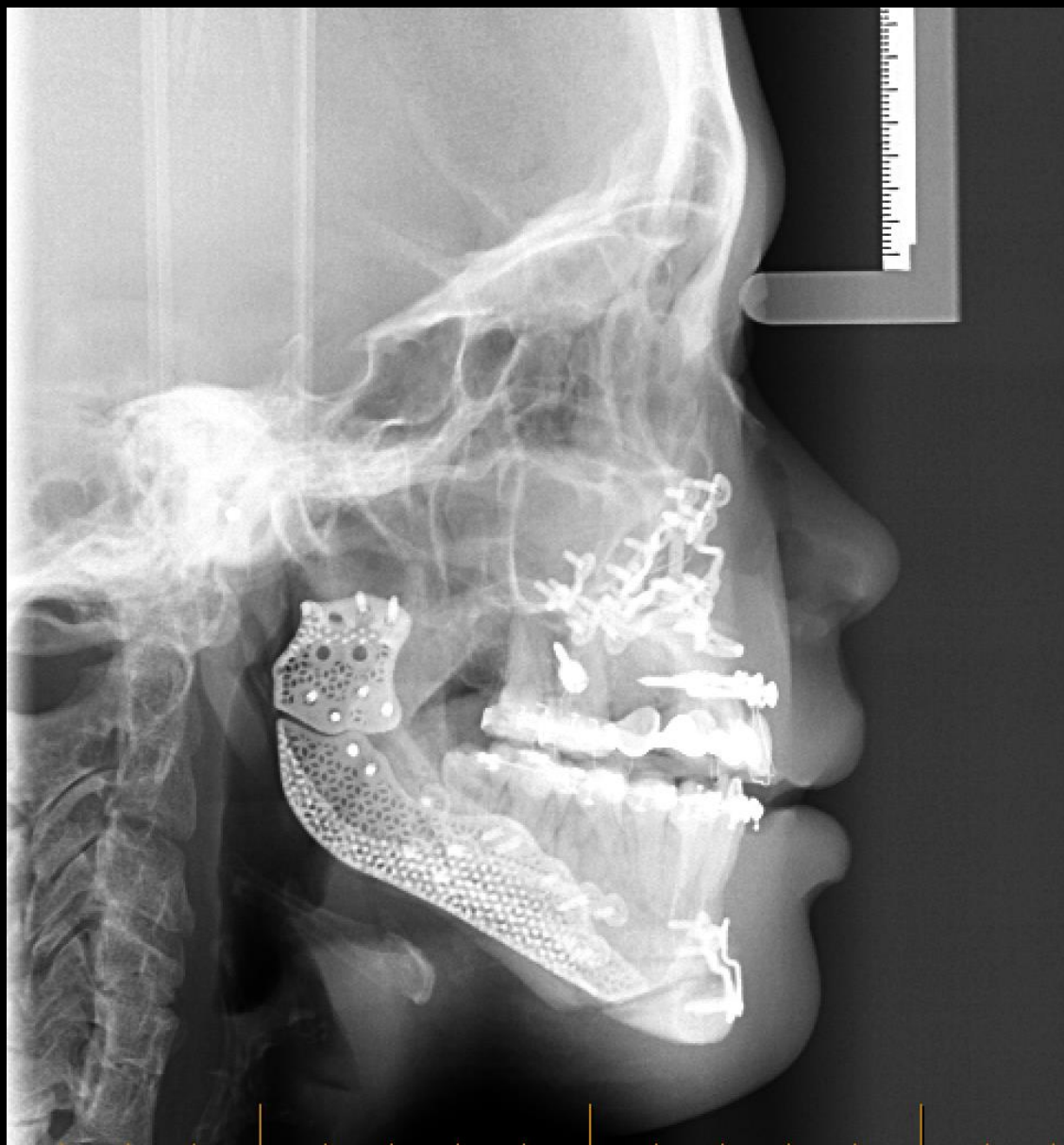


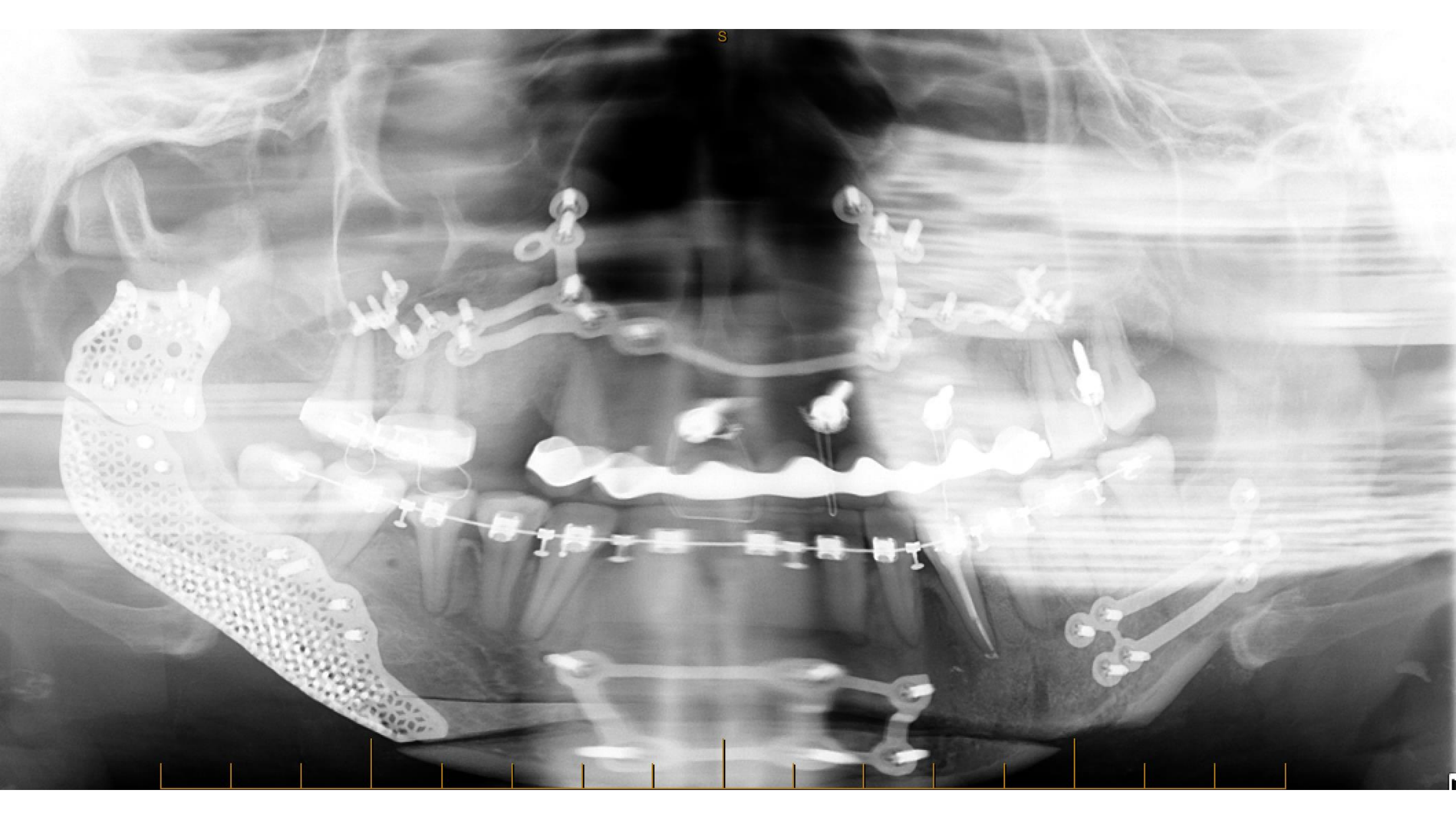
CCD











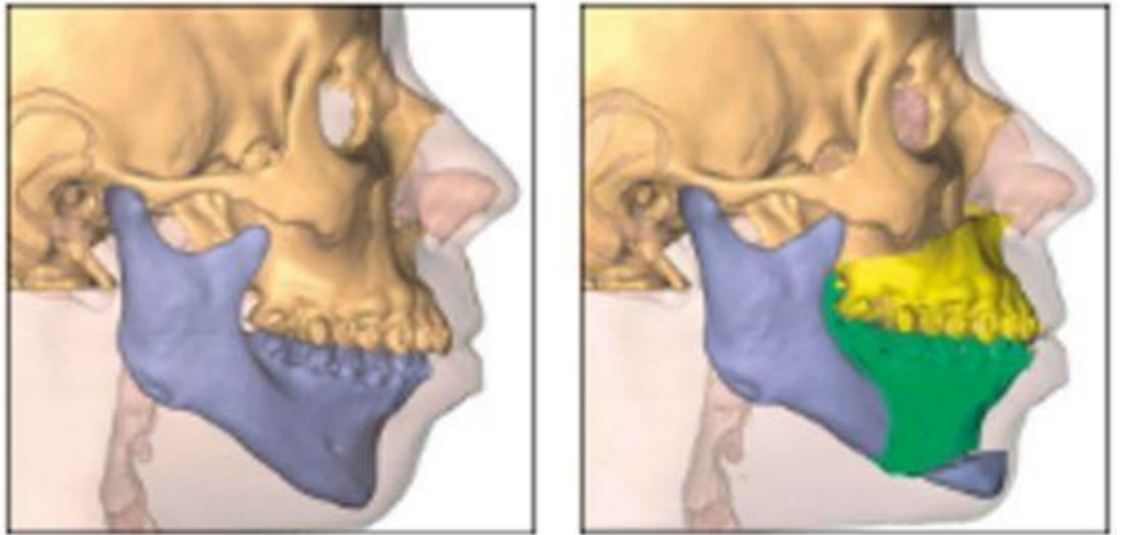
Developmental Dentofacial Deformity

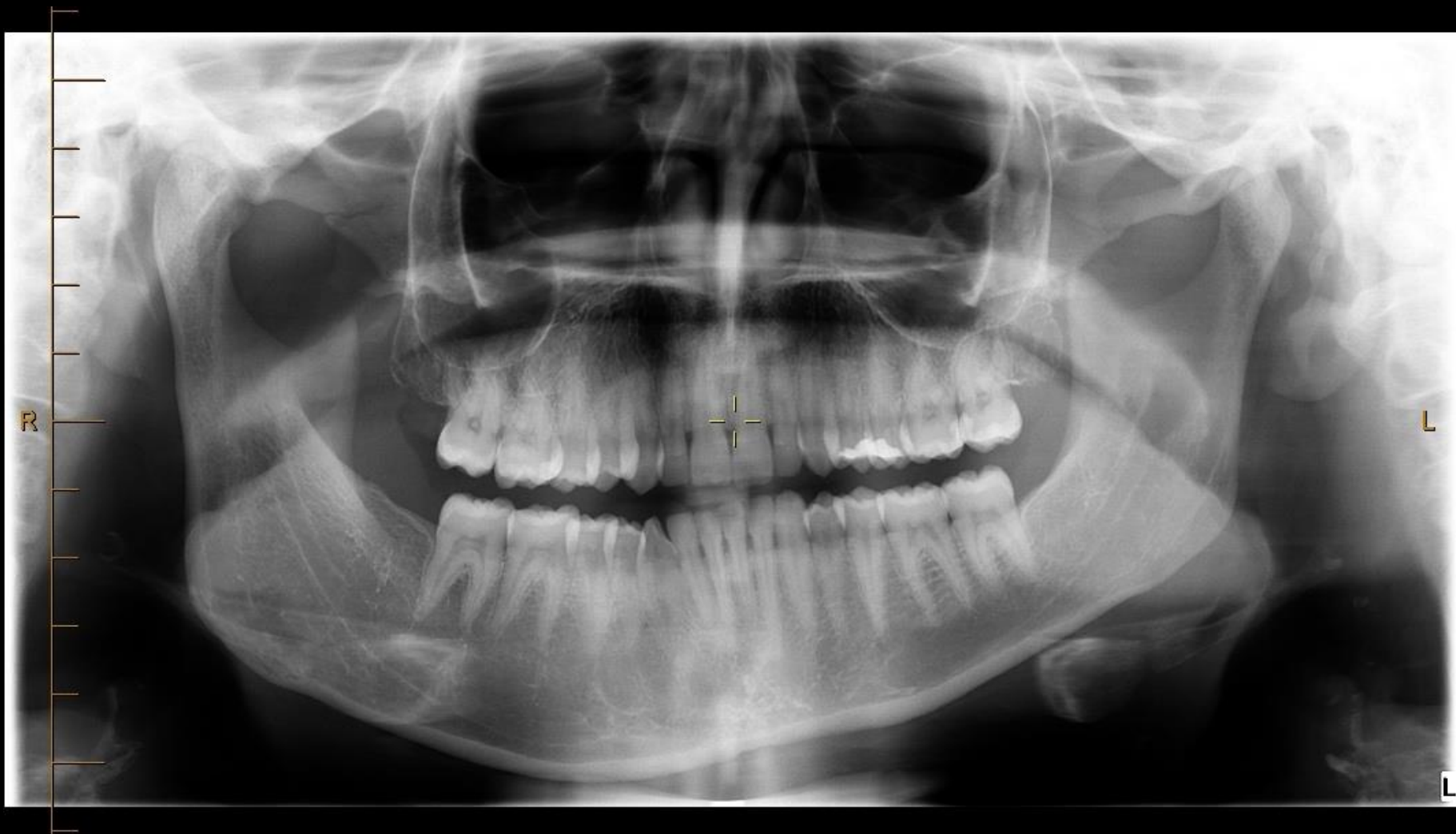
- Prognathism or retrognathism (A-P)
- Transverse jaw discrepancy
- Increased or decreased vertical dimension of the jaws

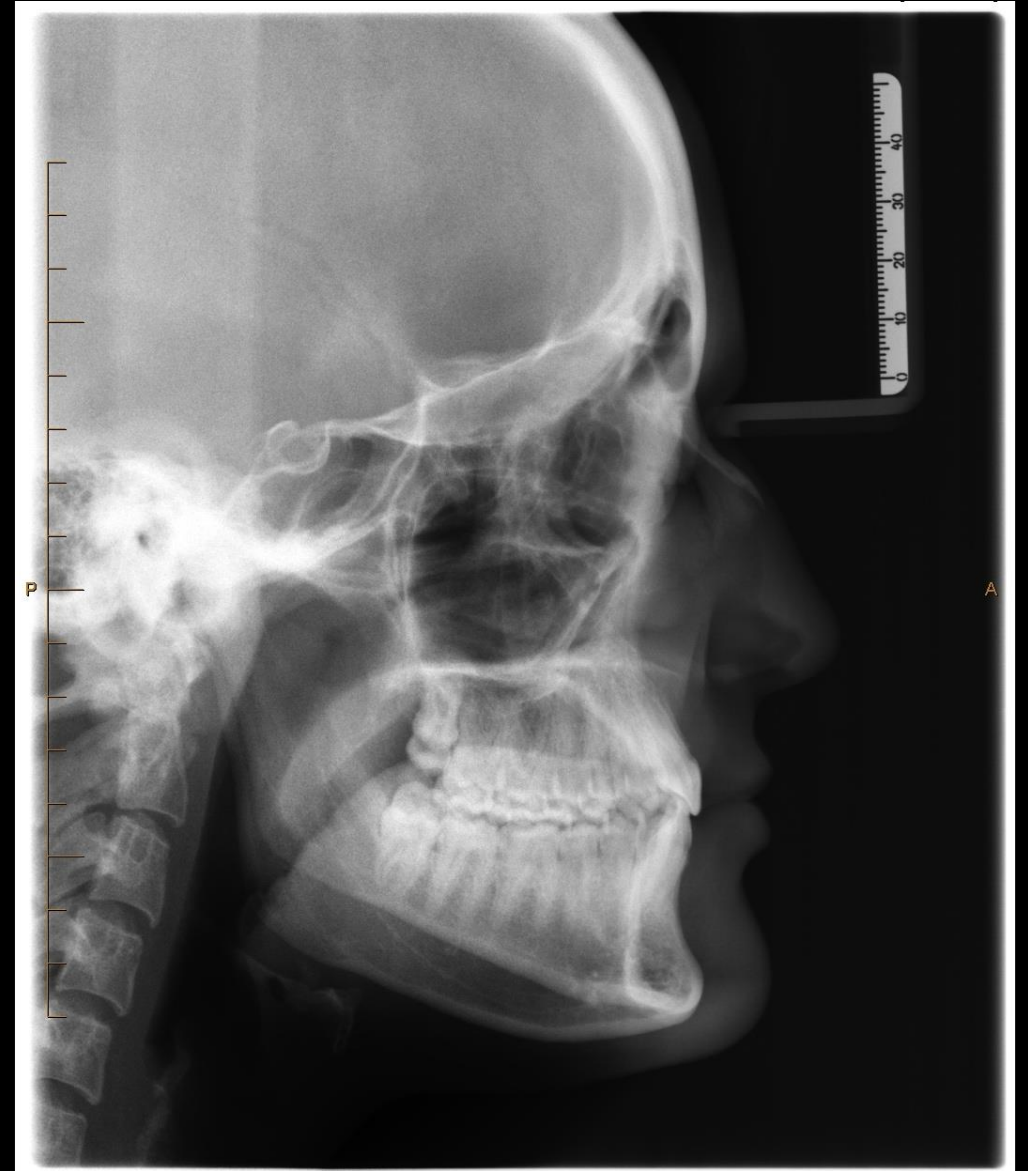
→ Can affect **quality of life** eg. function (chewing, breathing & swallowing)
aesthetics & speech

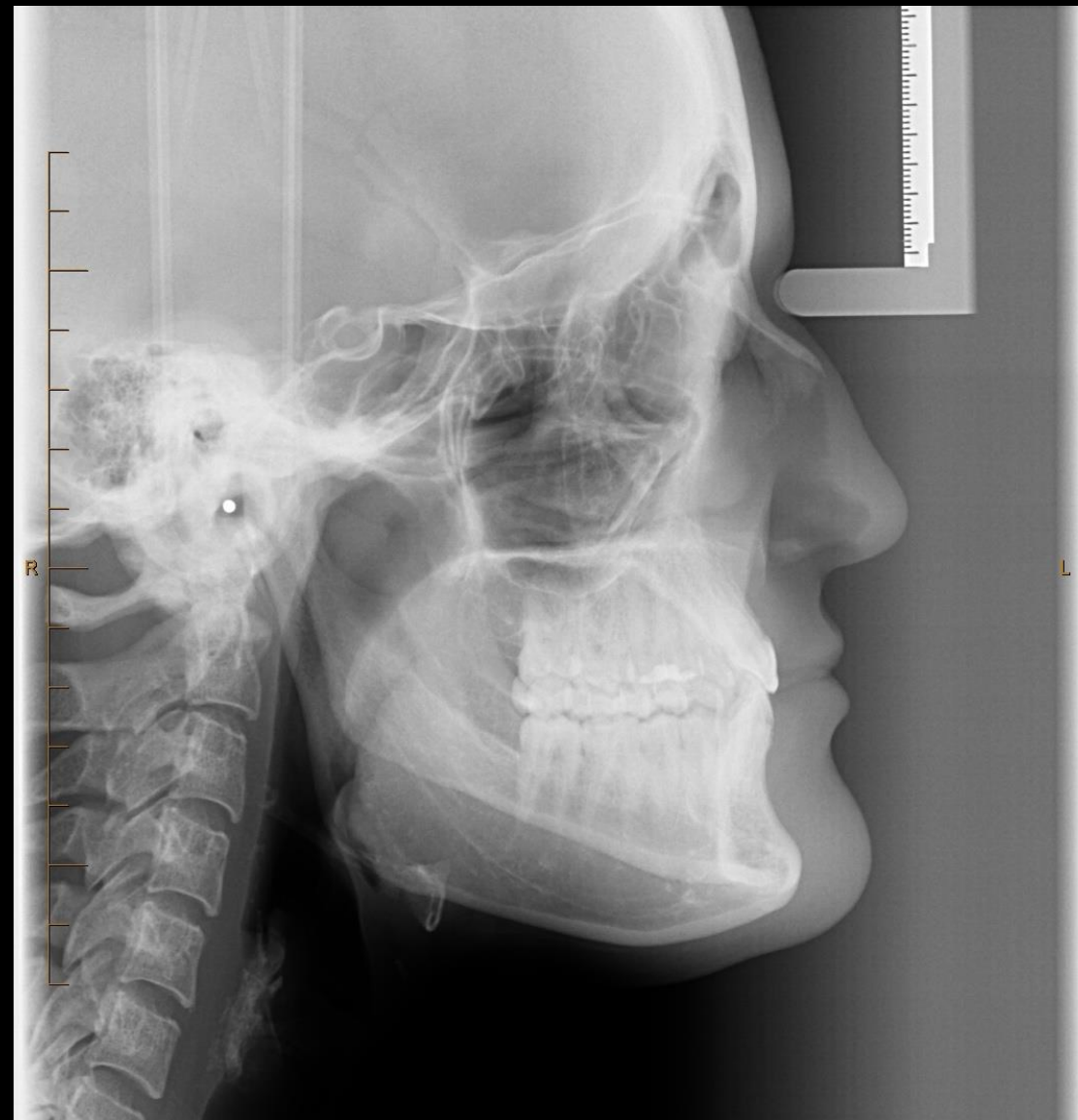
Imaging for Orthognathic Surgery

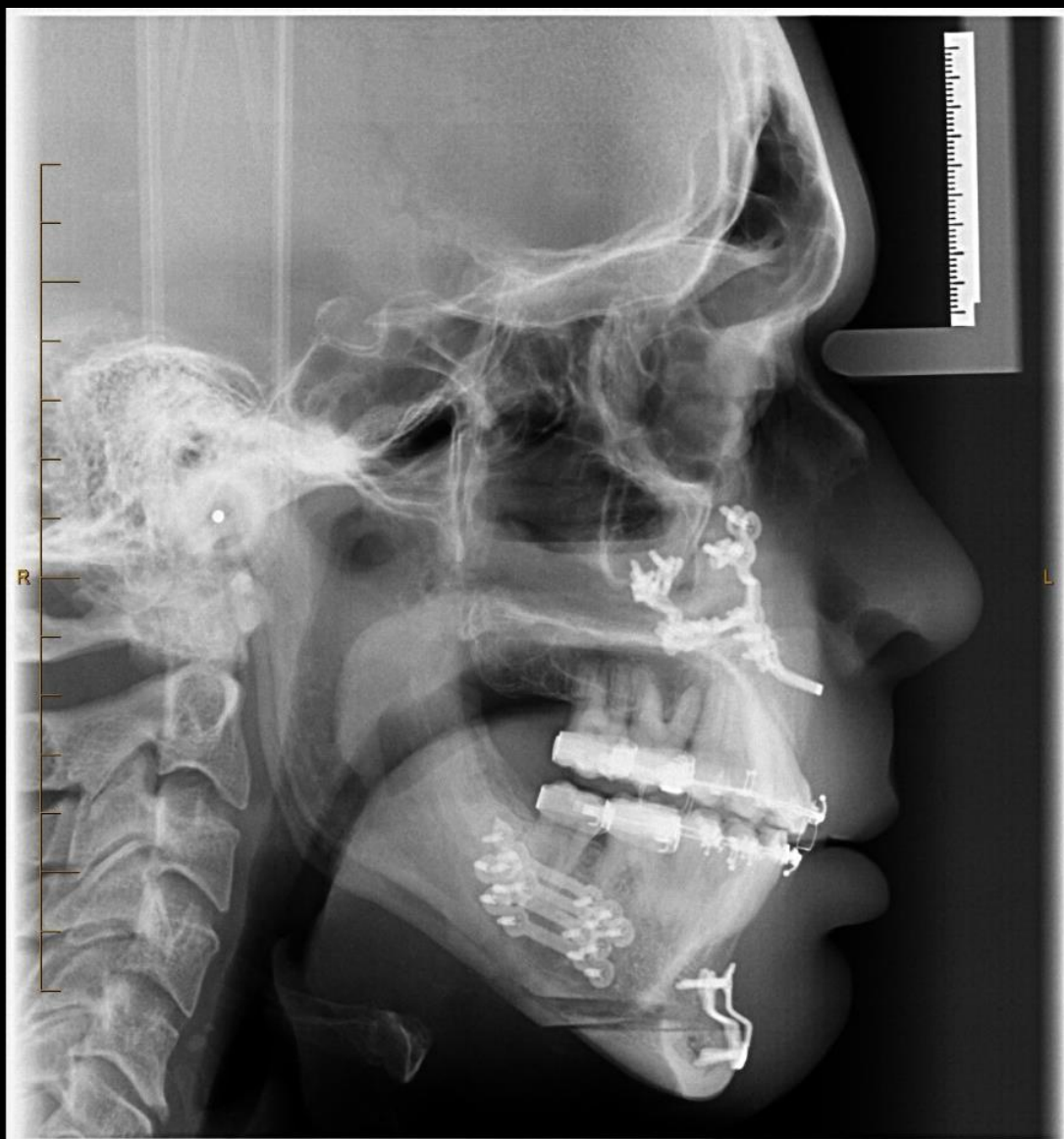
- OPG, Lat Ceph & PA Ceph
- CBCT (orofacial scan)
- CT (head)

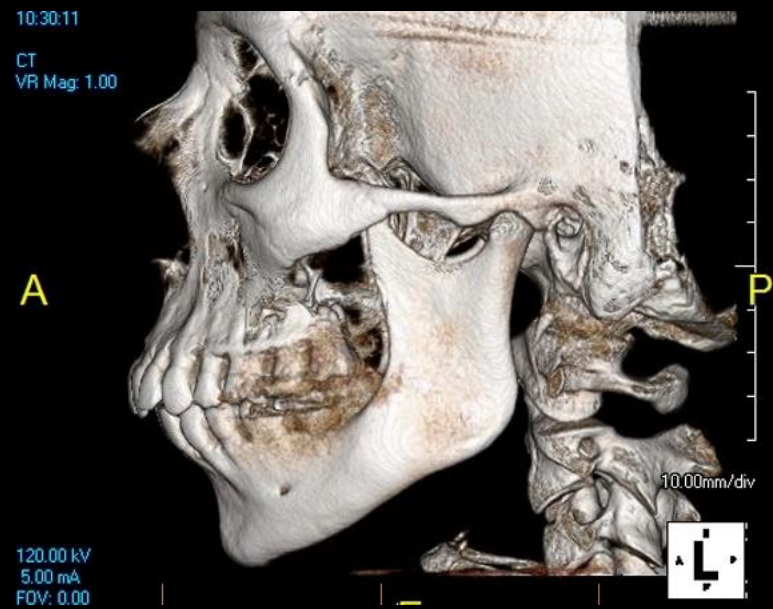
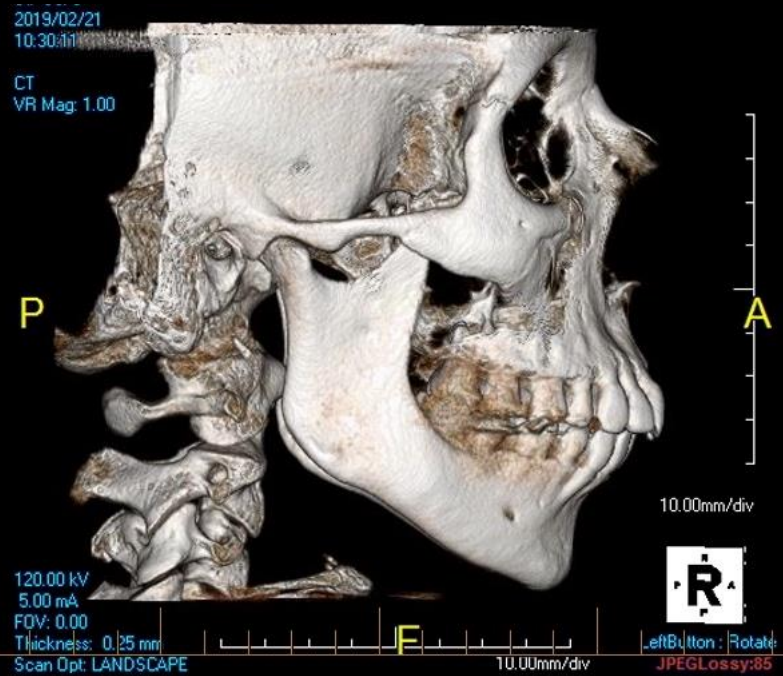
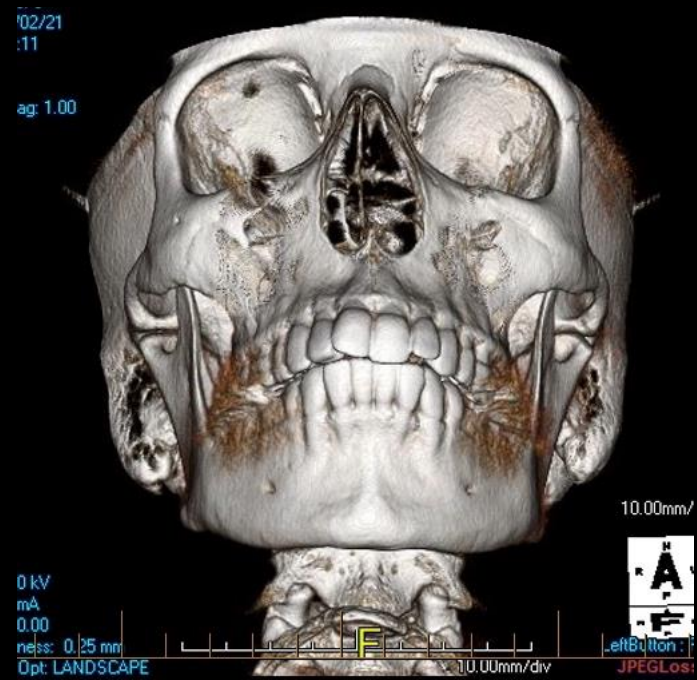
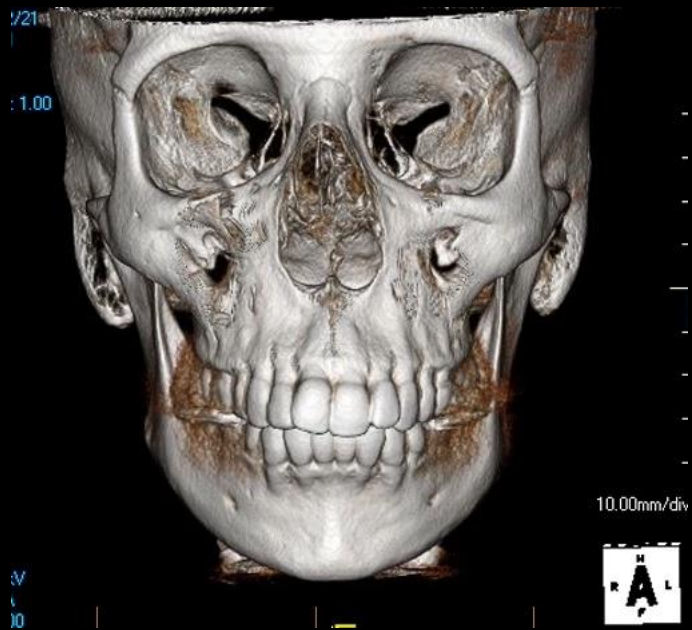


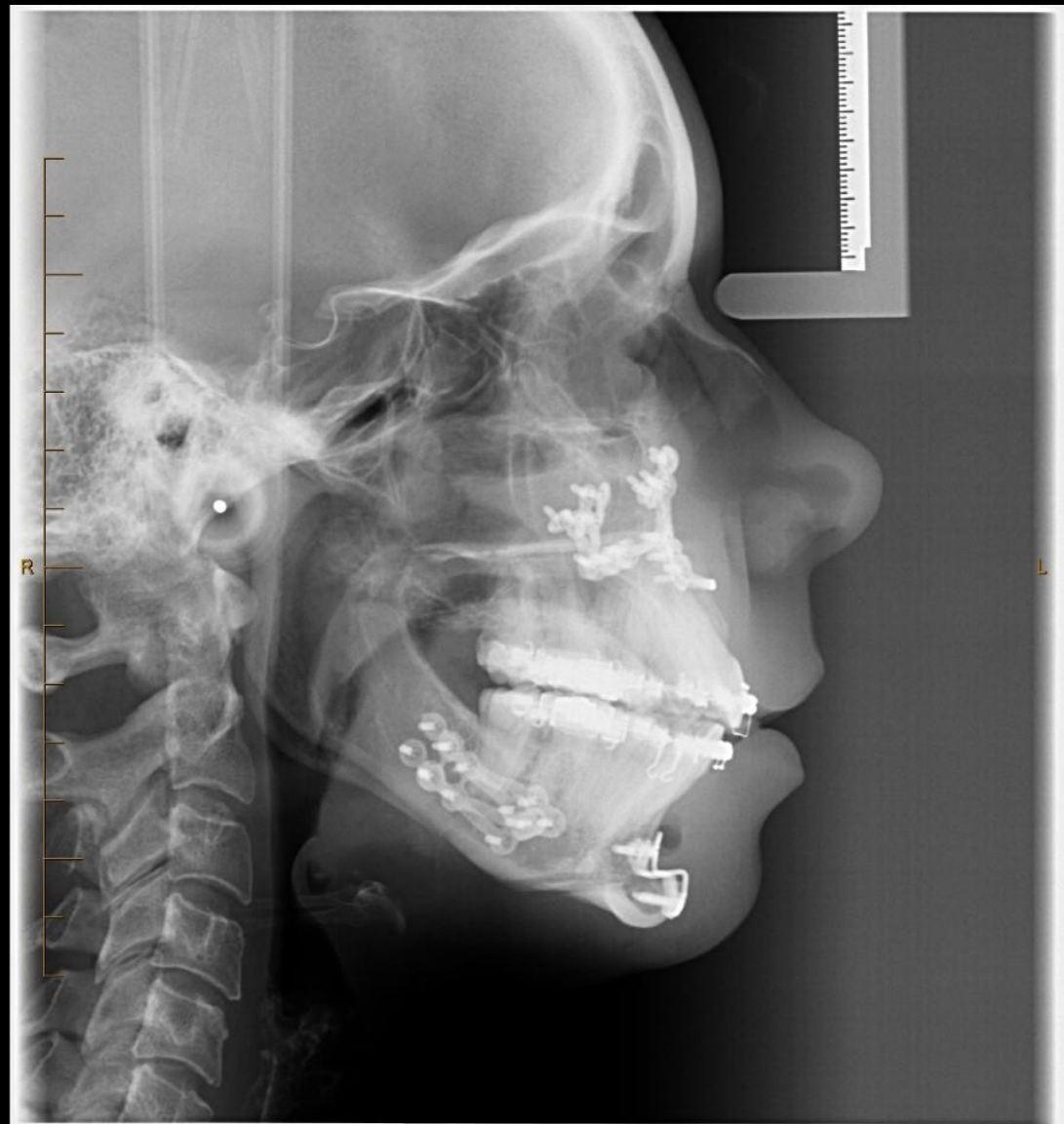


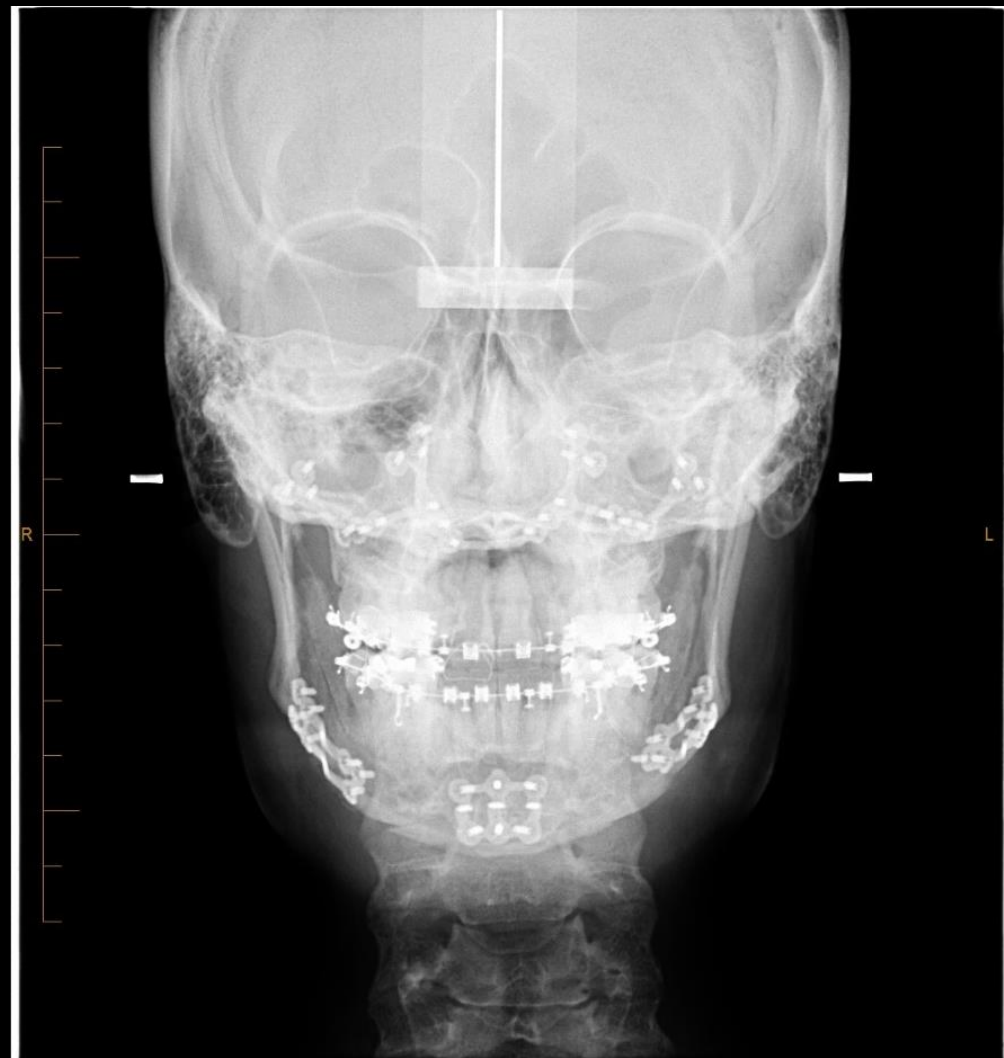
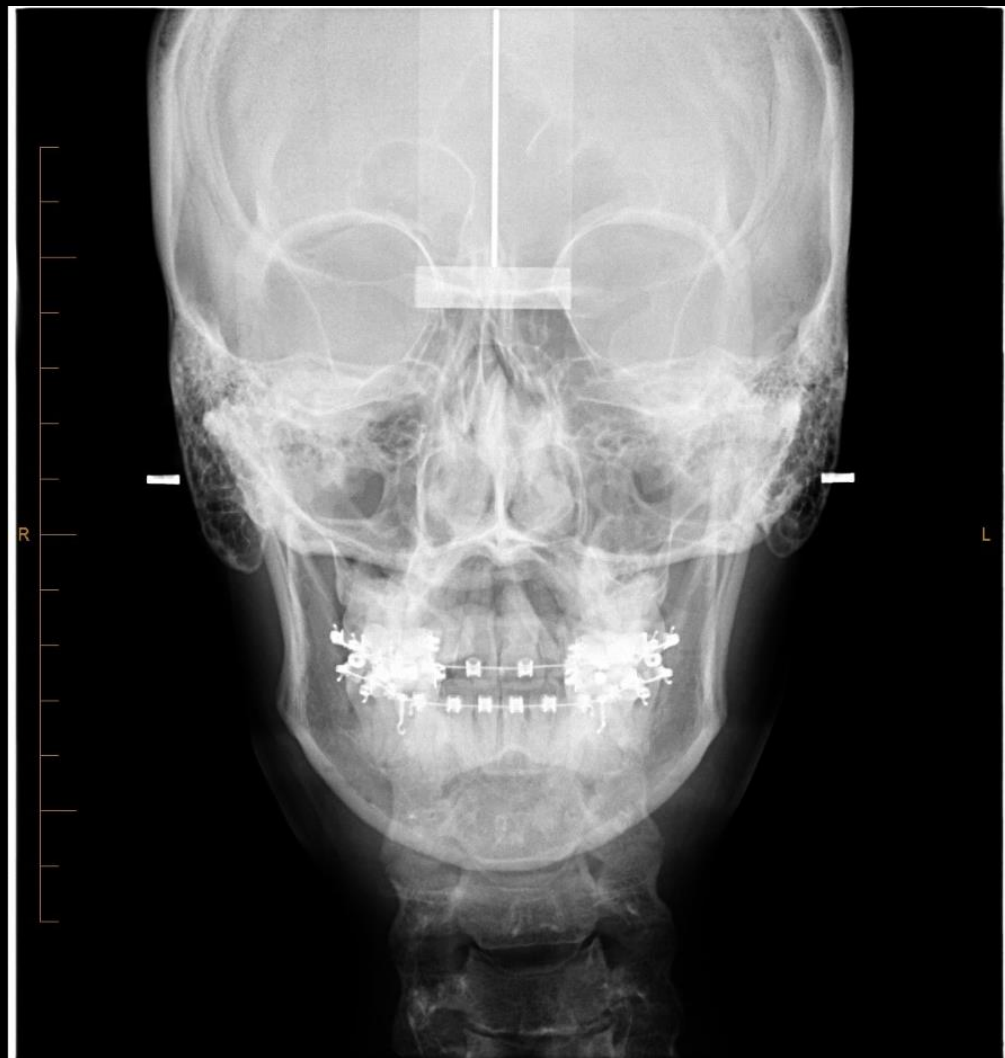












Acquired Facial Deformity

- Trauma
- Benign cysts & tumours
- Infection
- Malignancy
- Other bony lesions
 - Fibro-osseous lesions
 - Giant cell lesions
- Post-surgery (for removal of pathological lesions)



Ameloblastoma in the mandible

Marcelo Medeiros¹, Gabriela Granja Porto², Jose Rodrigues Laureano Filho³, Luis Portela⁴, Ricardo Holanda Vasconcellos⁵

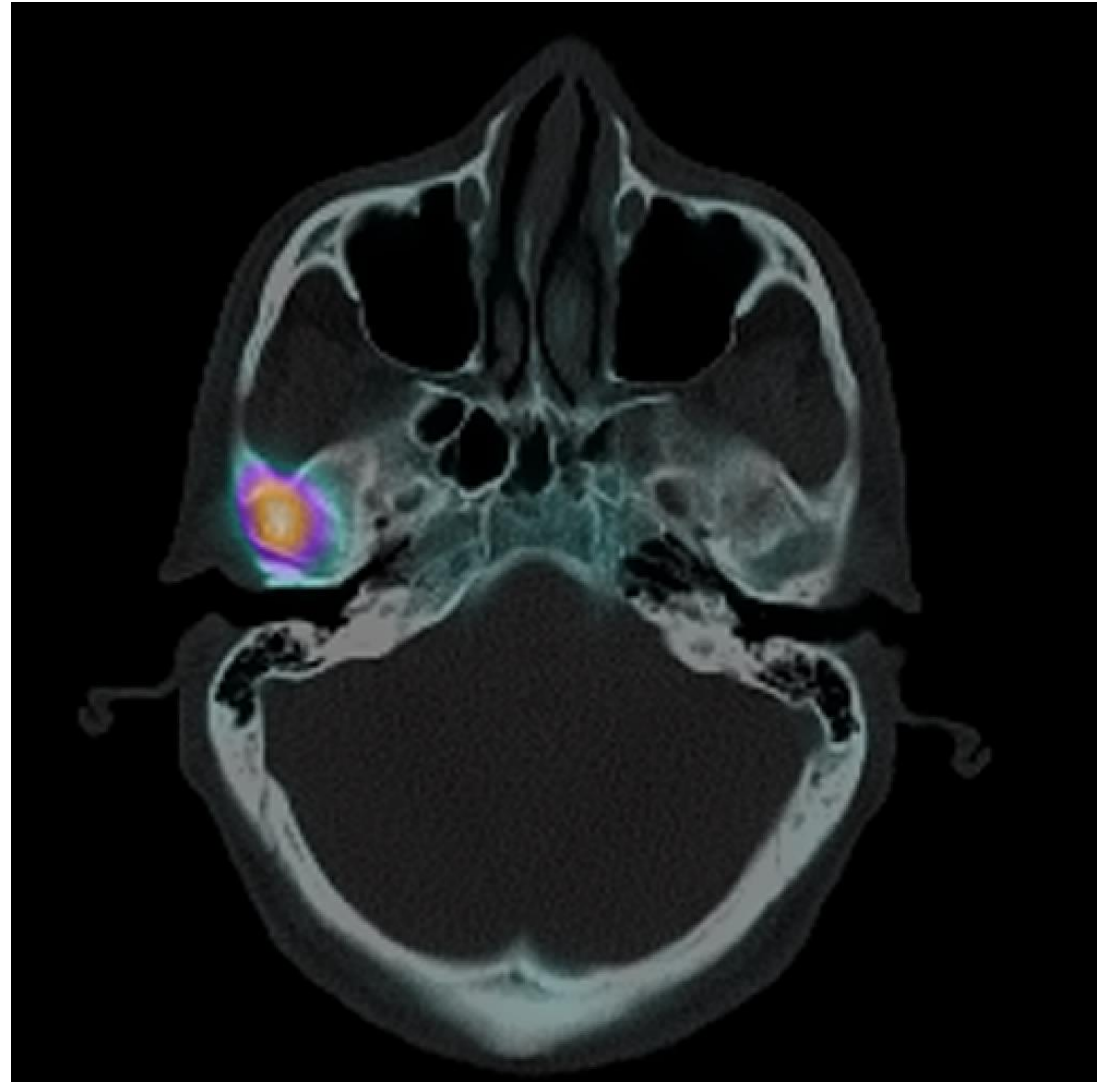
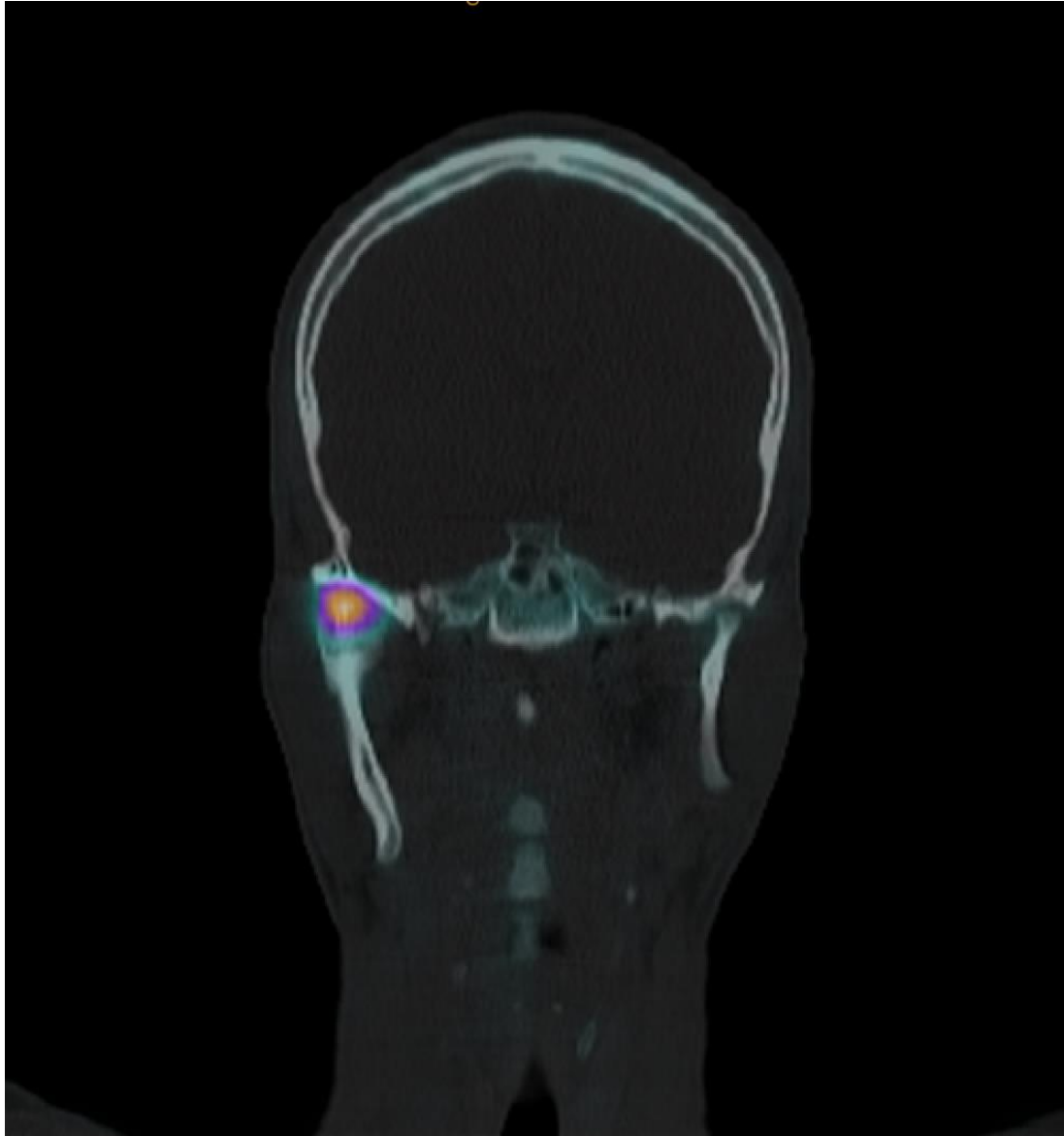
Imaging for Acquired Facial Deformity

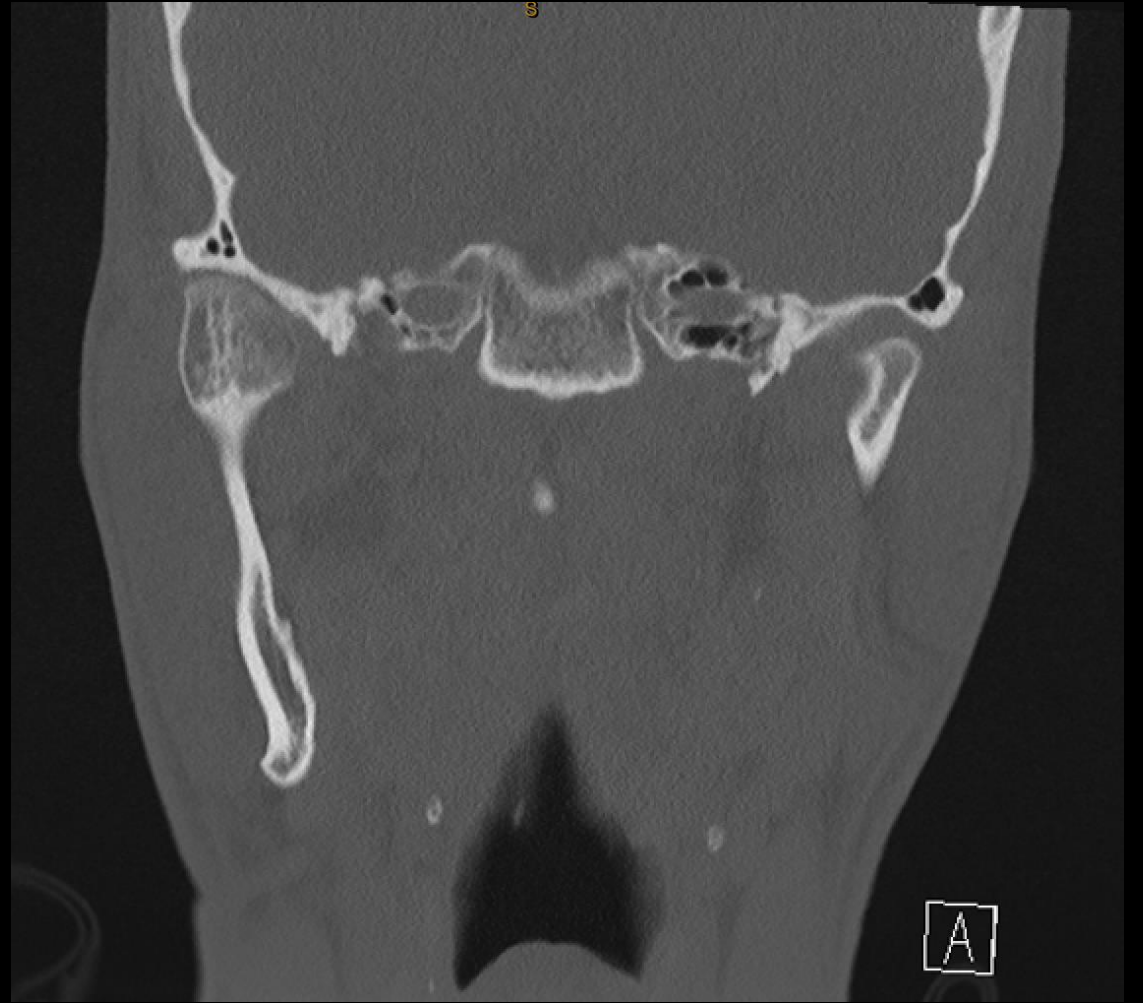
Depends on the nature of the abnormality

- OPG (good overview)
- CBCT
- **CT**
- MRI
- NMI esp. bone scans









Fibrous dysplasia of bone: craniofacial and dental implications

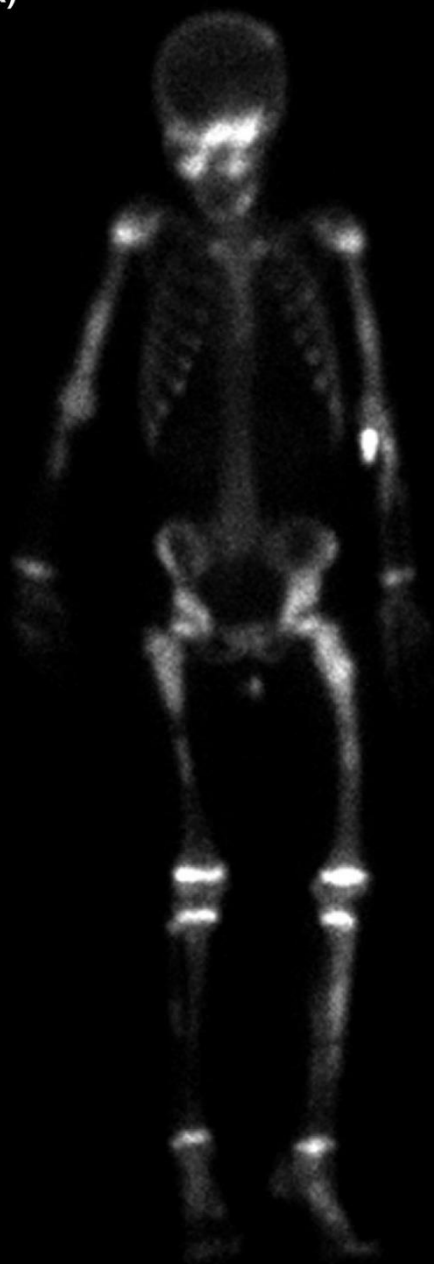
AB Burke  MT Collins, AM Boyce,

First published: 05 August 2016

<https://doi.org/10.1111/odi.12563>

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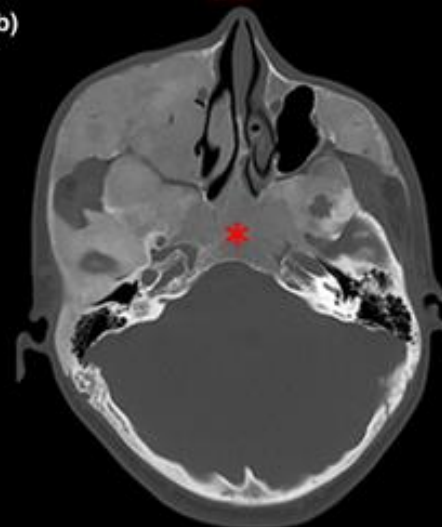
(a)



(a)



(b)



(c)



END