FACIAL FRACTURES

PROFESSOR STAVROS VASSILIOU

ORAL AND MAXILLOFACIAL SURGEON

INJURY TREATMENT AT THE PLACE OF THE ACCIDENT

1. Ensuring a free airway→ removal of foreign bodies (teeth, dentures etc), Treatment of bleeding→package
2. Safe transport to hospital → neck protection,

ASSESSMENT OF THE INJURY TO THE EMERGENCY ROOM

ATLS - ABCDE

- AIRWAY → control
- BREATHING → oxygen administration
  CIRCULATION →bleeding control
- DISABILITY →Neurological status check
- EXPOSURE/ENVIROMENT →complete removal of clothing and examination of the injured, protection from hypothermia

AIRWAY CONTROL

OBSTRUCTION DUE TO FACIAL FRACTURES?

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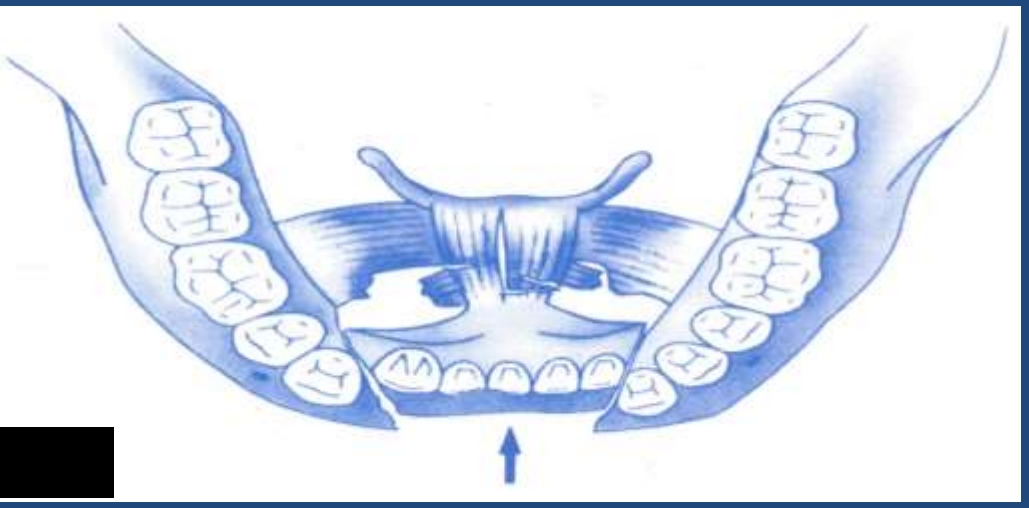
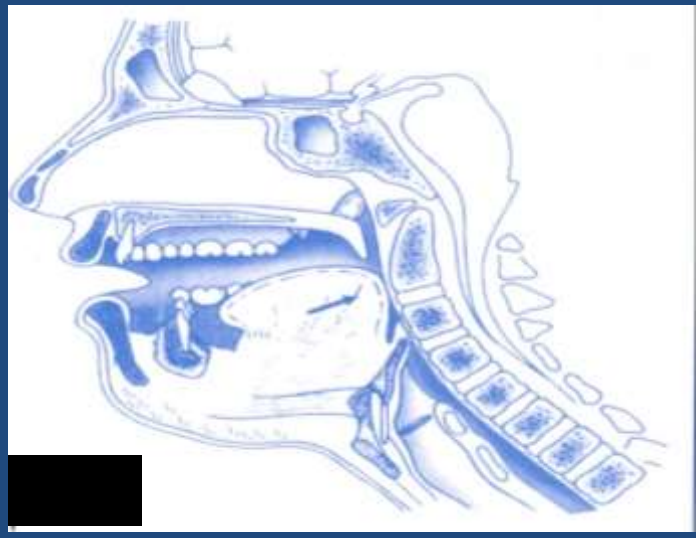
DANGER FRACTURES

RISK OF AIRWAY OBSTRUCTION

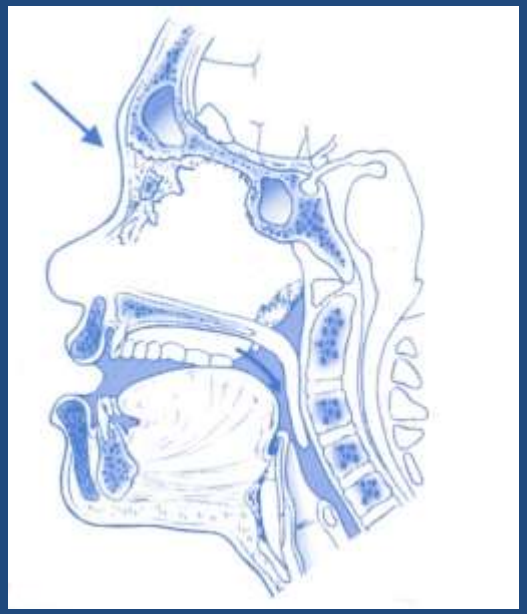




Double fracture at the anterior mandible

The anterior part of the lower jaw moves backwards and the tongue blocks the airway

DANGER FRACTURES
RISK OF AIRWAY OBSTRUCTION



Le Fort II fracture

The maxilla moves backwards and the soft palate blocks the airway

RISK OF AIRWAY OBSTRUCTION

IMMEDIATE TREATMENT

- Pulling the tongue forward and holding it with a strong (thick) suture outside the mouth, which is anchored to the skin of the chin
- Temporary immobilization of fractures with wire bands on adjacent teeth
- Pulling the upper jaw forward

Temporary immobilization of fractures with wire bands on adjacent teeth

FACIAL TRAUMA

•Before the stitching will be done

- Wash with normal saline and check for foreign bodies
- Control of bleeding
- Control of the extent of the wound and cross-section of the nerve branch (facial nerve)
- Check for a fracture
- Anti-tetanus serum in wounds dangerous for tetanus

SOFT TISSUE INJURY TO THE LOWER THIRD OF THE FACE

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SOFT TISSUE INJURY TO THE FACE

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INJURY DUE TO A FALL

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INJURY DUE TO A FALL FROM A GREAT HEIGHT

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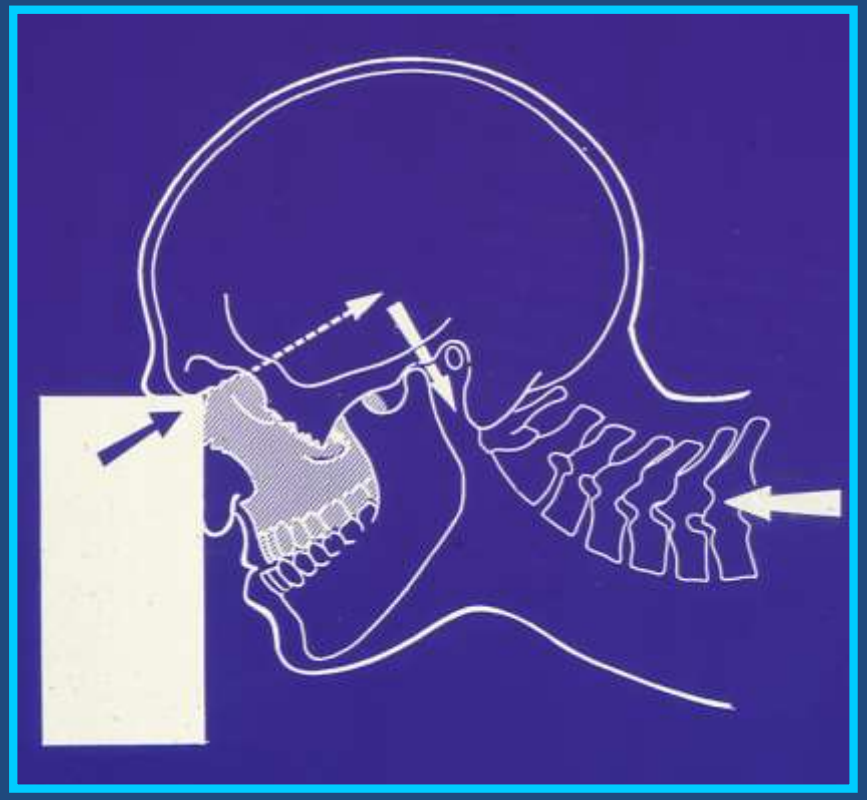
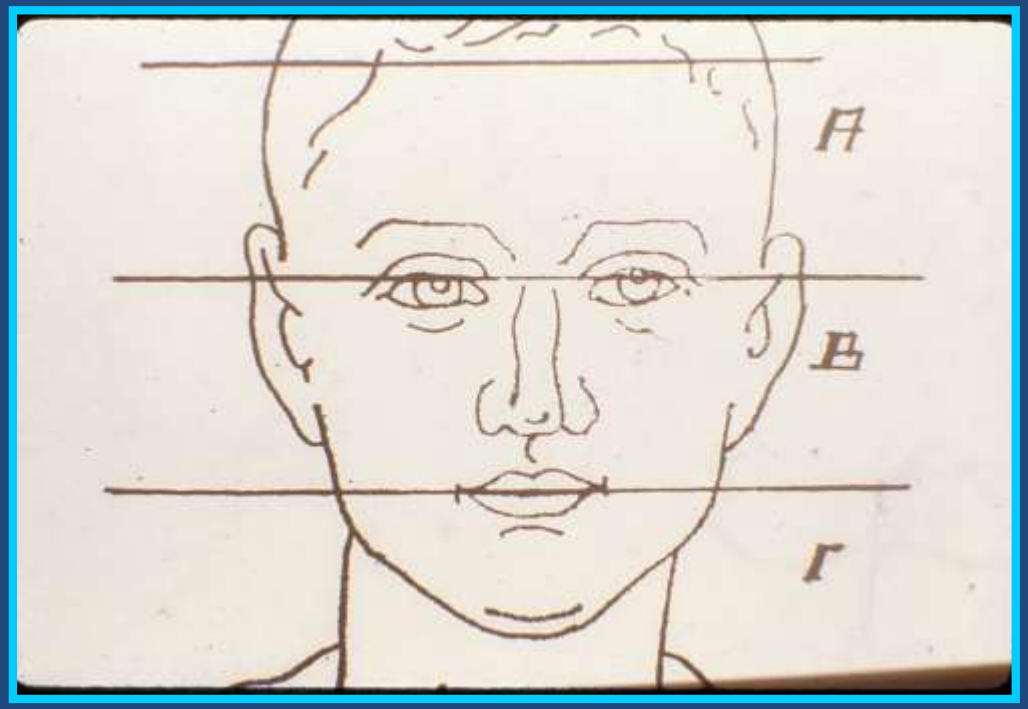
FACIAL FRACTURES





A: Upper third of the face
B: Middle third of the face
Γ: Lower third of the face

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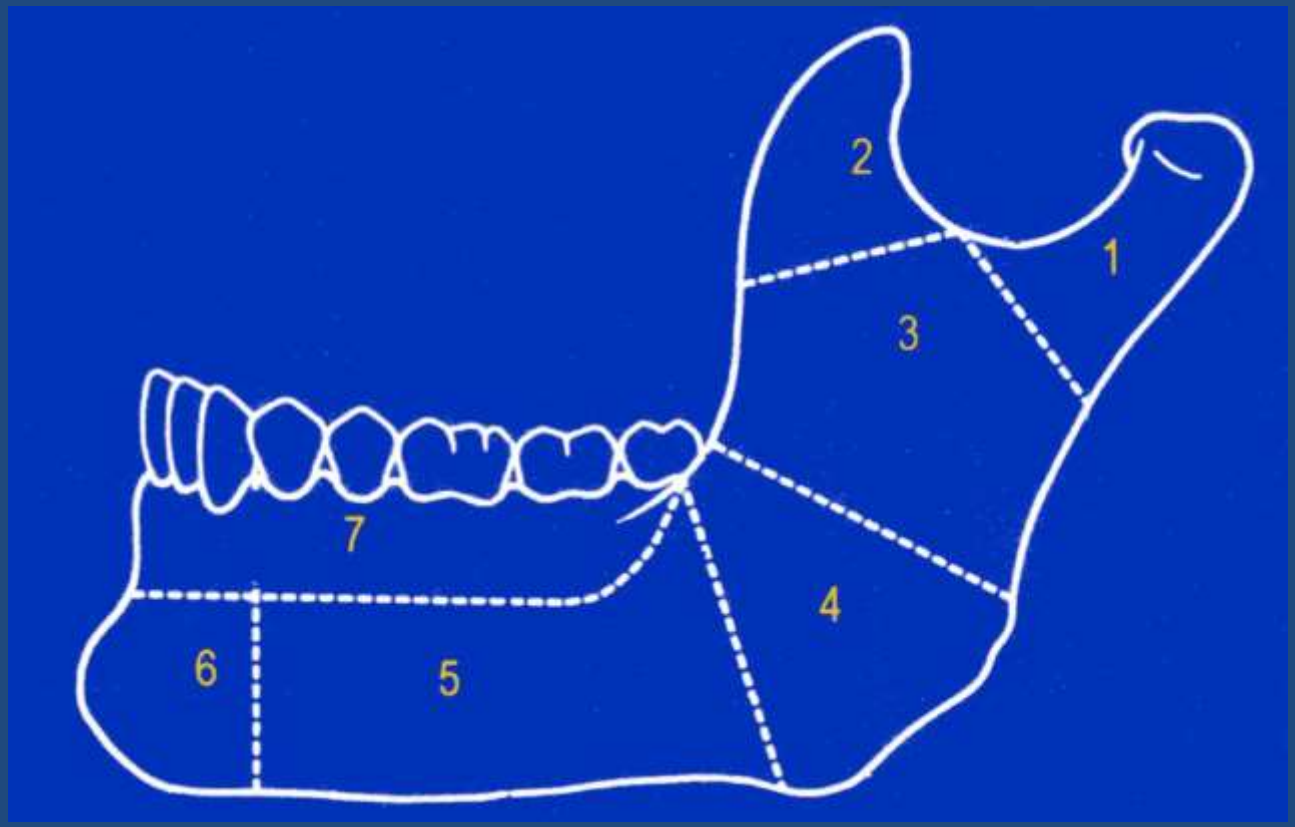
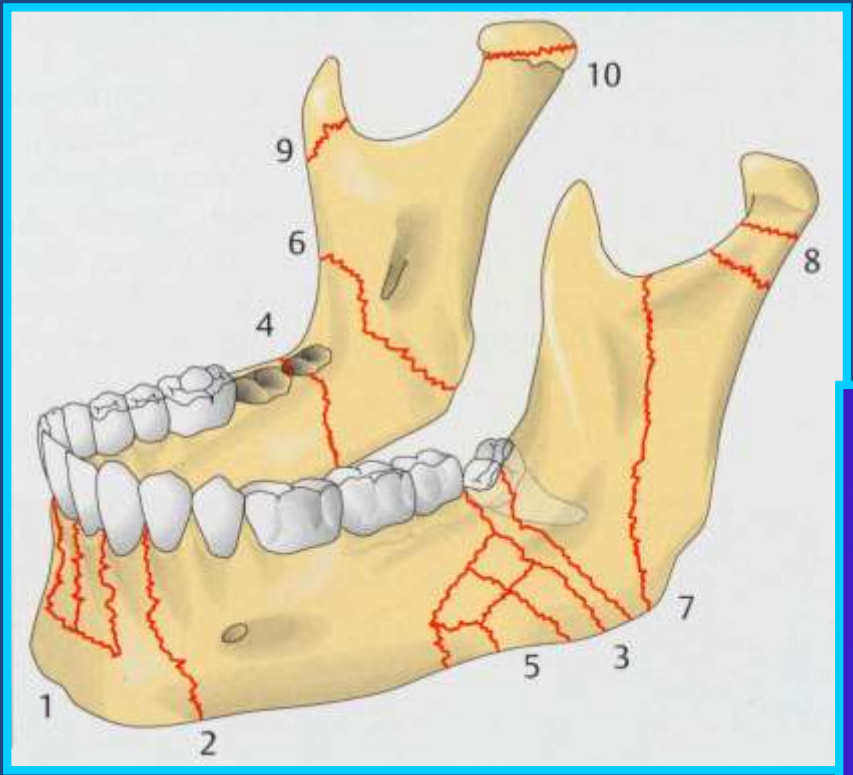
MANDIBULAR FRACTURES

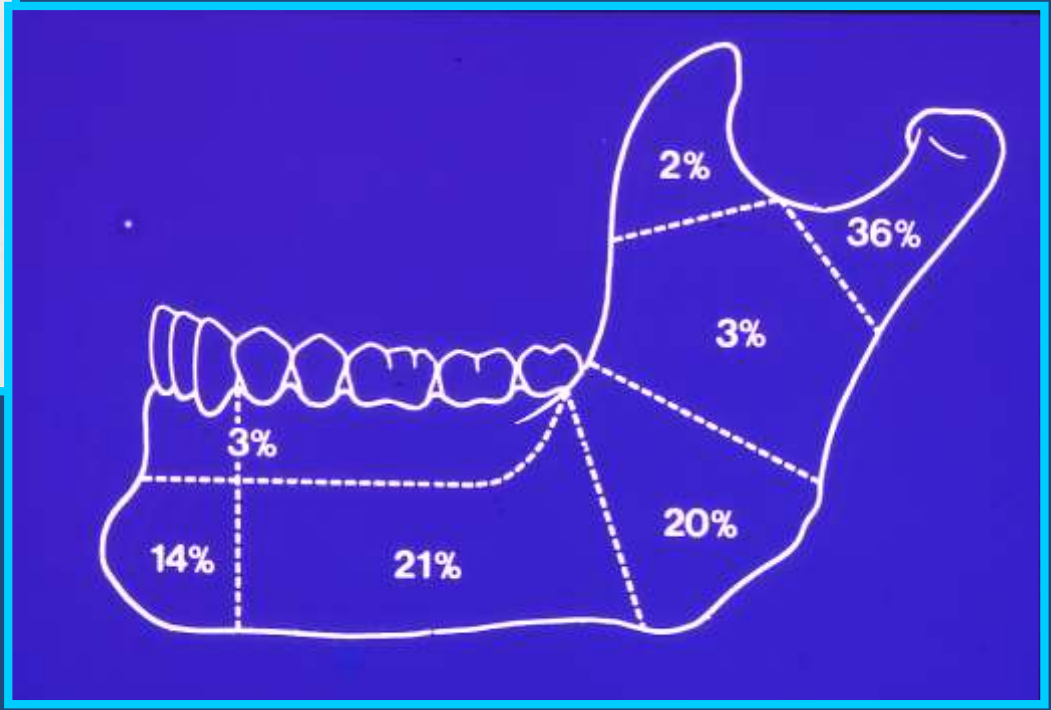
MANDIBLE



1. CONDULE 2. CORONOID PROCESS
3. RAMUS 4. ANGLE 5. BODY 6. CHIN 7. ALVEOLAR PROCESS

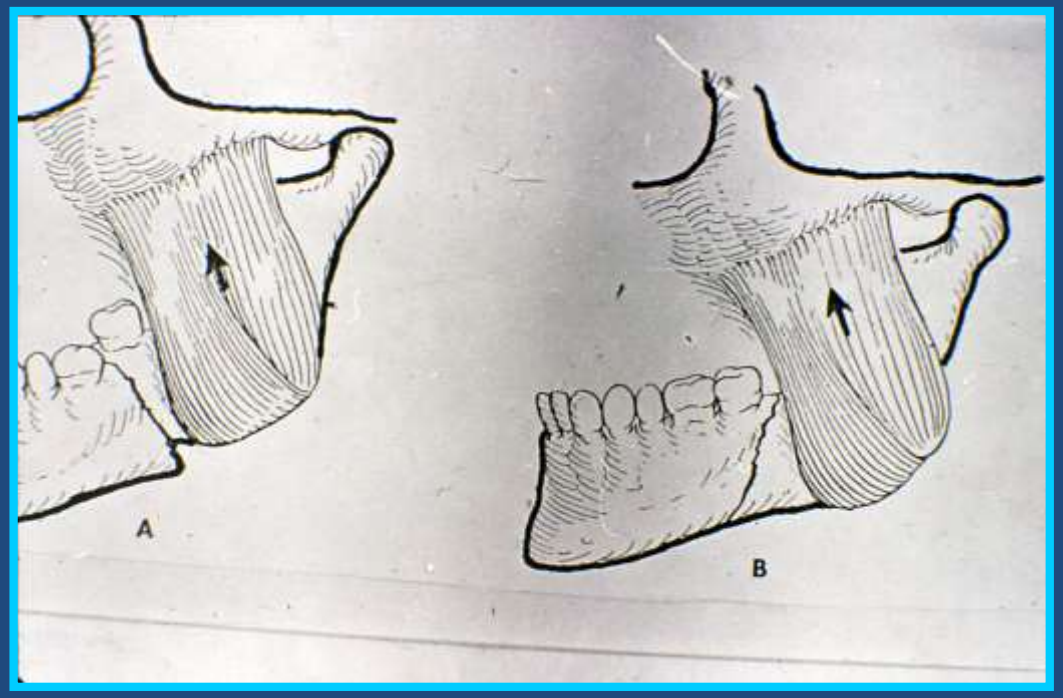
LOCATION OF FRACTURES IN THE LOWER JAW

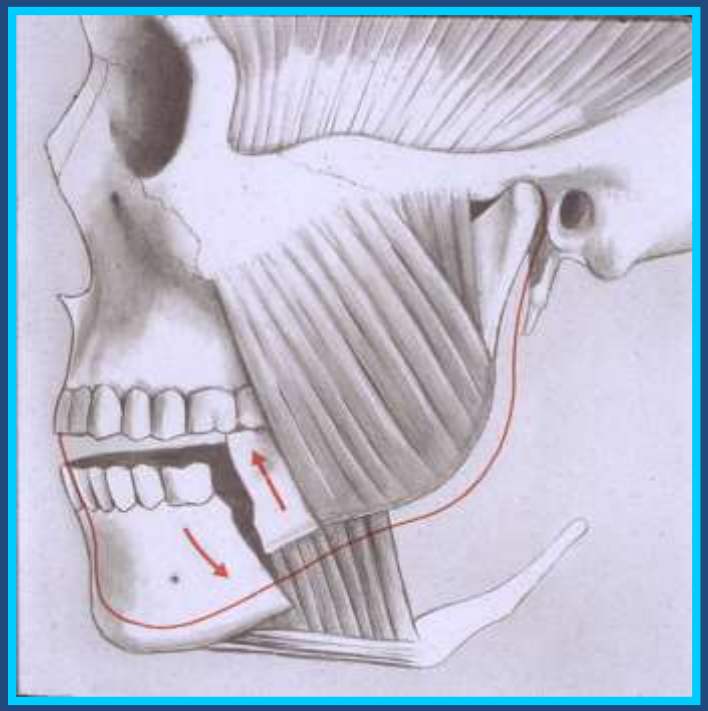




FRACTURE OF THE CONDYLE IS MORE COMMON

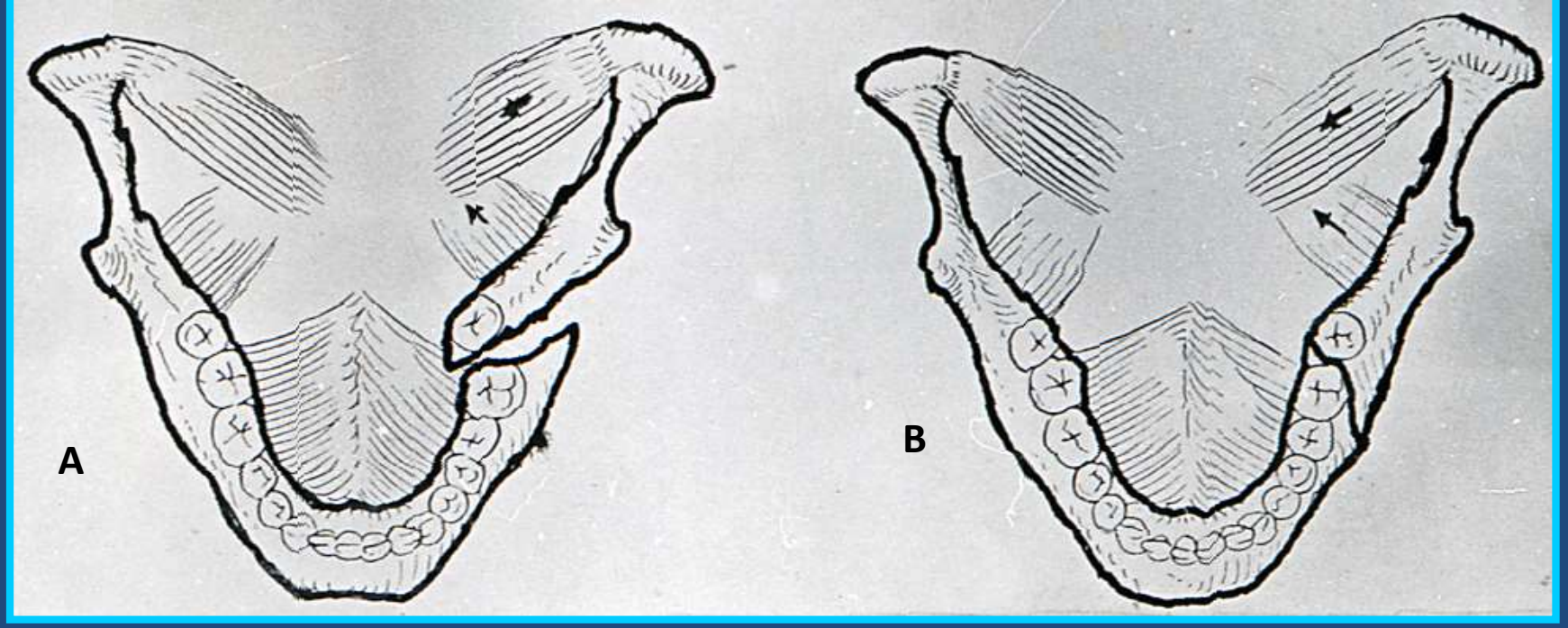
SEVERITY OF FRACTURES ACCORDING TO DIRECTION OF THE FRACTURE LINE





A. Adverse fracture. The masseter muscle pulls the back of the jaw upwards

B. Benign fracture



A. Adverse fracture. **The mylohyoid muscle pulls** the back of the jaw inwards

B. Benign fracture

MANDIBULAR FRACTURE

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CLINICAL SIGNS OF MANDIBULAR FRACTURE

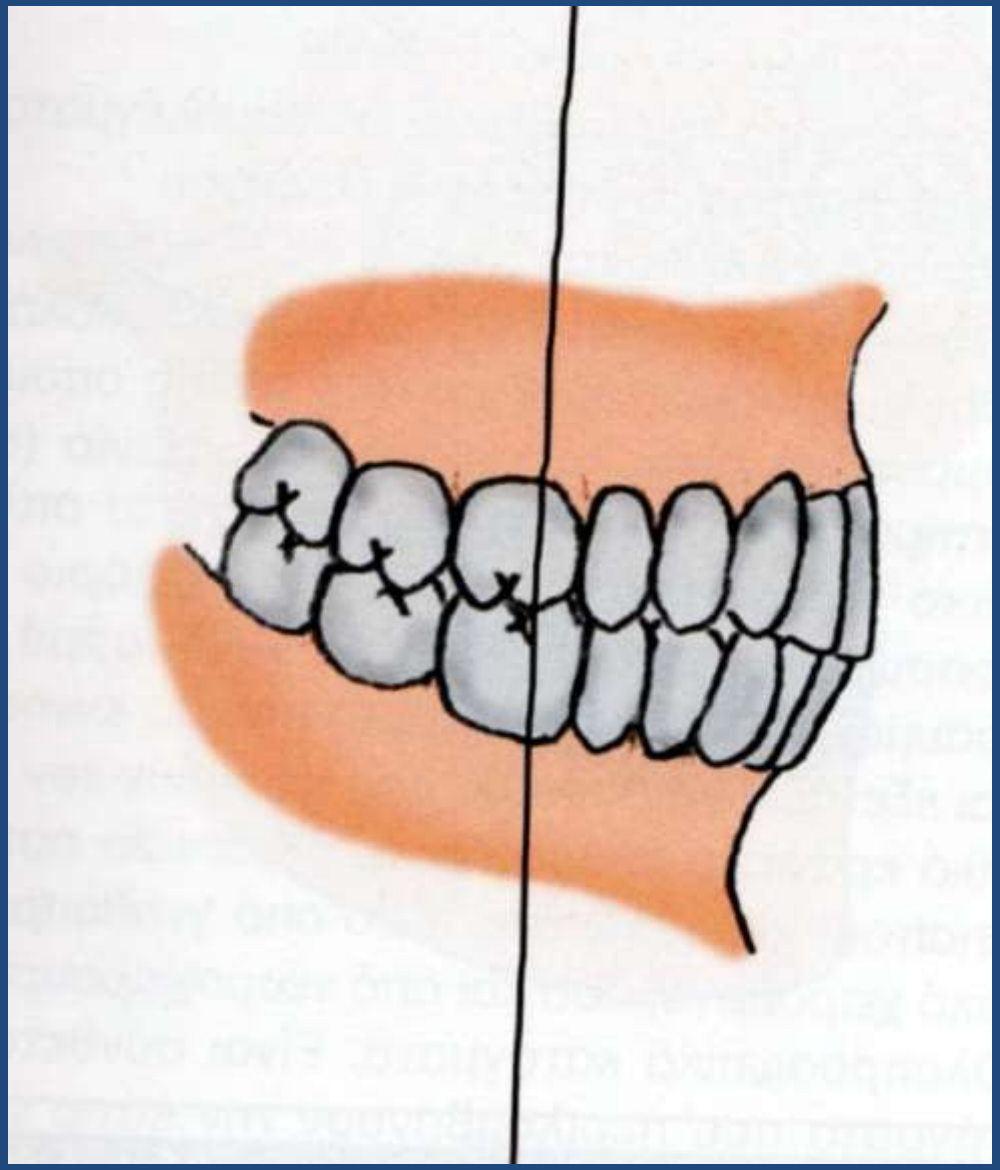
Presence of fracture

- **Abnormal dental occlusion**
- **Mobility abnormal**
- **Displacement**
- **Grief**

Possible fracture

- **Pain**
- **Edema**
- **Hematoma**
- **Functional impairment**

NORMAL DENTAL OCCLUSION



CLINICAL EXAMINATION OF THE LOWER JAW FOR FRACTURE CHECKING

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IMAGING EXAMINATIONS OF THE LOWER JAW FOR FRACTURE CHECK

- Panoramic X-ray
- Posterior-anterior skull radiograph

- Computed Tomography

PANORAMIC X-RAY

MANDIBULAR FRACTURES

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PANORAMIC X-RAY

PRE-OPERATIVE (FRACTURE OF THE LEFT ANGLE)

POSTOPERATIVE

POSTERIOR-ANTERIOR SKULL RADIOGRAPH

FRACTURE OF THE LEFT MANDIBULAR ANGLE

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Computed Tomography

axial section

FRACTURE OF THE BODY OF THE LOWER JAW ON THE LEFT

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Computed Tomography

coronal section

FRACTURE OF LEFT CONDYLE AND RIGHT MANDIBULAR BRANCH

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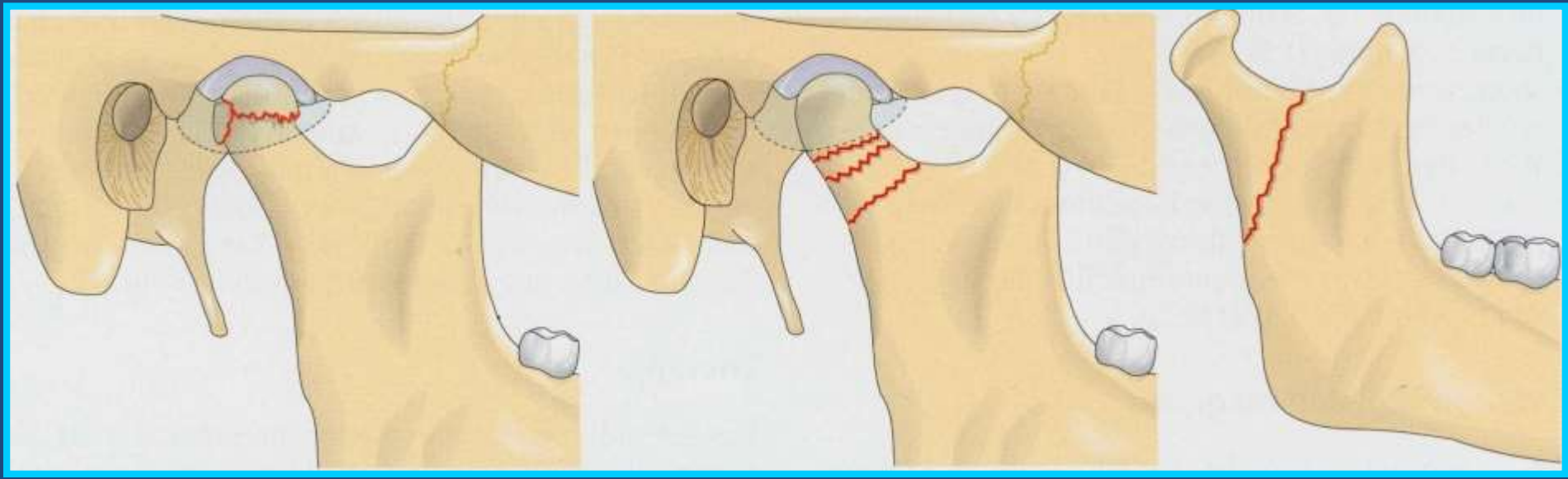
FRACTURE OF MANDIBULAR CONDYLE



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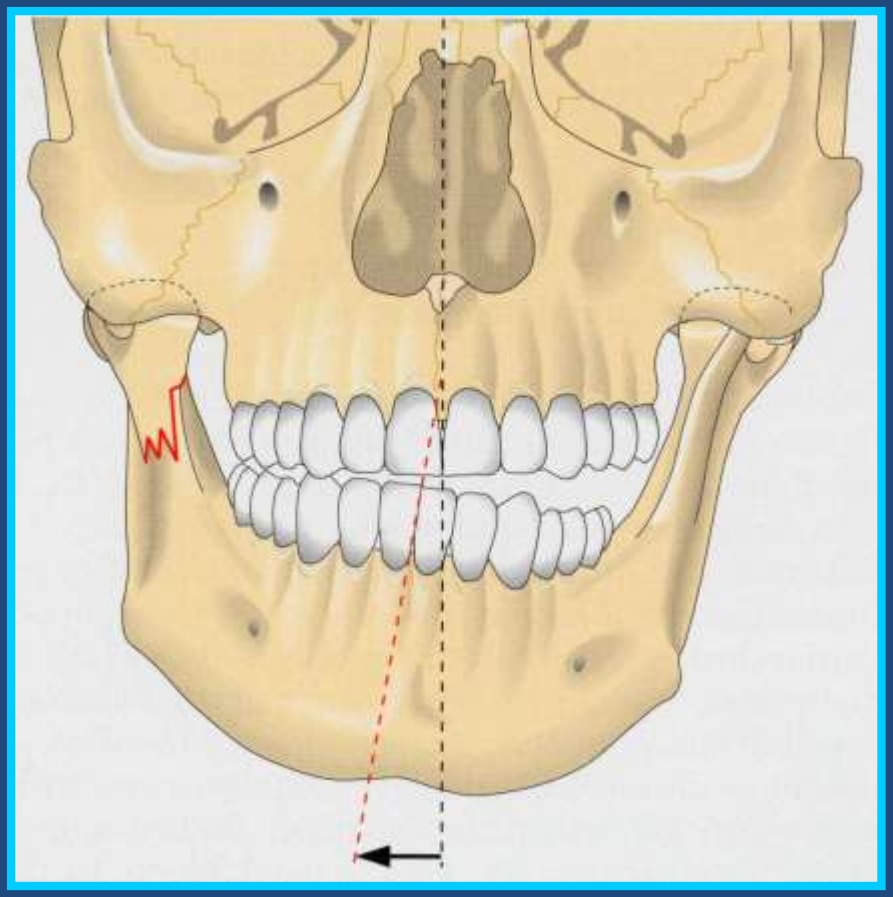
FRACTURE OF MANDIBULAR CONDYLE



On the side of the fracture is observed

- Reduction of facial height
- Full tooth contact (no contact on healthy side)

CAUTION

Fracture of the condyle is easy not to diagnose!

CLINICAL PICTURE OF LATERAL CONDYLE FRACTURE

- Premature tooth contact on the side of the fracture
- When opening the mouth and moving the lower jaw forward there will be a shift towards the affected side

- When opening the mouth, the movement of the condyle on the healthy side is palpable, while the condyle on the side of the fracture does not move

Palpation of the movement of the condyles is done

- By placing the fingers in front of the ears
- By placing the little fingers in the external auditory canals

CLINICAL EXAMINATION FOR CONDYLE FRACTURE

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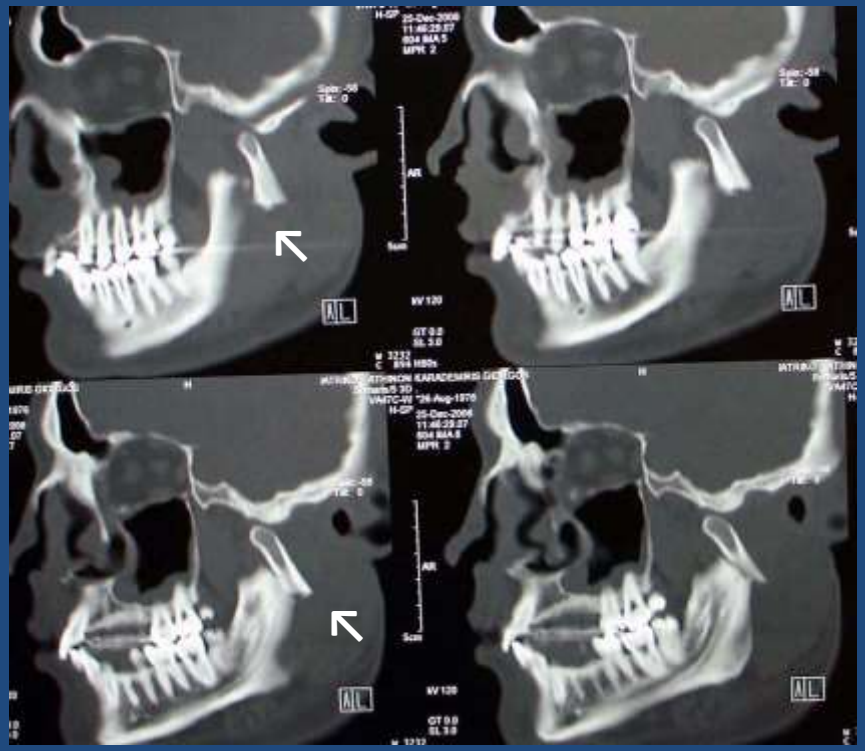
FRACTURE OF MANDIBULAR CONDYLE



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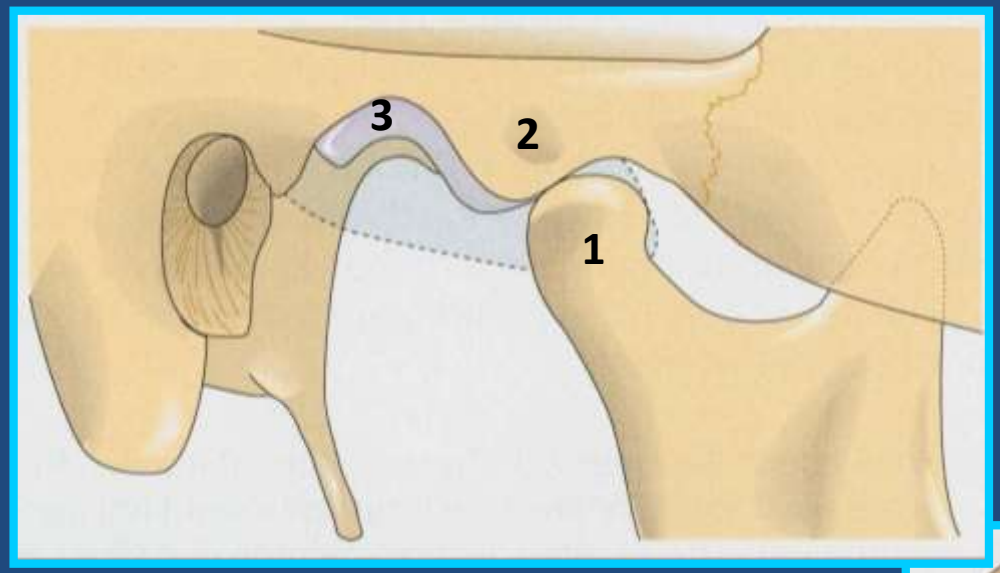
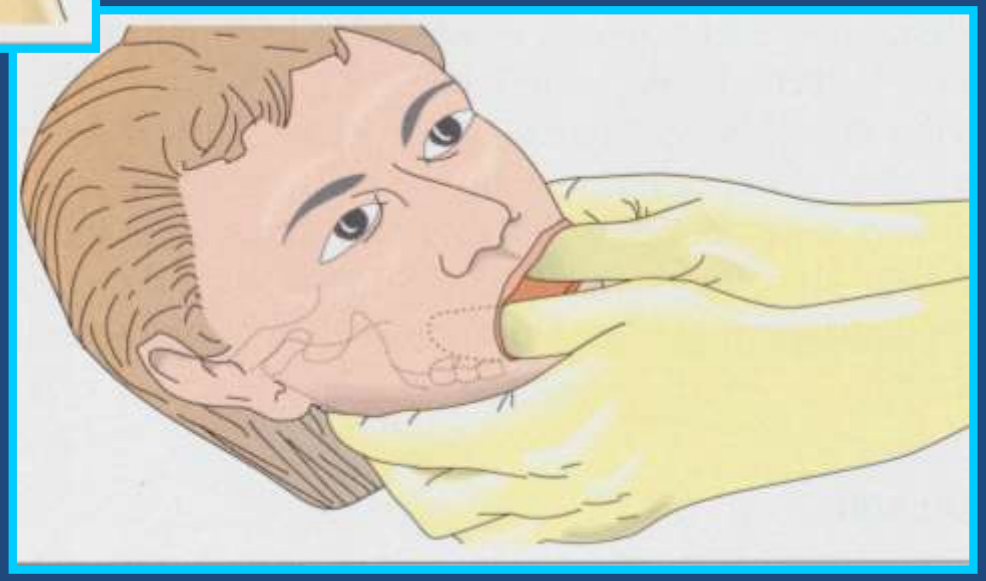
Fracture of the condyle should not be confused with recurrent dislocation

RECURRENT DISLOCATION OF THE CONDYLE

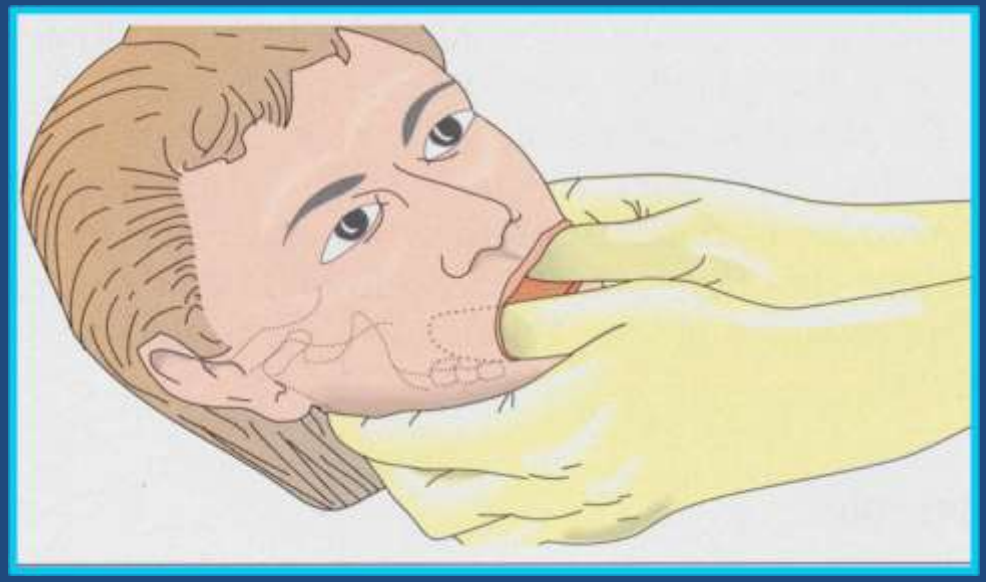


1. Condyle
2. Anterior articular eminence
3. Glenoid fossa

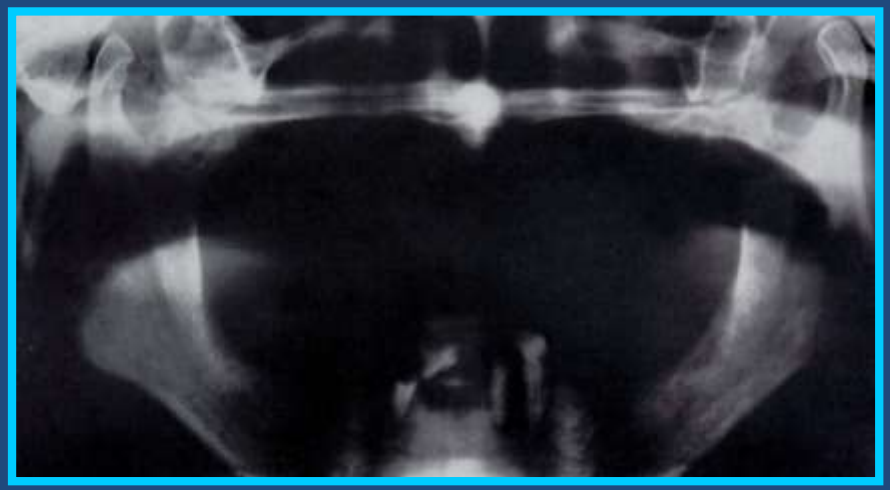


BILATERAL DISLOCATION OF THE CONDYLE

- The patient cannot close his mouth
- Clinically, the temporal fossa is palpated empty (in front of the external ear canal)
- The reduction is done by manipulation of Hippocrates



RECURRENT DISLOCATION



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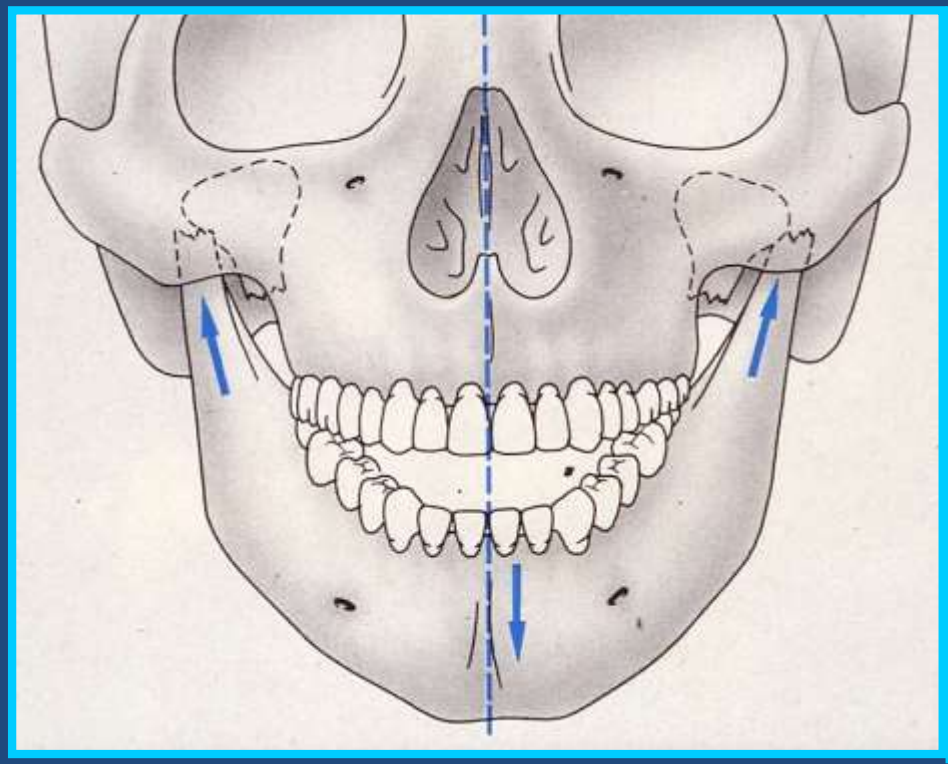
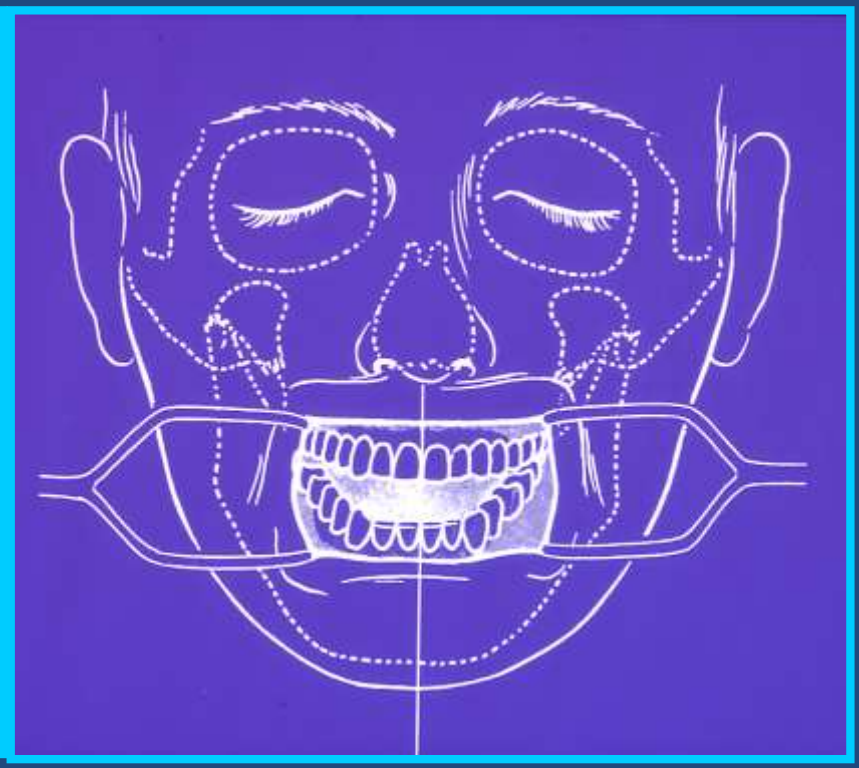
BILATERAL CONDYLE FRACTURE





- Reduction in facial height bilaterally
- Contact of posterior teeth only with anterior open bite

BILATERAL CONDYLE FRACTURE

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Condylar fracture often occurs in a midline (chin) fracture of the mandible

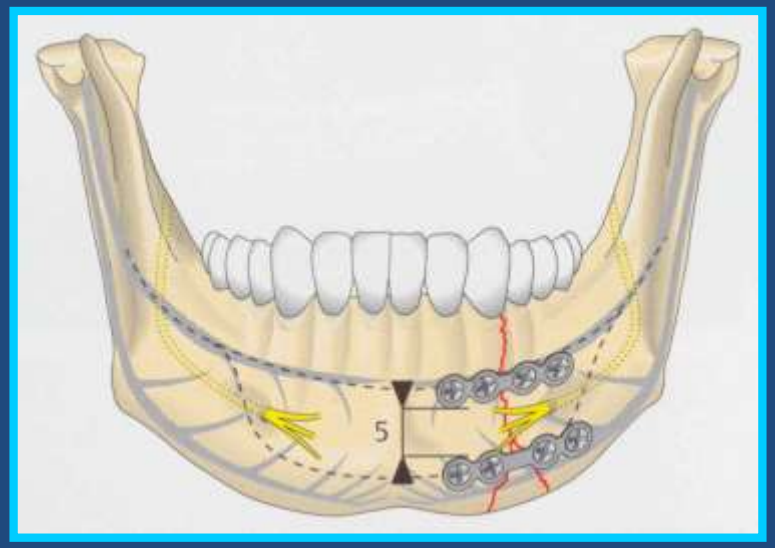
PRINCIPLES OF TREATMENT OF MANDIBULAR FRACTURES

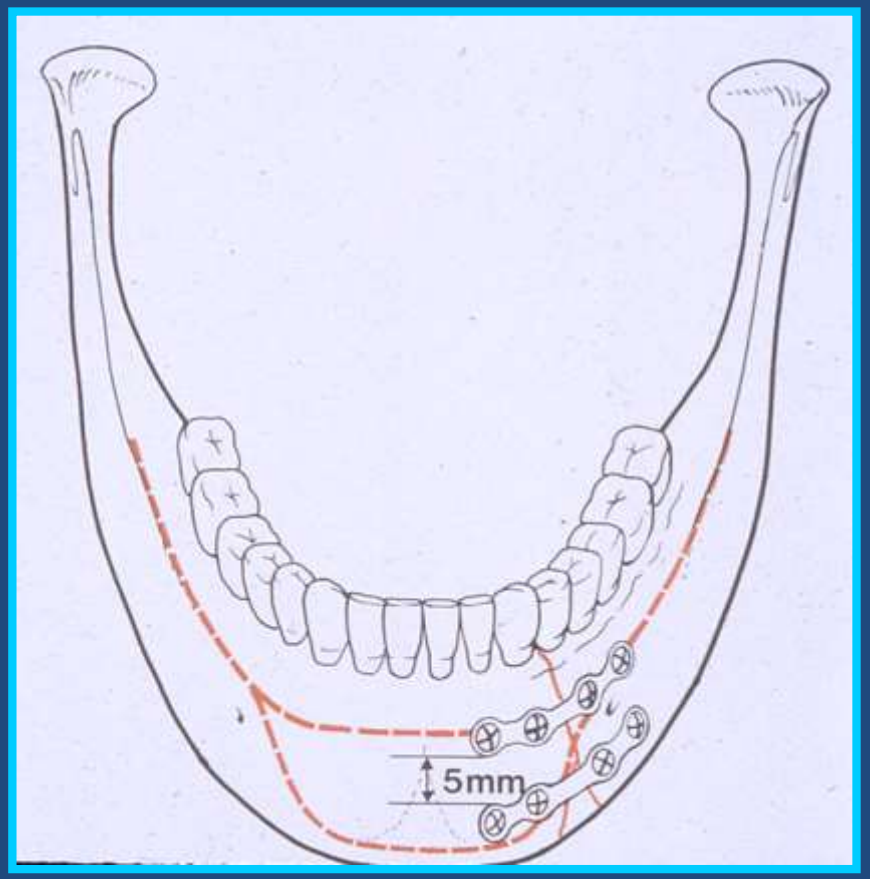
- CLOSE REDUCTION - INTERMAXILLARY FIXATION

- OPEN REDUCTION - OSTEOSYNTHESIS

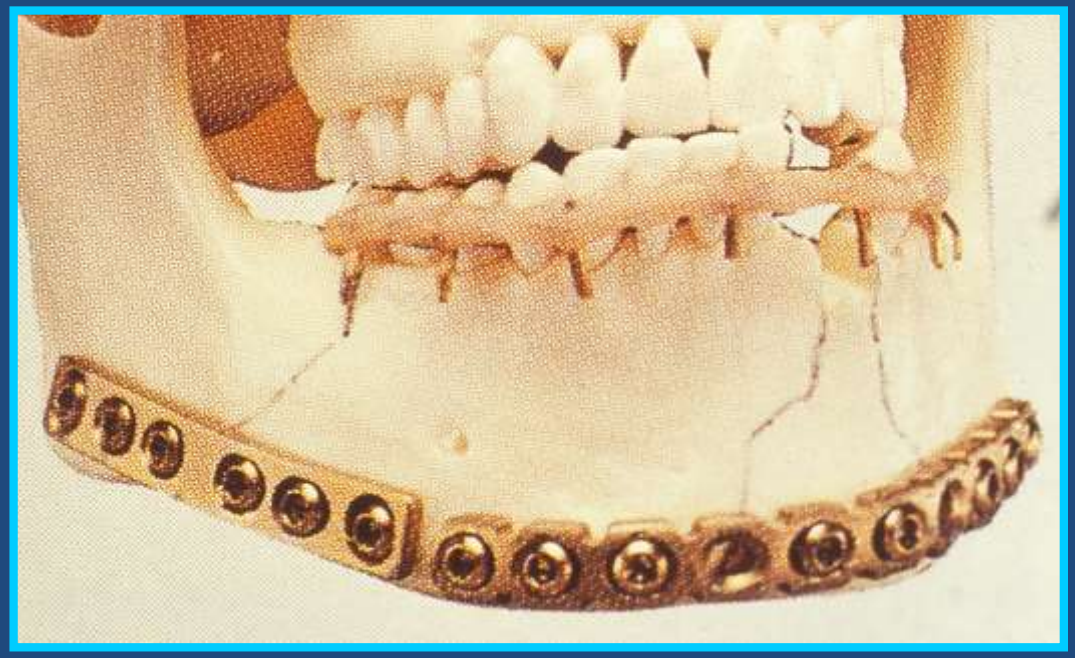
Close reduction – use of intermaxillary (IMF) screws and elastic bands

OPEN REDUCTION





After reduction. immobilization of the fracture with titanium mini-plates



Immobilization of the multiple fractures with reconstruction plate

REPRESENTATIVE CASES OF MANDIBULAR FRACTURES

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FRACTURE OF THE CHIN

Reduction of the fracture by intraoral approache (intraoral incision)

FRACTURE PARASYMPHYCIAL RIGHT AND ANGULAR LEFT

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FRACTURE PARASYMPHYCIAL RIGHT AND ANGULAR LEFT

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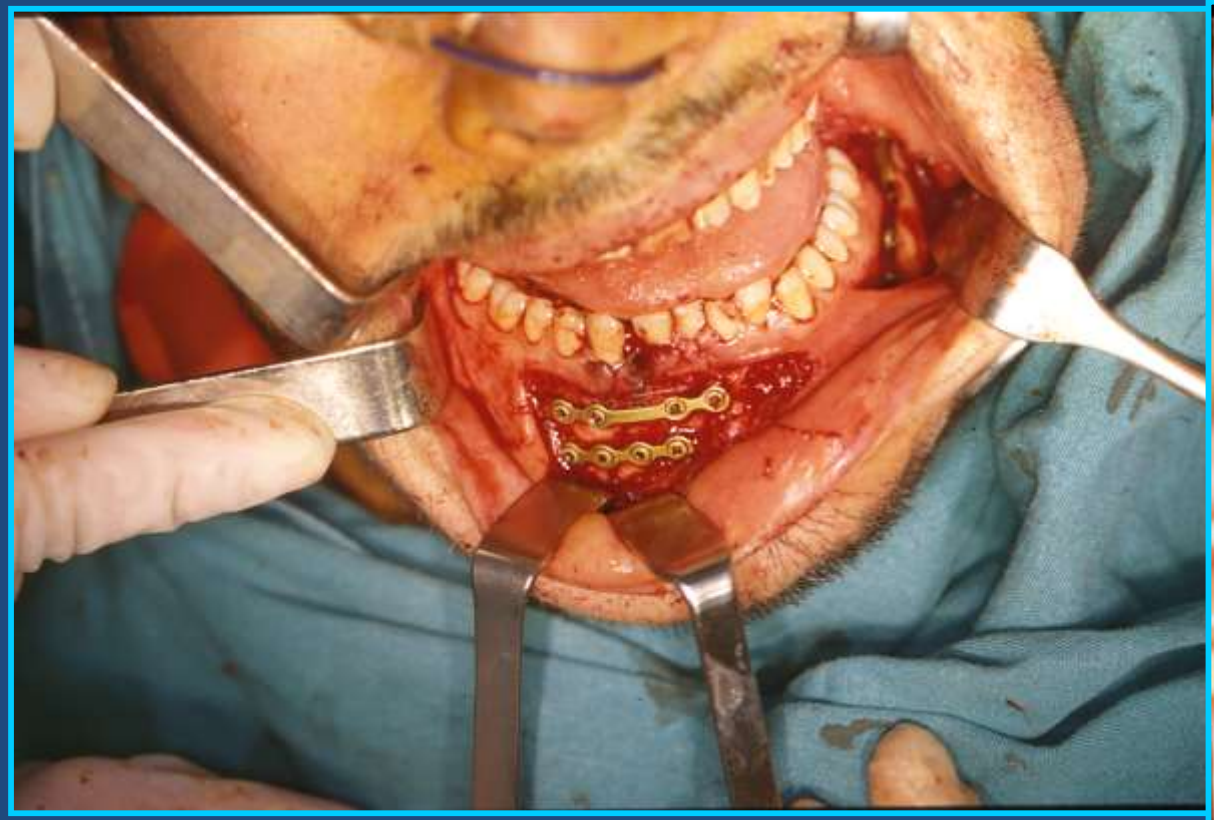
FRACTURE PARASYMPHYCIAL RIGHT AND ANGULAR LEFT



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ADVERSE FRACTURE OF THE LEFT ANGLE OF THE MANDIBLE

The reduction was done through an extraoral (submandibular) approach

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ADVERSE FRACTURE OF THE LEFT ANGLE OF THE MANDIBLE
OPERATIONAL STAGES

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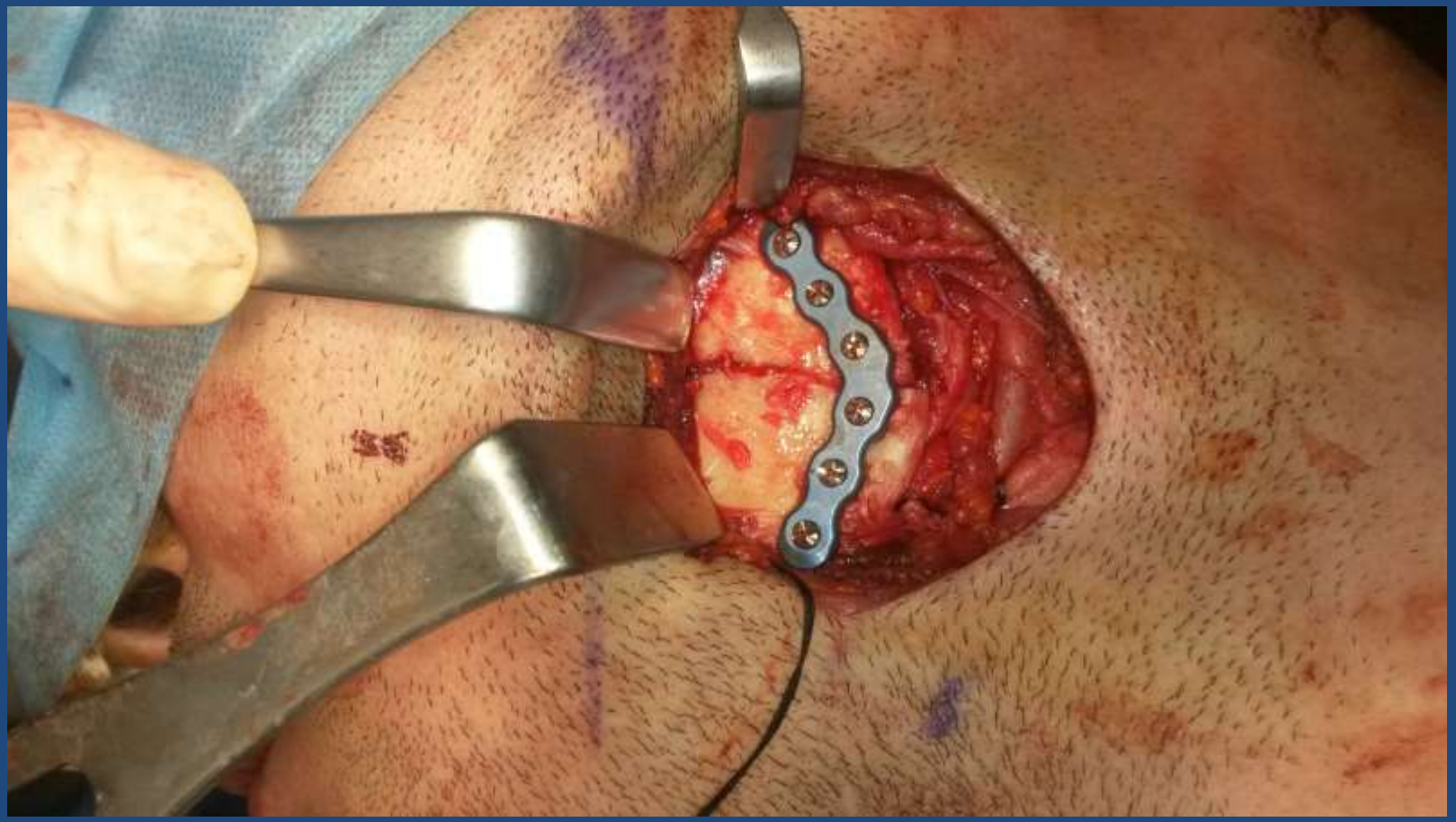
ADVERSE FRACTURE OF THE LEFT ANGLE OF THE MANDIBLE
OPERATIONAL STAGES



Immobilization with a 6-hole reconstruction locking plate

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ADVERSE FRACTURE OF THE LEFT ANGLE OF THE MANDIBLE

Postoperative panoramic radiography

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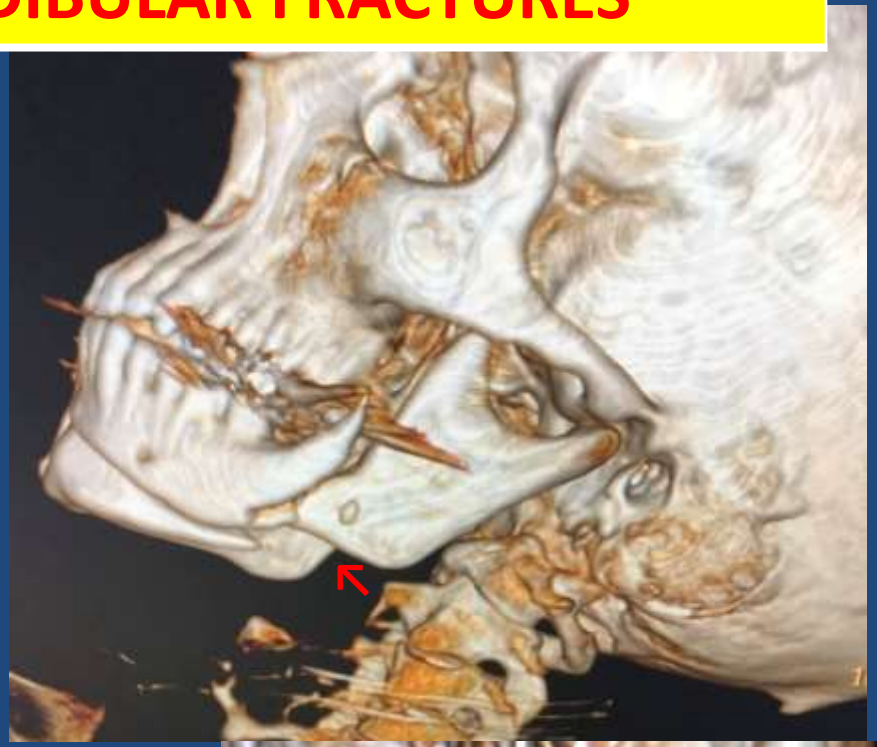
MULTIPLE MANDIBULAR FRACTURES



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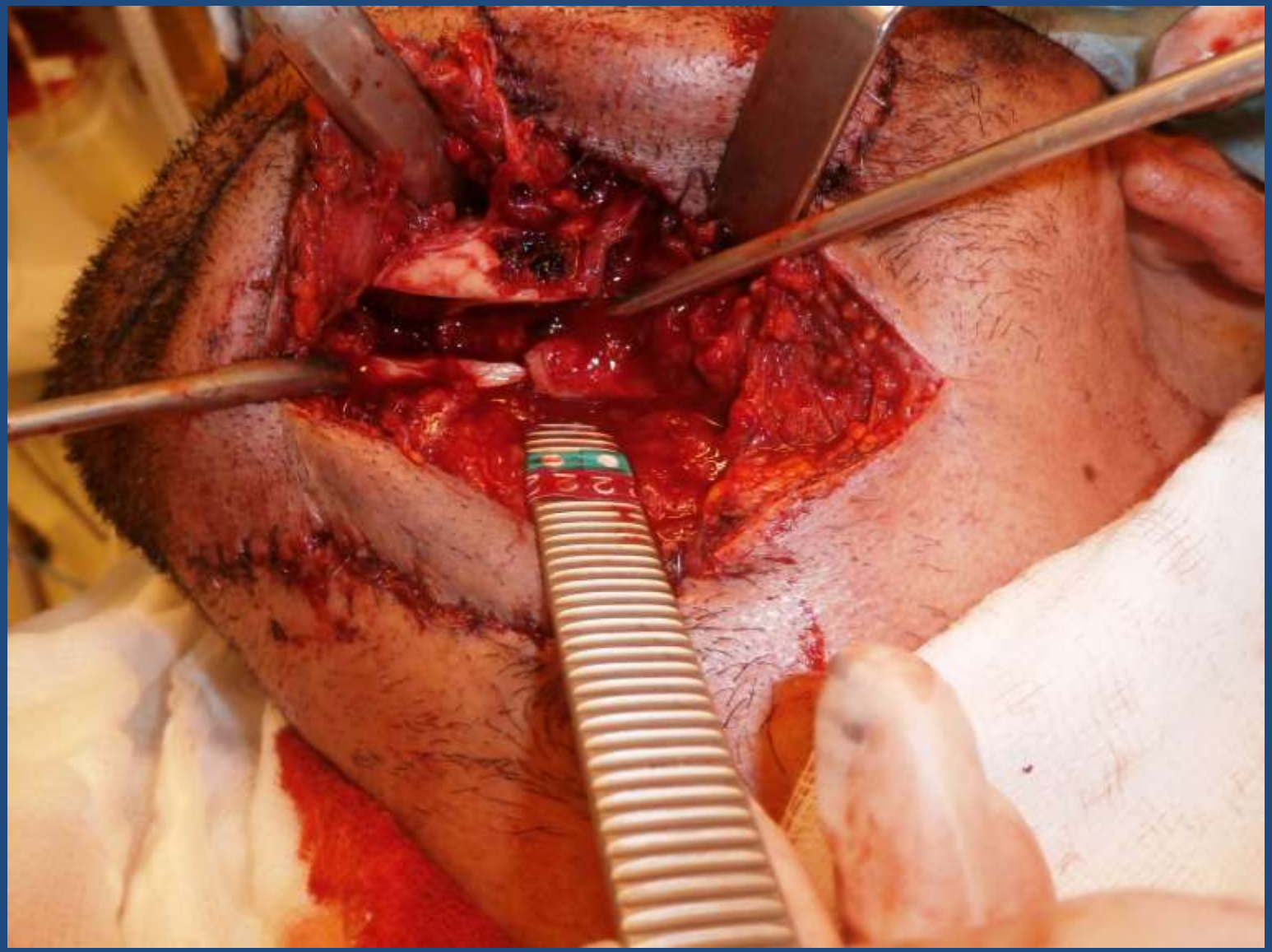
MULTIPLE MANDIBULAR FRACTURES



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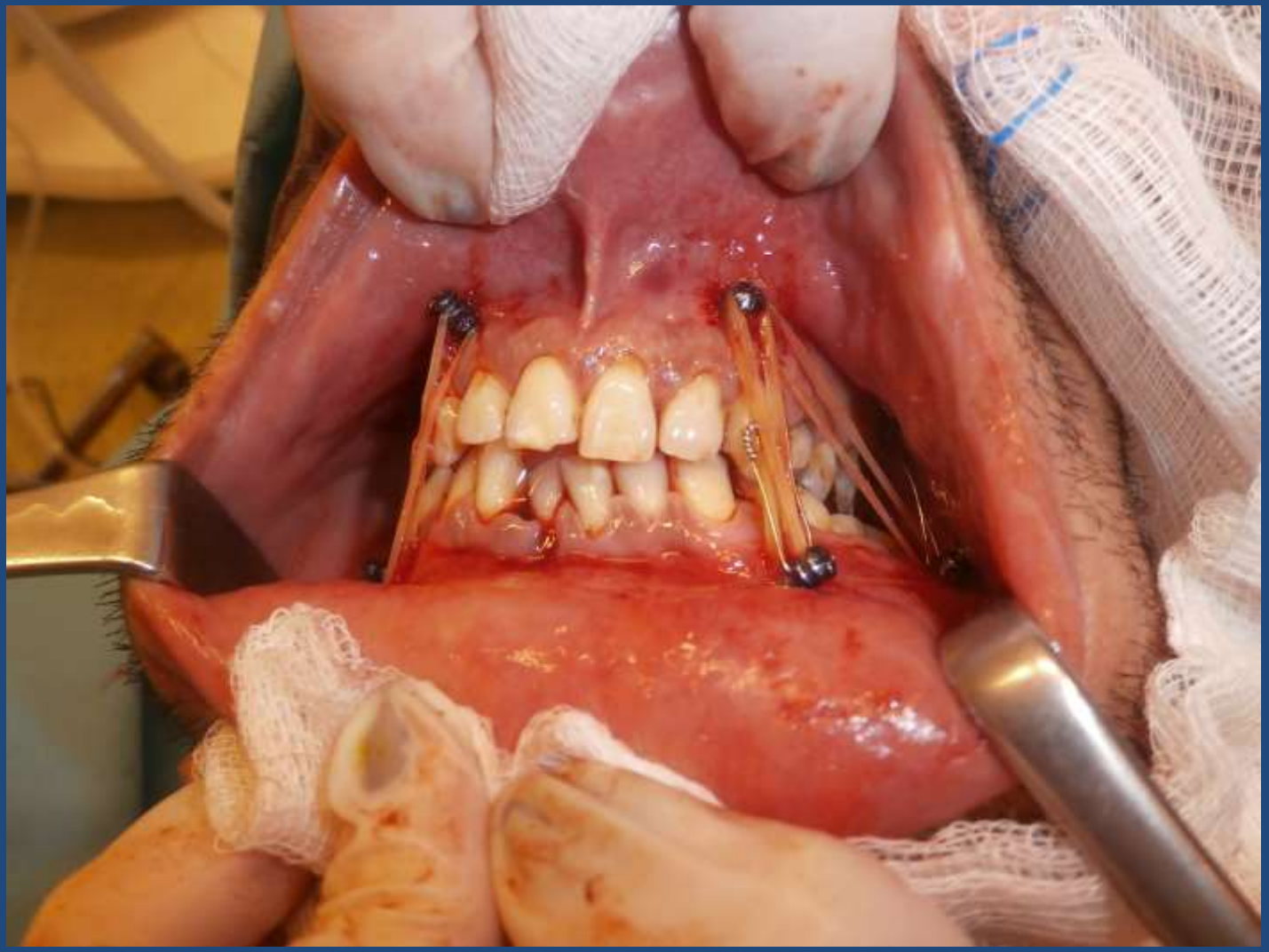
MULTIPLE MANDIBULAR FRACTURES



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MULTIPLE MANDIBULAR FRACTURES

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MULTIPLE MANDIBULAR FRACTURES

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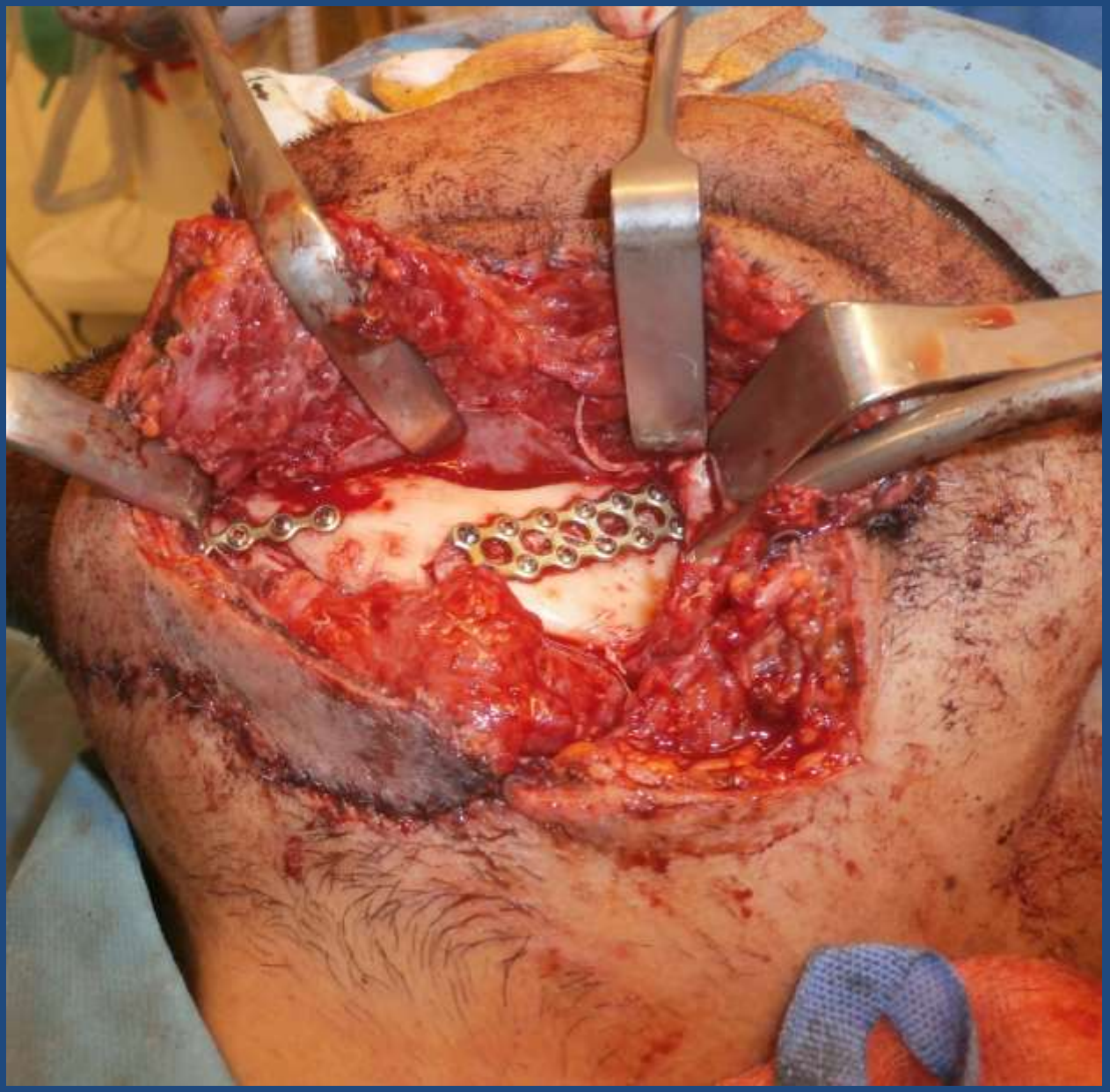
MULTIPLE MANDIBULAR FRACTURES



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MULTIPLE MANDIBULAR FRACTURES

FACE INJURY FROM GUN

The neck wound is the projectile's exit portal

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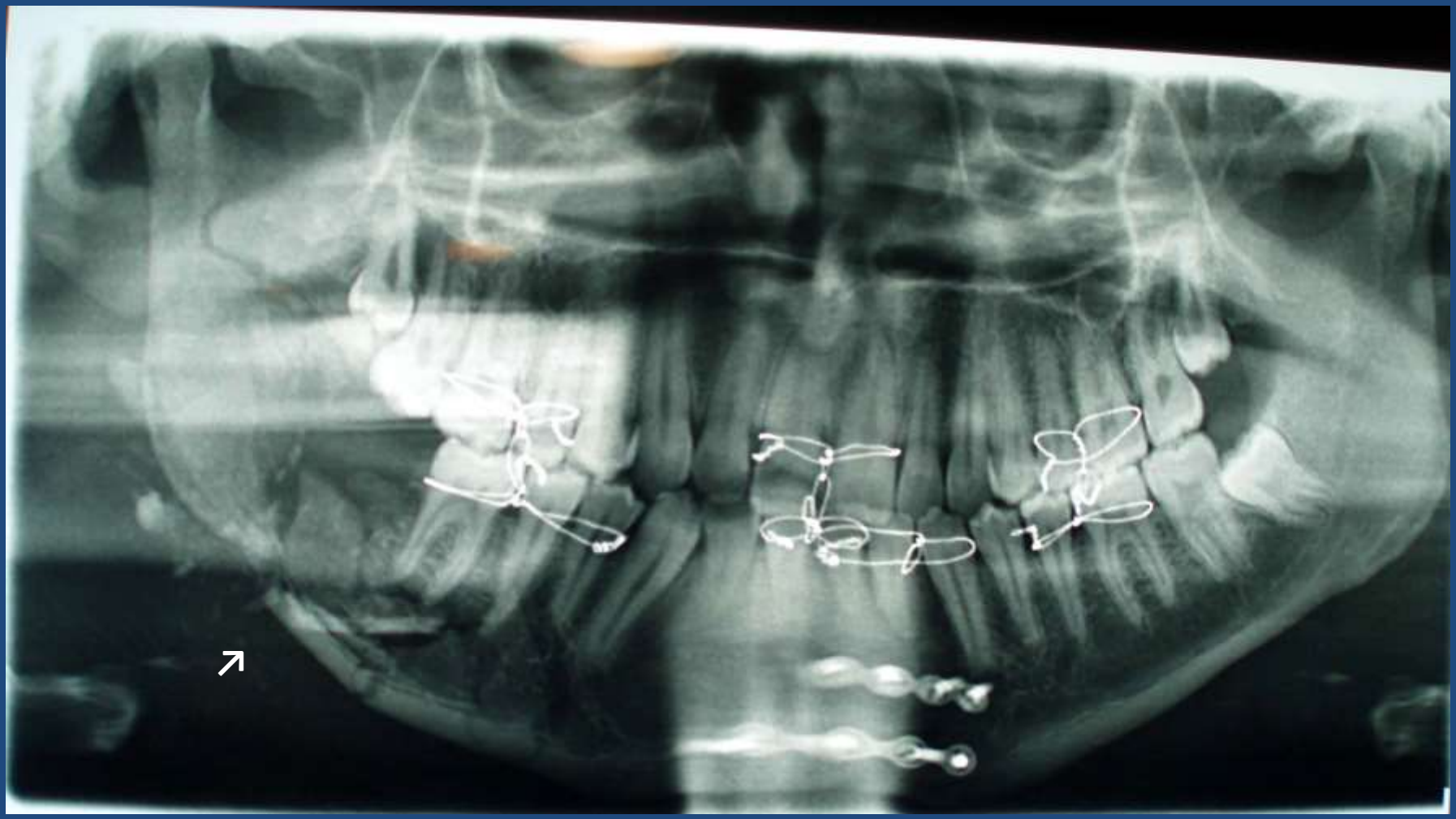
FACE INJURY FROM GUN



Comminuted fractures of right mandible

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FACE INJURY FROM GUN

3-D CT: Comminuted fractures of right mandible

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FACE INJURY FROM GUN

Postoperative X-ray

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COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT

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COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT

Panoramic x-ray

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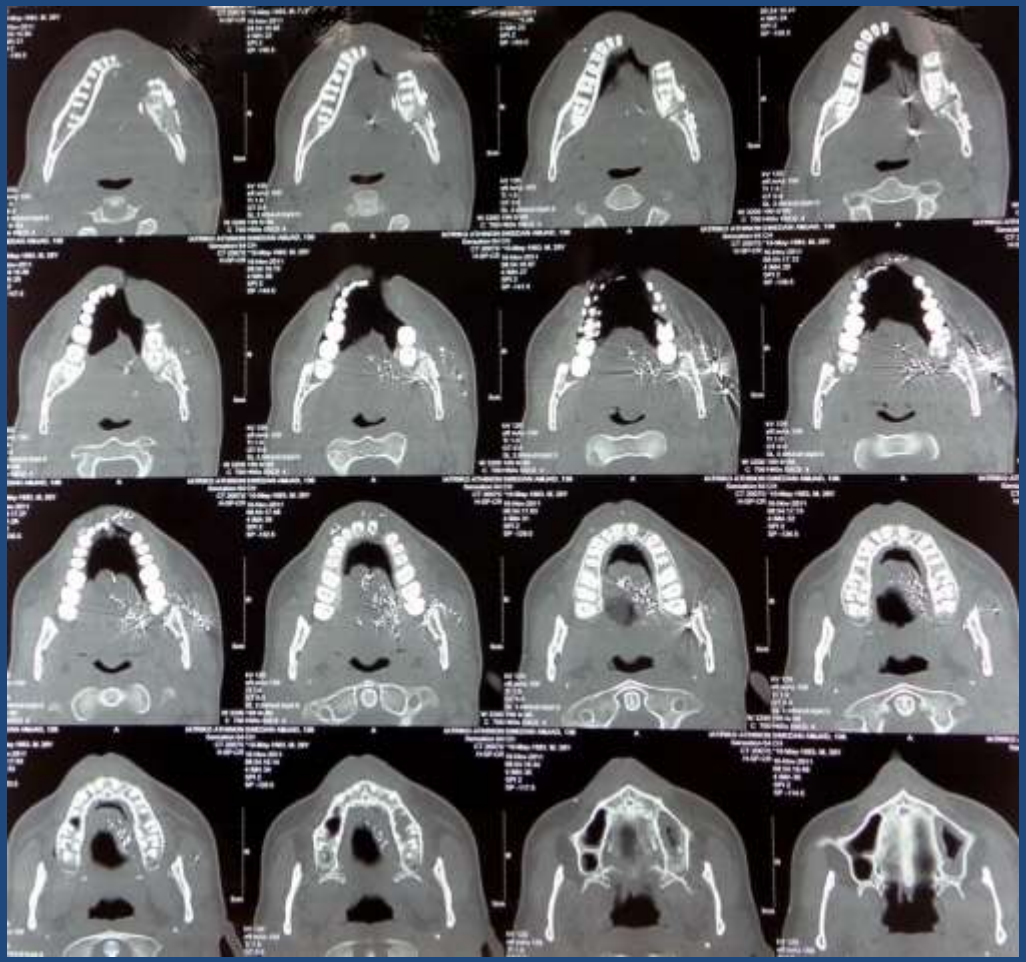
COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT



CT: axial cross-sections

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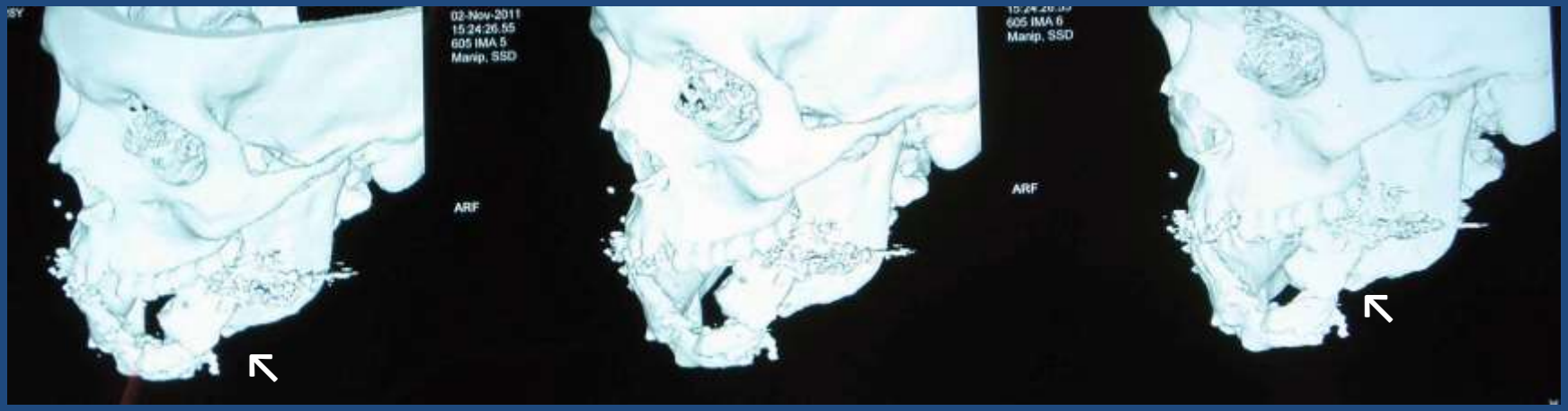
COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT



3-D CT: Comminuted mandibular fractures

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COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT

Access from the pre-existing scar

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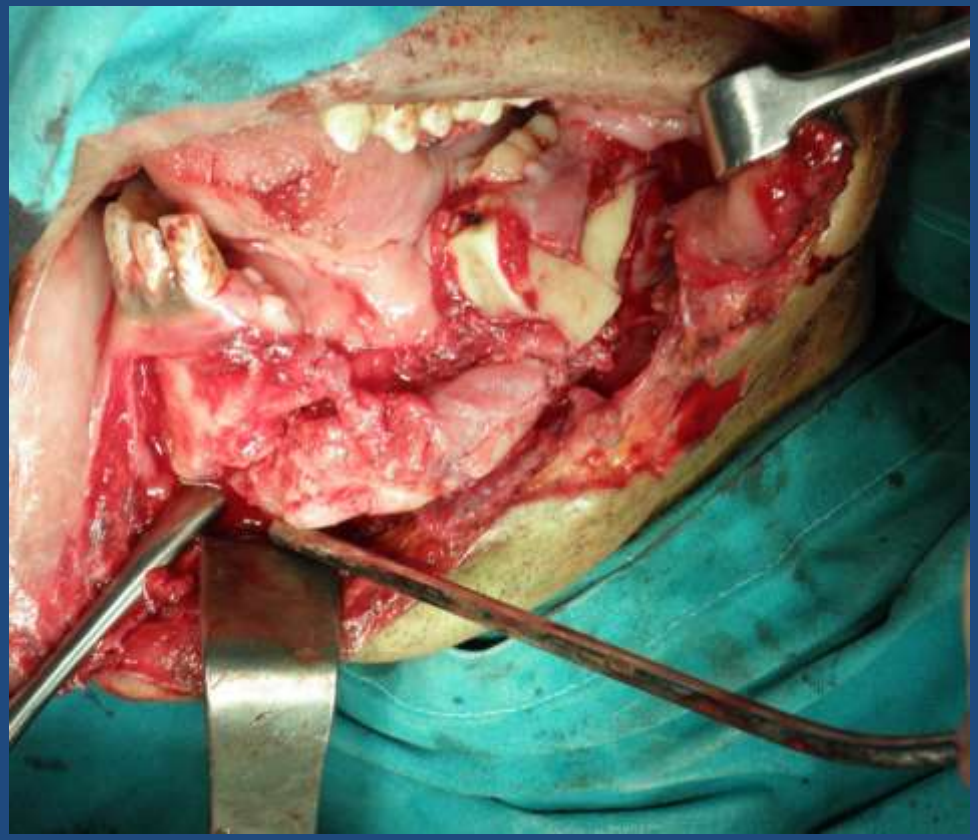
COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT



Intraoperative image

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COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT

Open reduction-osteosynthesis

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COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT

Postoperative panoramic x-ray

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COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT

Restoration of the soft tissue defect with a cervical advancement flap

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COMMINUTED FRACTURES OF THE MANDIBLE FROM GUNSHOT

The patient 20 days after the operation

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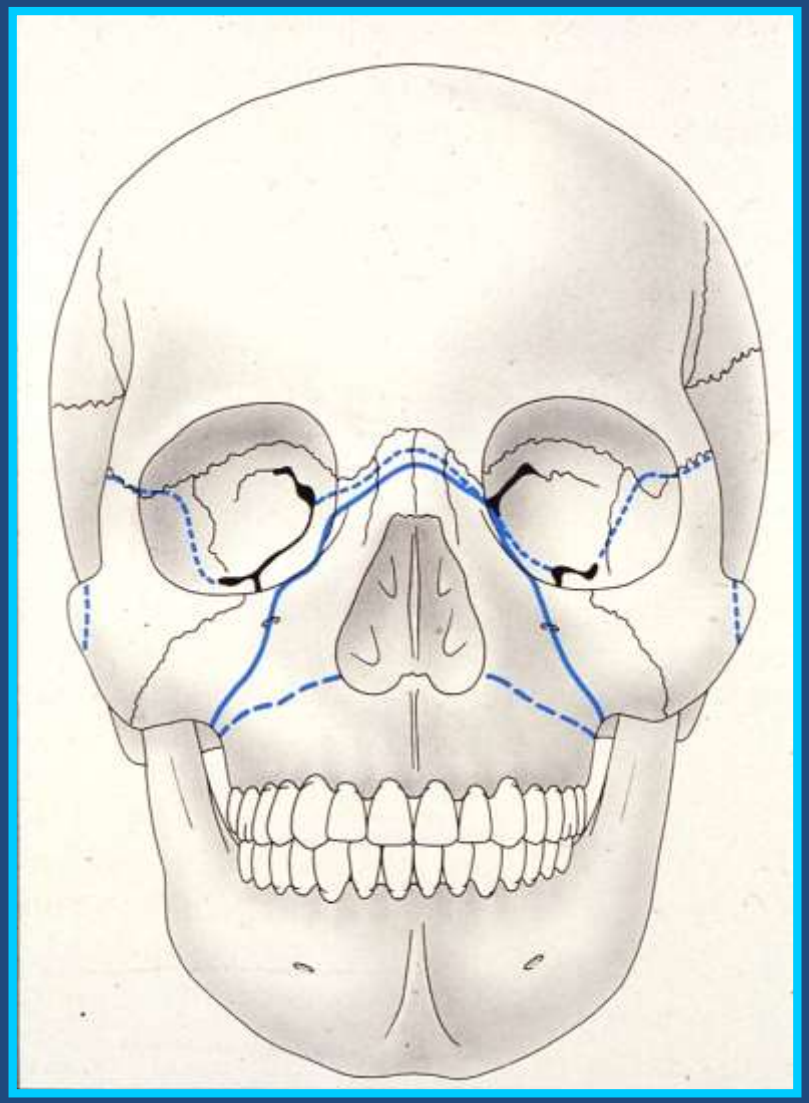
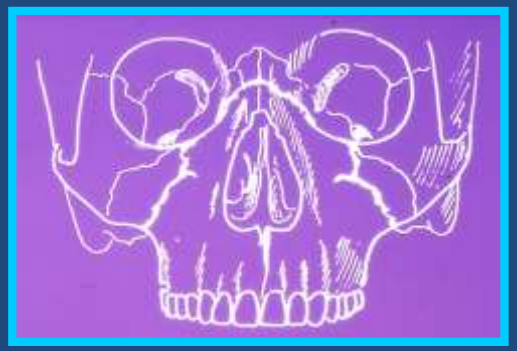
FRACTURES OF THE MIDDLE THIRD OF THE FACE





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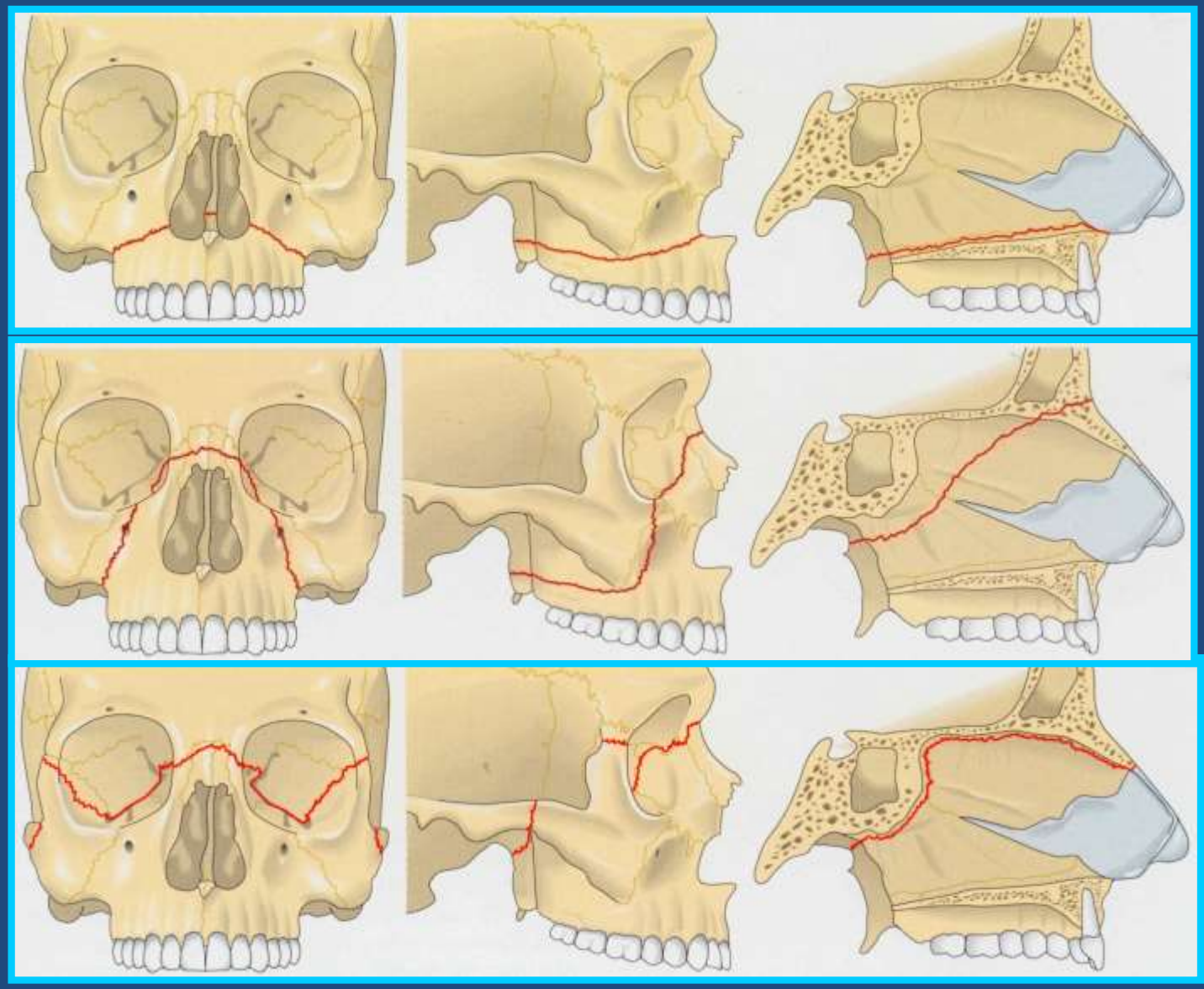
LOCATION OF THE FRACTURES IN THE MIDDLE THIRD OF THE FACE



Le Fort I

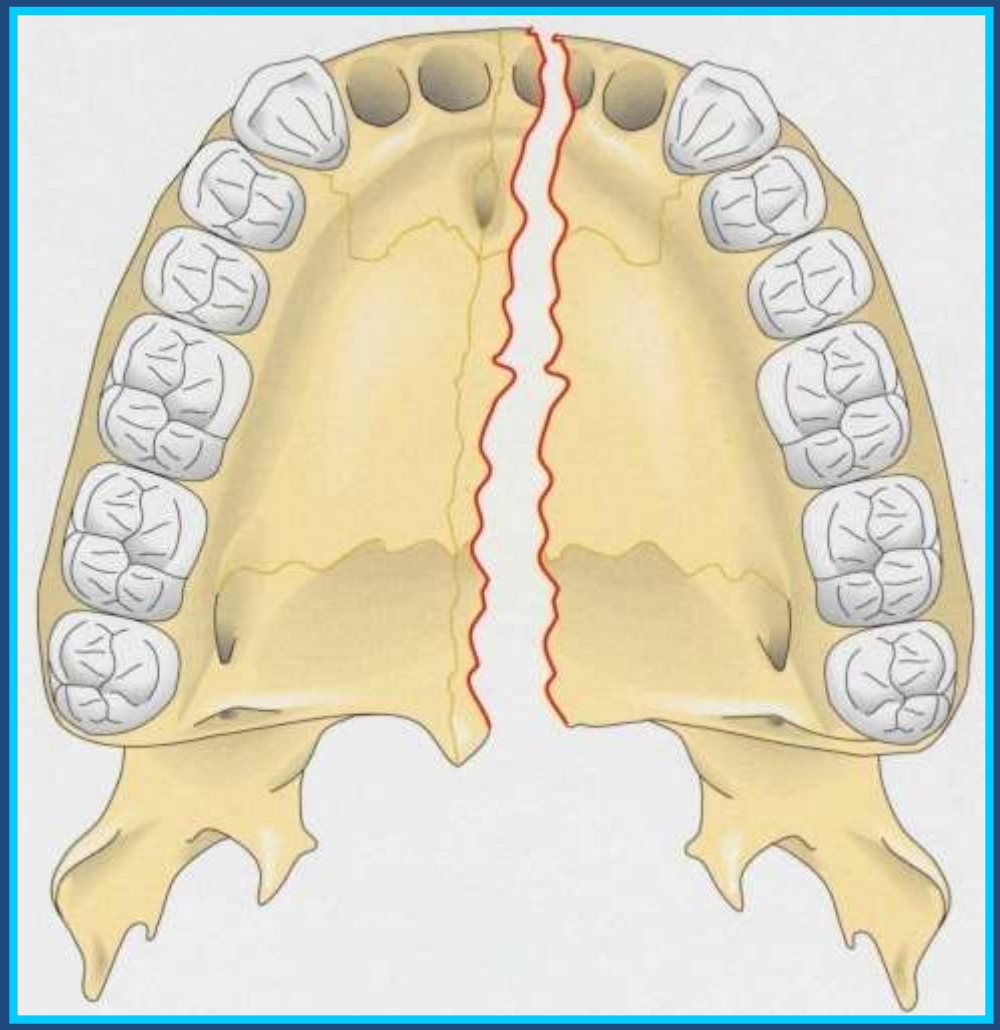
Le Fort II

Le Fort III

LE FORT FRACTURES

Concomitant zygomatic fracture is present only in Le Fort III fracture

FRACTURES OF THE MAXILLA



Sagittal midline fracture of the palate

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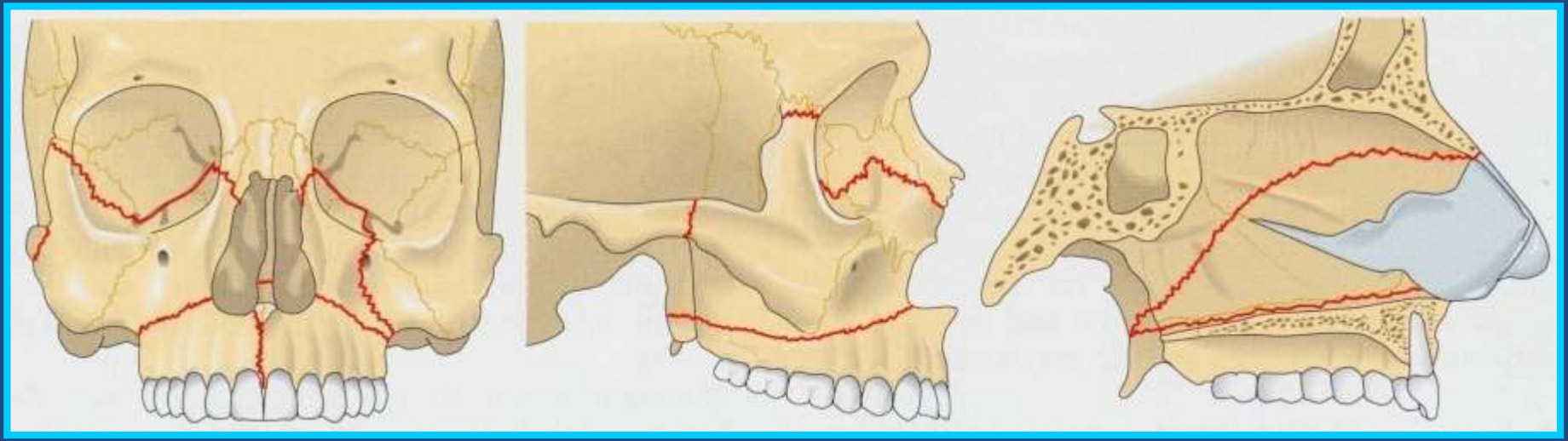
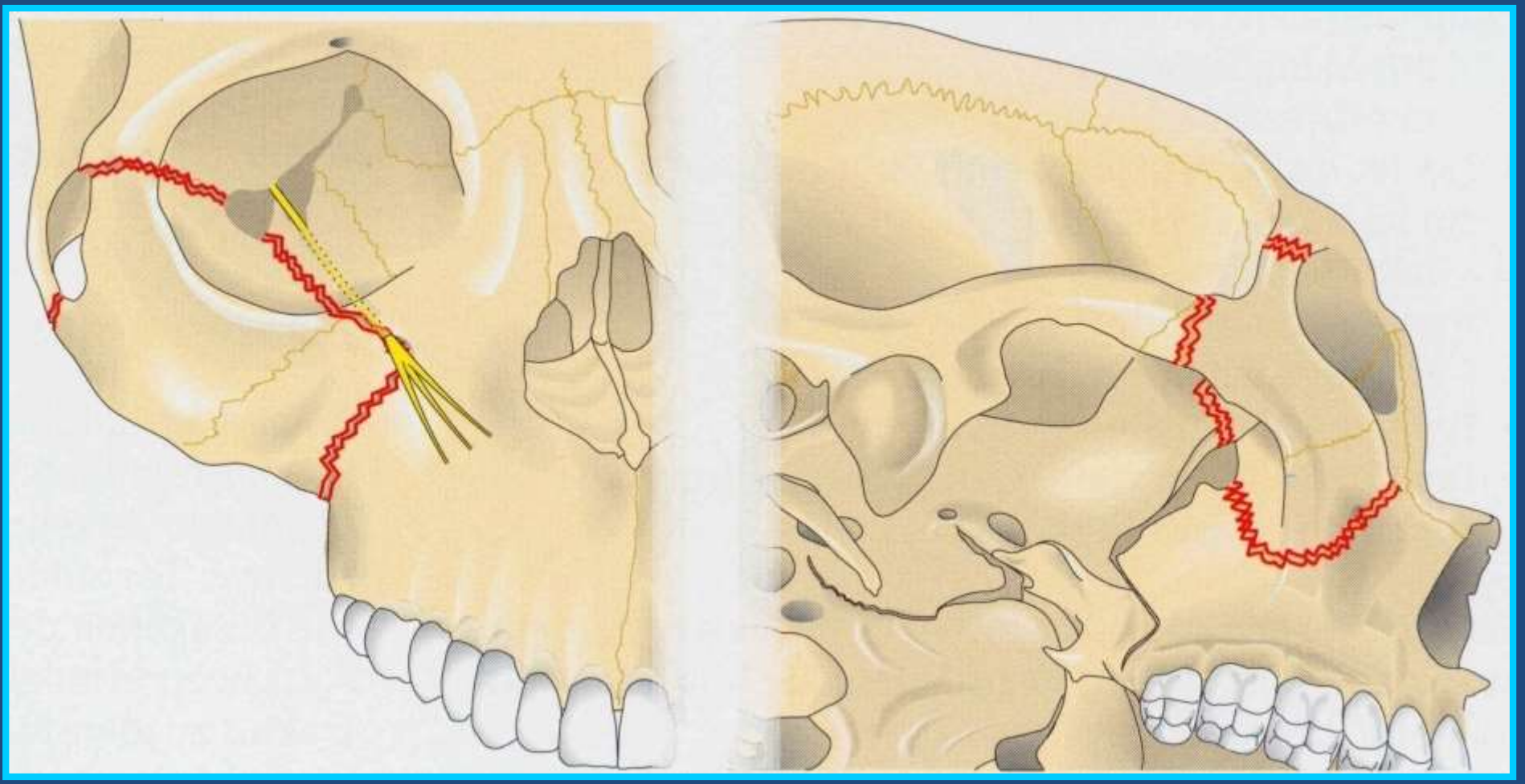
MULTIPLE FRACTURES OF THE MIDDLE THIRD OF THE FACE



Le Fort I fracture, Le Fort III right*, Le Fort II left, sagittal fracture of the palate

* On the right side of the patient

FRACTURE OF ZYGOMATIC BONE



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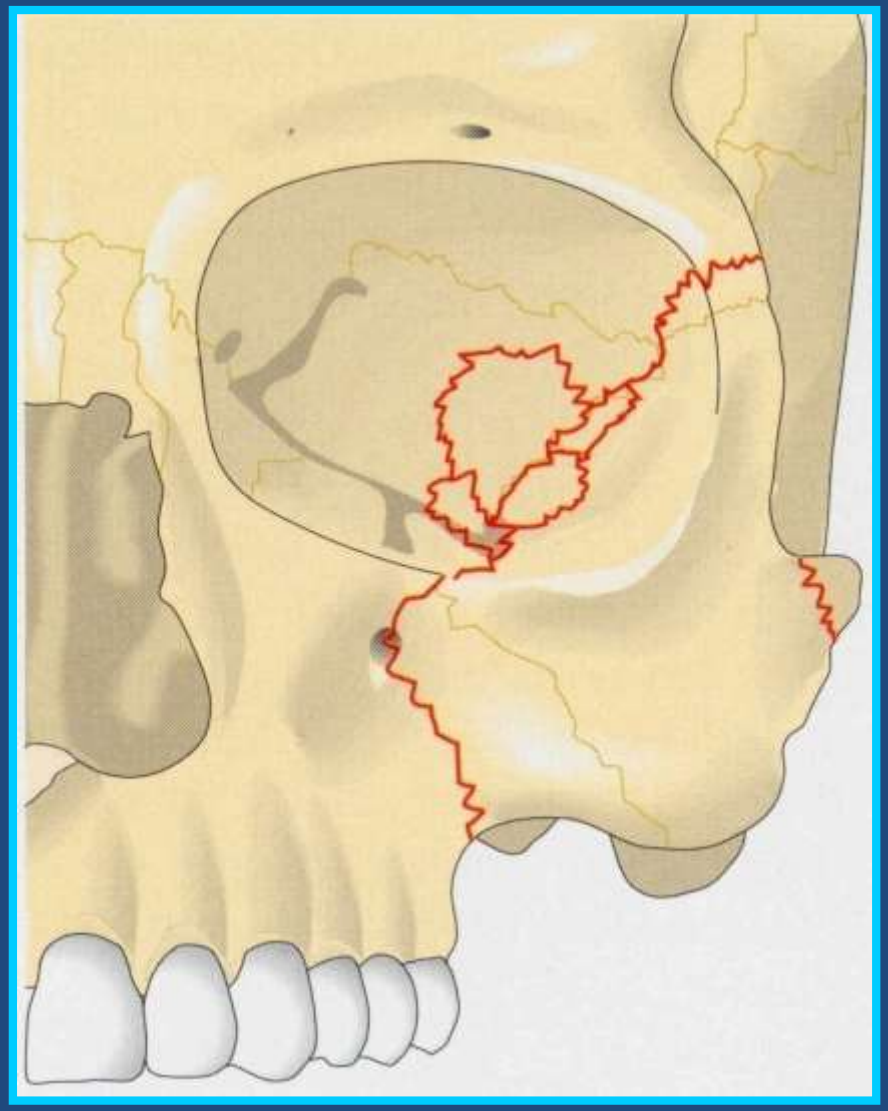
ORBITAL FRACTURE



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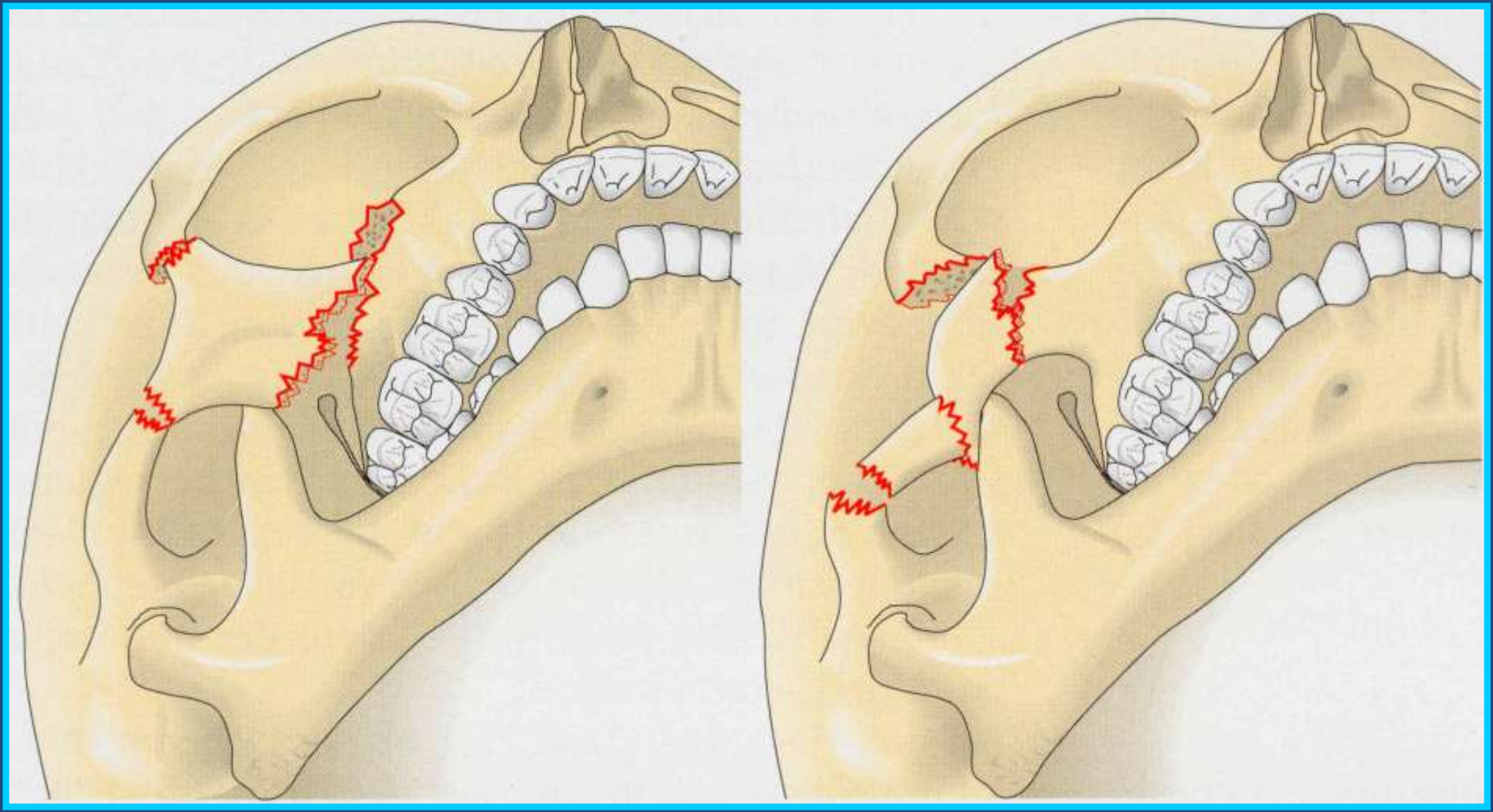
FRACTURE OF ZYGOMATIC ARCH



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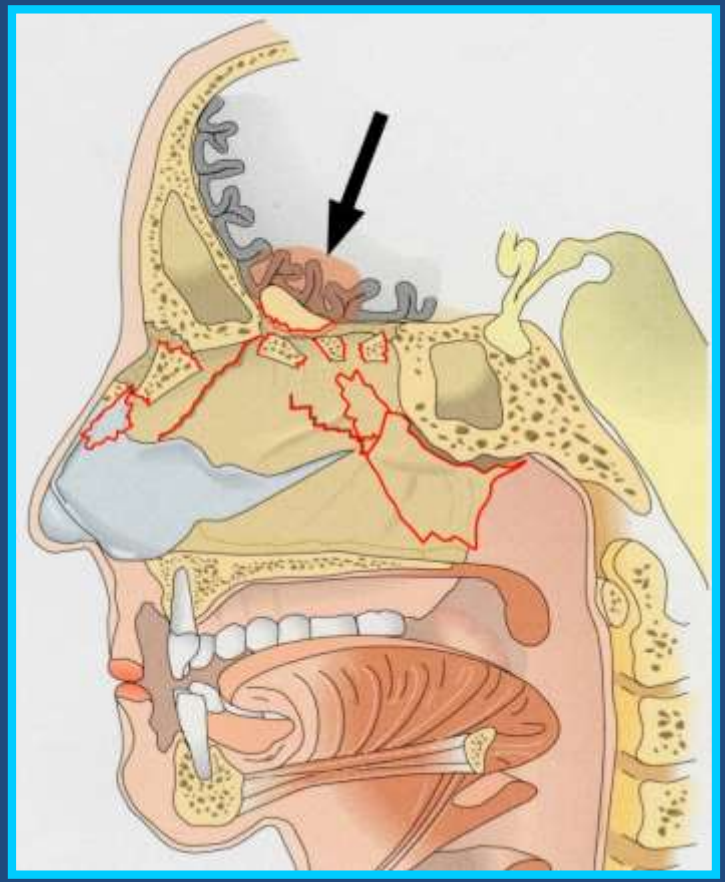
FRACTURE OF THE CRIBRIFORM PLATE



Fracture of the cribriform plate causes cerebrospinal fluid rhinorrhea

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CLINICAL PICTURES OF FRACTURES OF THE MIDDLE THIRD OF THE FACE

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Le Fort II fracture: tabular face

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Abnormal dental occlusion. The upper jaw has shifted backwards

CLINICAL SIGNS OF FACIAL FRACTURES

- **Definite presence of fracture**

Mobility abnormal

Displacement

Grief

- **Possible fracture**

Pain

Edema

Hematoma

Functional impairment

CLINICAL EXAMINATION TO CHECK THE EXISTENCE OF FRACTURES

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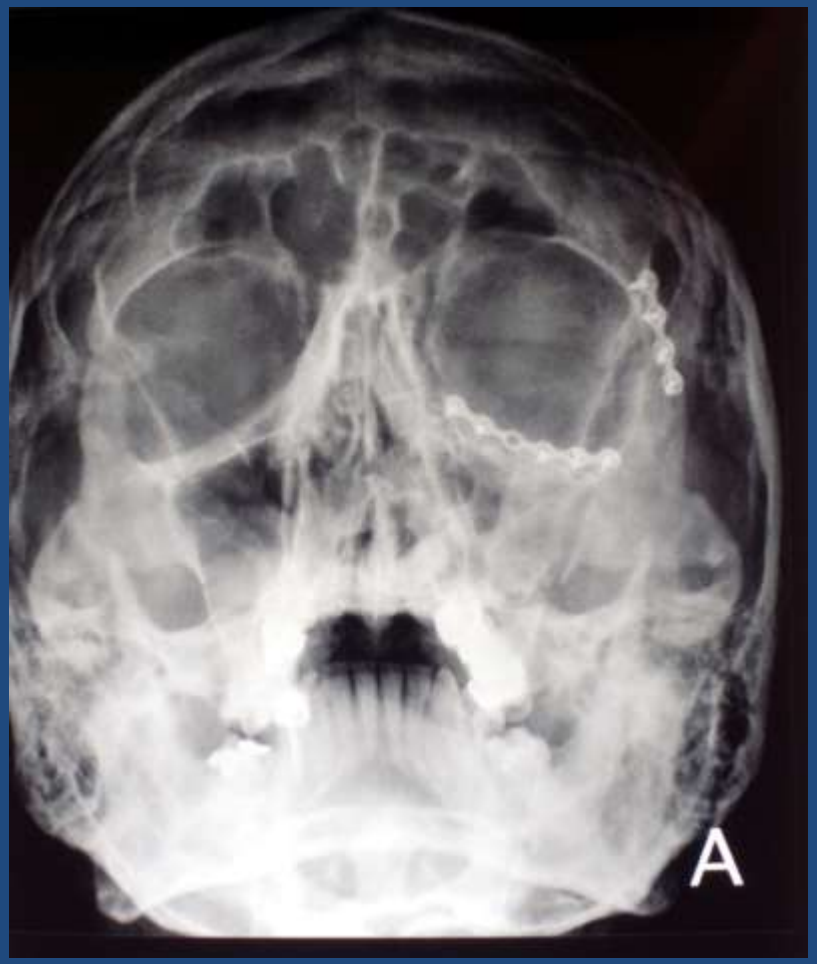
RADIOLOGICAL EXAMINATION FOR FRACTURES OF THE MIDDLE THIRD OF THE FACE

- X-ray of paranasal sinuses
- Subgenioparietal radiograph

- Computed Tomography

X-RAY OF PARANASAL SINUSES



Postoperative x-ray: Left Orbital Fractures

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SUBGENIOPARIETAL X-RAY

Fracture of zygomatic arch

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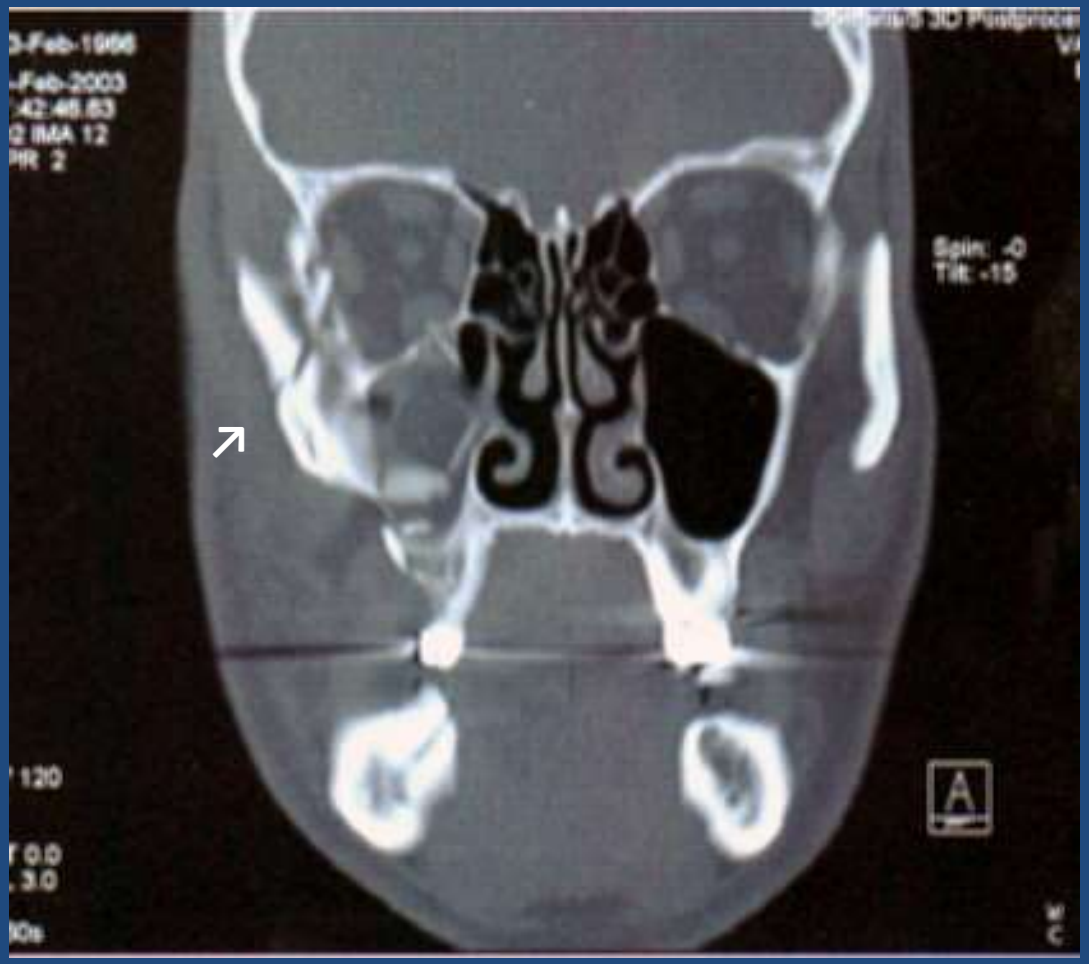
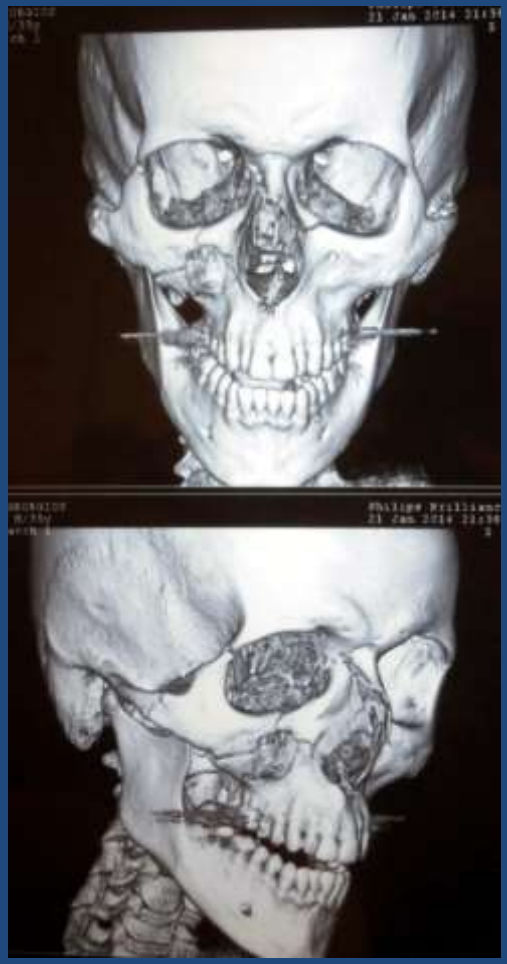
CT - CORONARY SECTION



Fractures of the orbit, zygomatic bone and arch. Right sinus opacification is due to blood collection (hemo-sinus)

3-D CT



Le Fort II fracture

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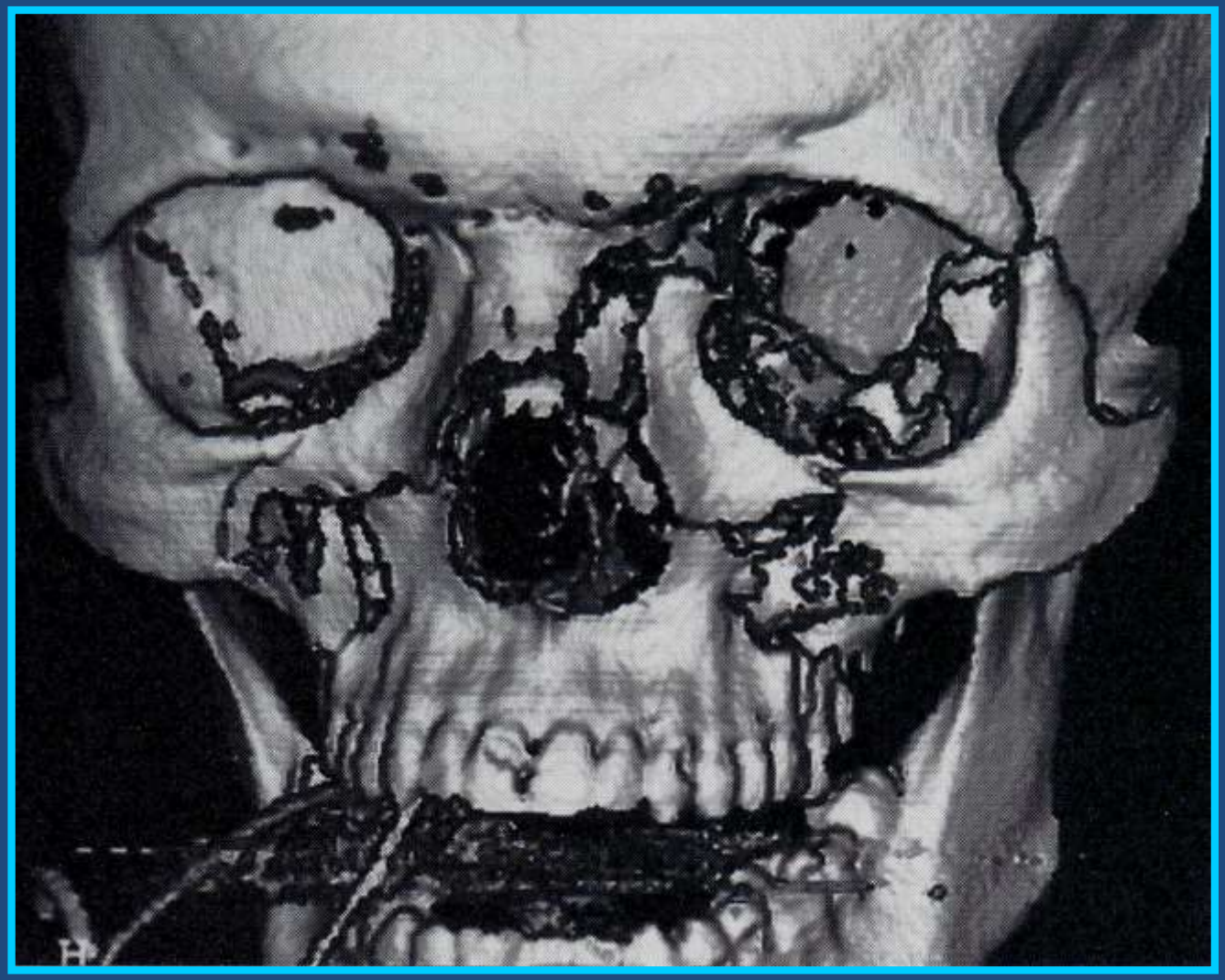
3-D CT



Multiple fractures of the middle third of the face

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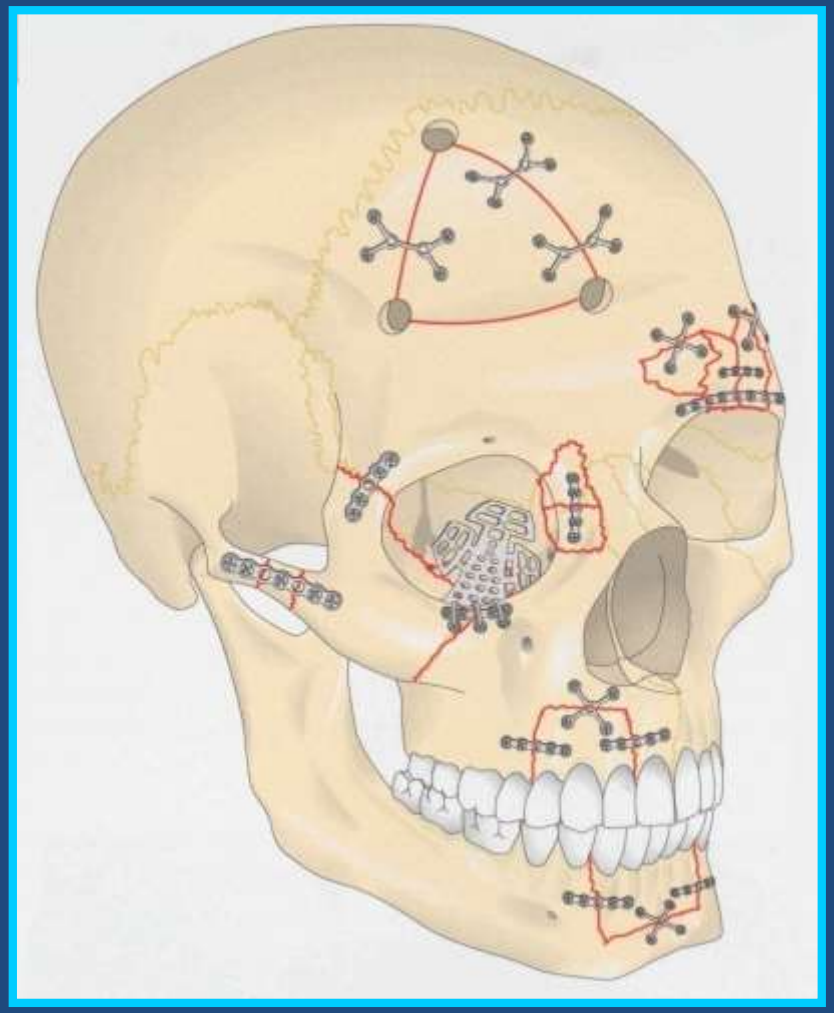
PRINCIPLES OF THERAPEUTIC TREATMENT OF FRACTURES OF THE MAXILLARY, NASAL AND FRONTAL BONE

- Open reduction – osteosynthesis
- Closed reduction

PRINCIPLES OF THERAPEUTIC TREATMENT OF FRACTURES OF THE MAXILLARY, NASAL AND FRONTAL BONE



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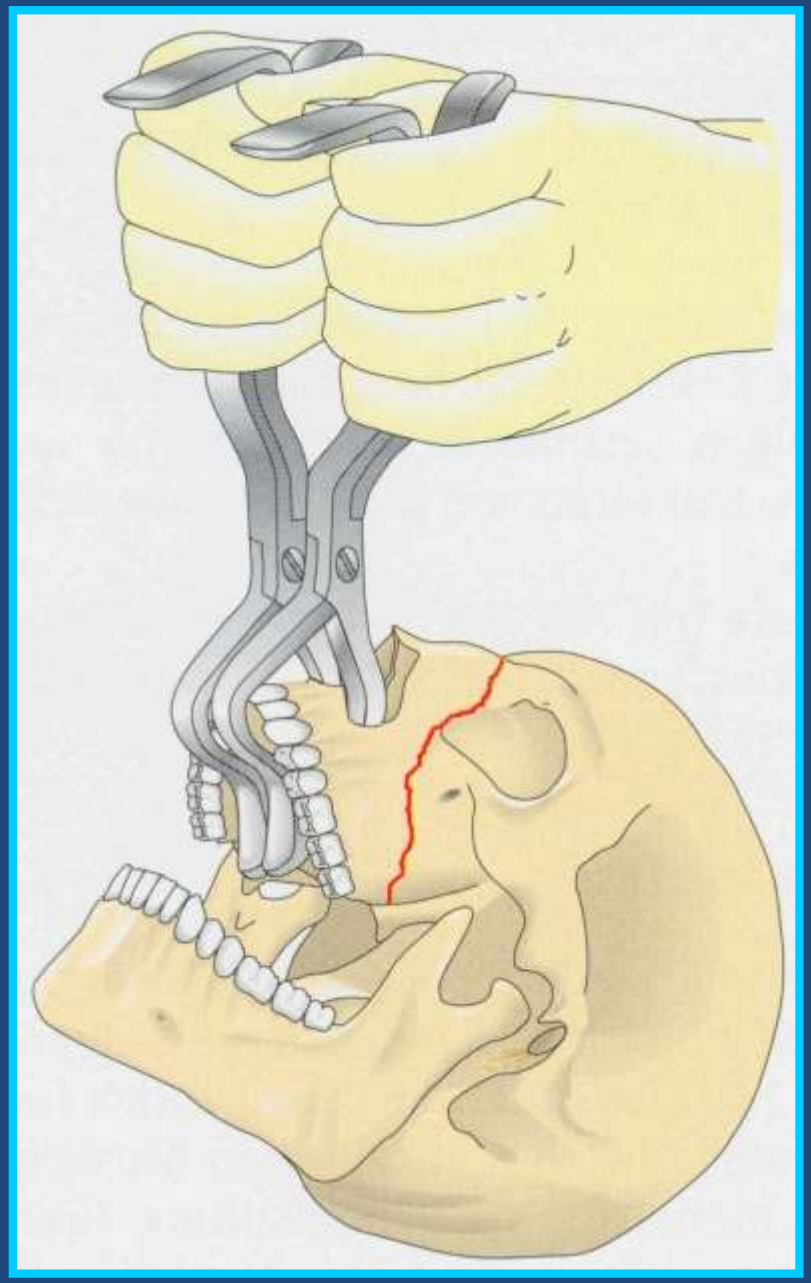
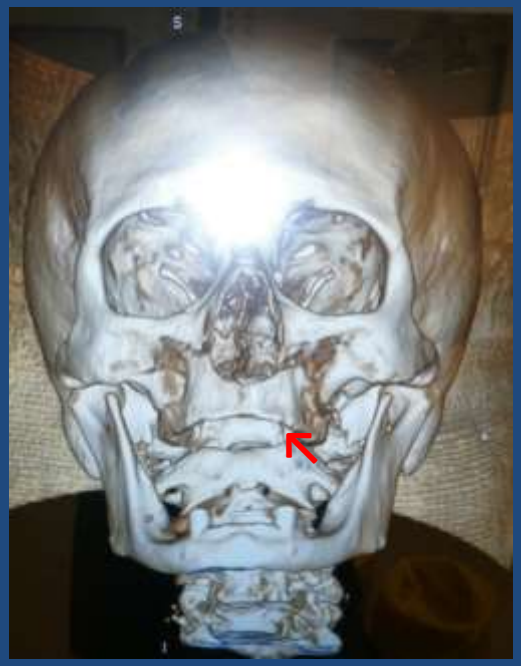
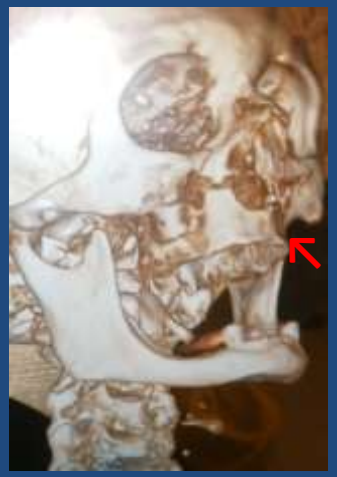


FRACTURE LE FORT I





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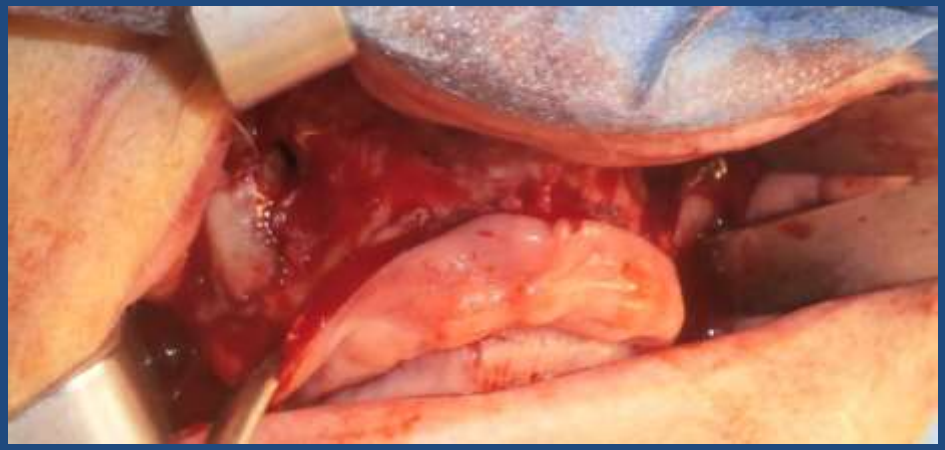
FRACTURE LE FORT I



Intraoperative stages

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FRACTURE LE FORT I





Intraoperative stages

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FRACTURE LE FORT I

Postoperative X-ray

ORBITAL FRACTURES

CLINICAL SIGNS AND SYMPTOMS

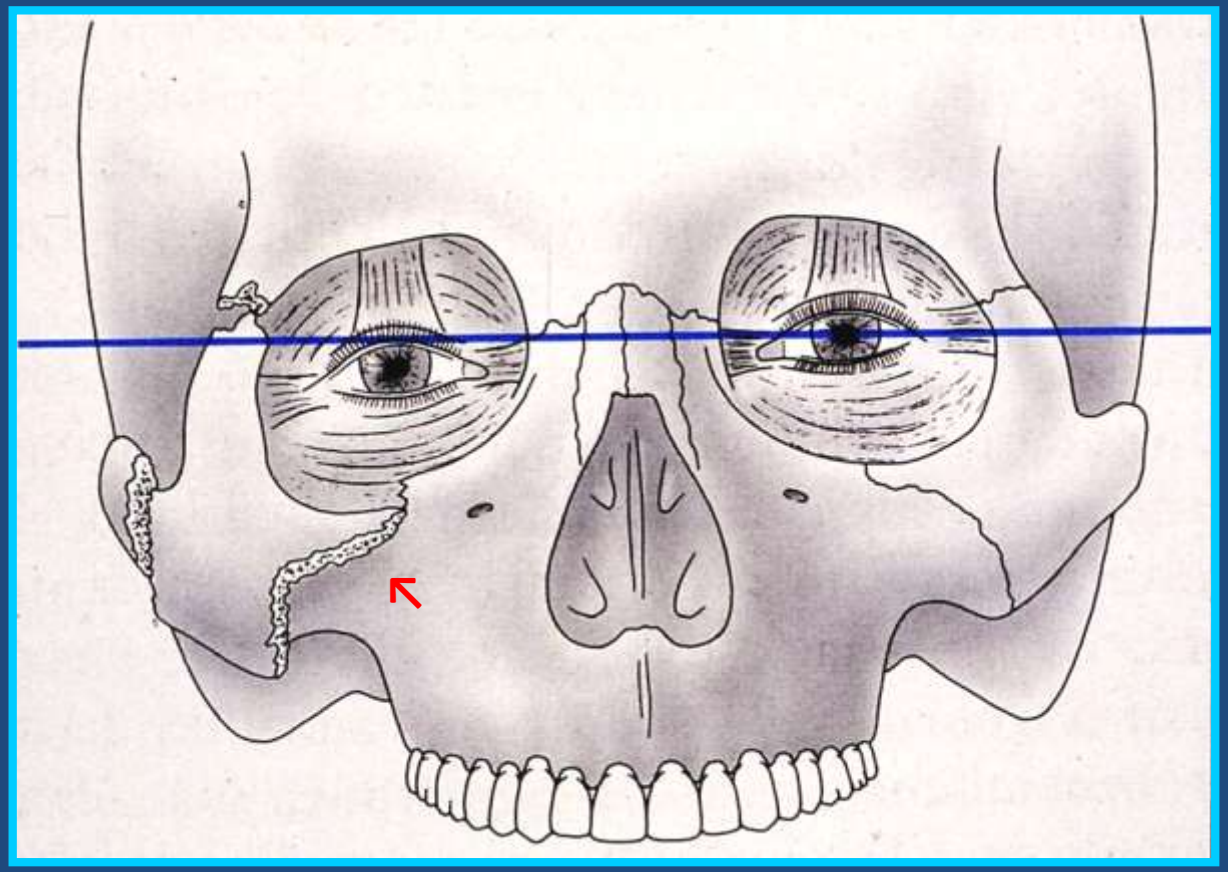
- Edema and periorbital ecchymosis, subconjunctival hemorrhage
- Pain
- Enophthalmos
- Diplopia
- Difficulty moving the eyeball
- Hypoesthesia of the infraorbital nerve

ORBITAL FRACTURES

- Fractures of the orbit, and in general of the face, if possible, should be operated on within 5-8 days of the injury, because the rich perfusion of the face facilitates their rapid porosity in an unfavorable position. Thus, their delayed treatment requires a heavier intervention

- For the same reason, if the administration of general anesthesia is not contraindicated, the patient is operated on during his stay in the intensive care unit

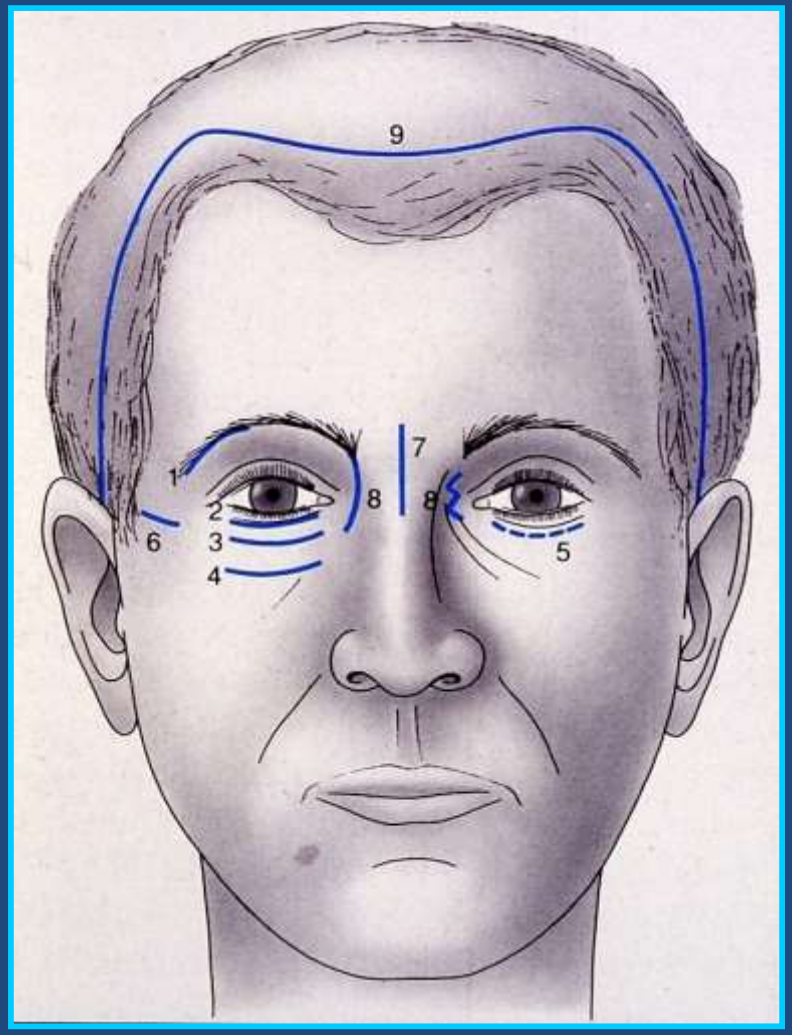
DIPLOPIA IN ORBITAL FRACTURES



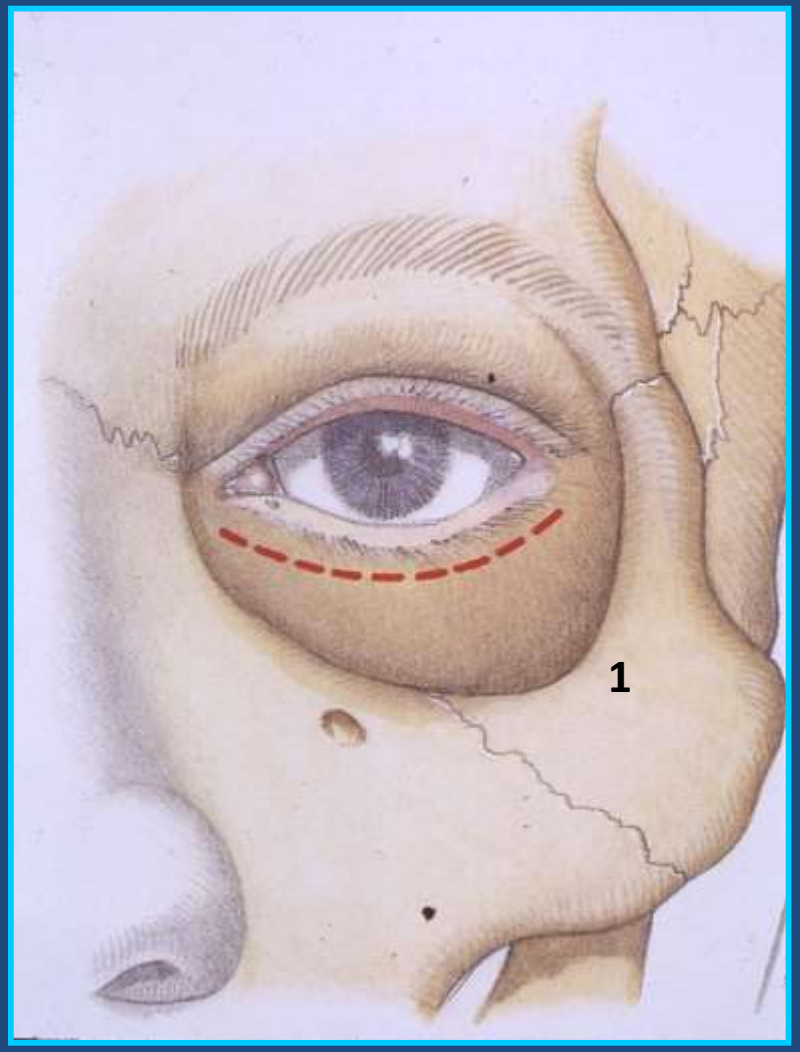
Fractures increase the capacity of the orbit resulting in displacement of the bulb

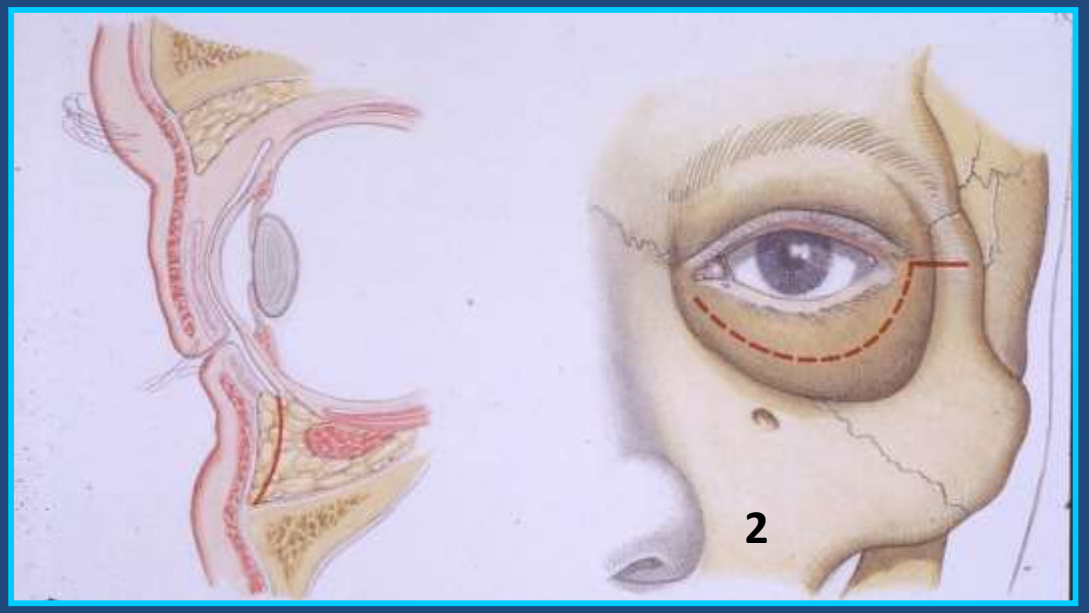
APPROACH TO MIDDLE-THIRD FACIAL FRACTURES

1. At the frontozygomatic suture
2. Through the lower conjunctiva
3. Middle Subciliary
4. Lower Subciliary
5. Upper Subciliary
6. Temporal (Gillies)
7. Middle nasal
8. Inner wall of the orbit
9. Coronal incision



Frontozygomatic incision





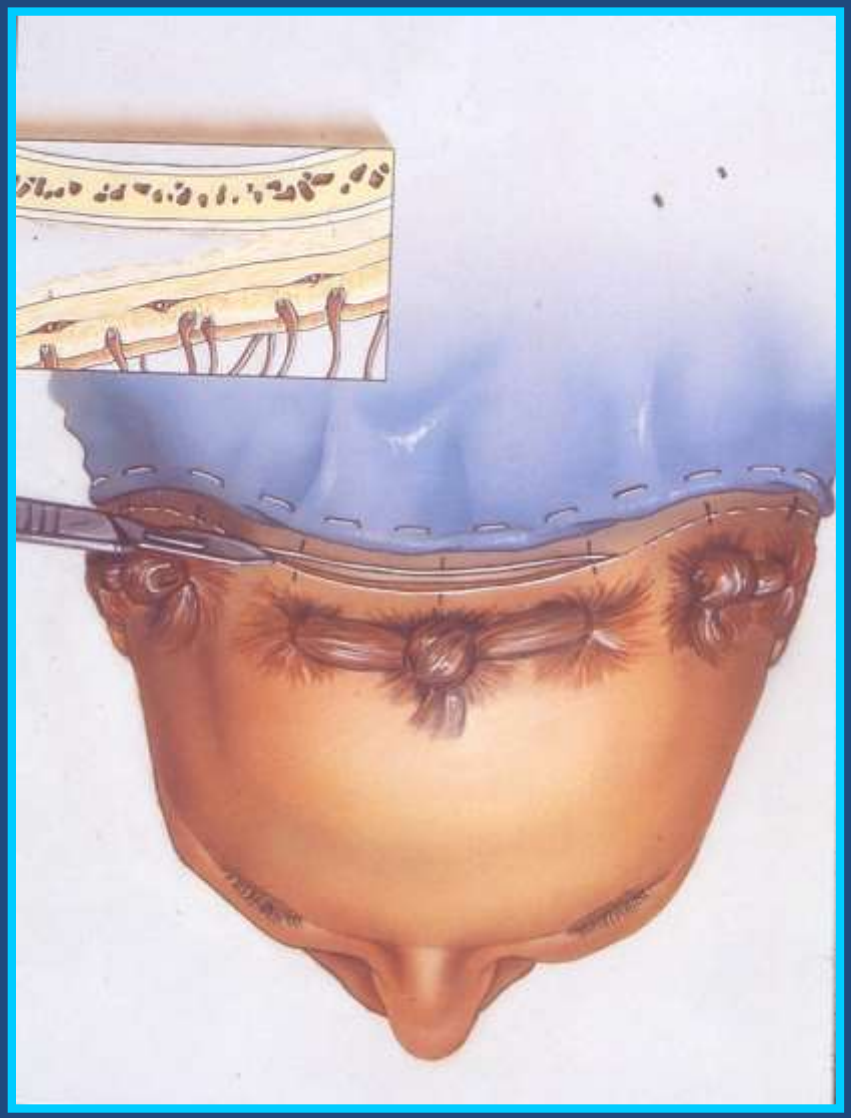
1.Upper Subciliary incision

2. Middle Subciliary incision

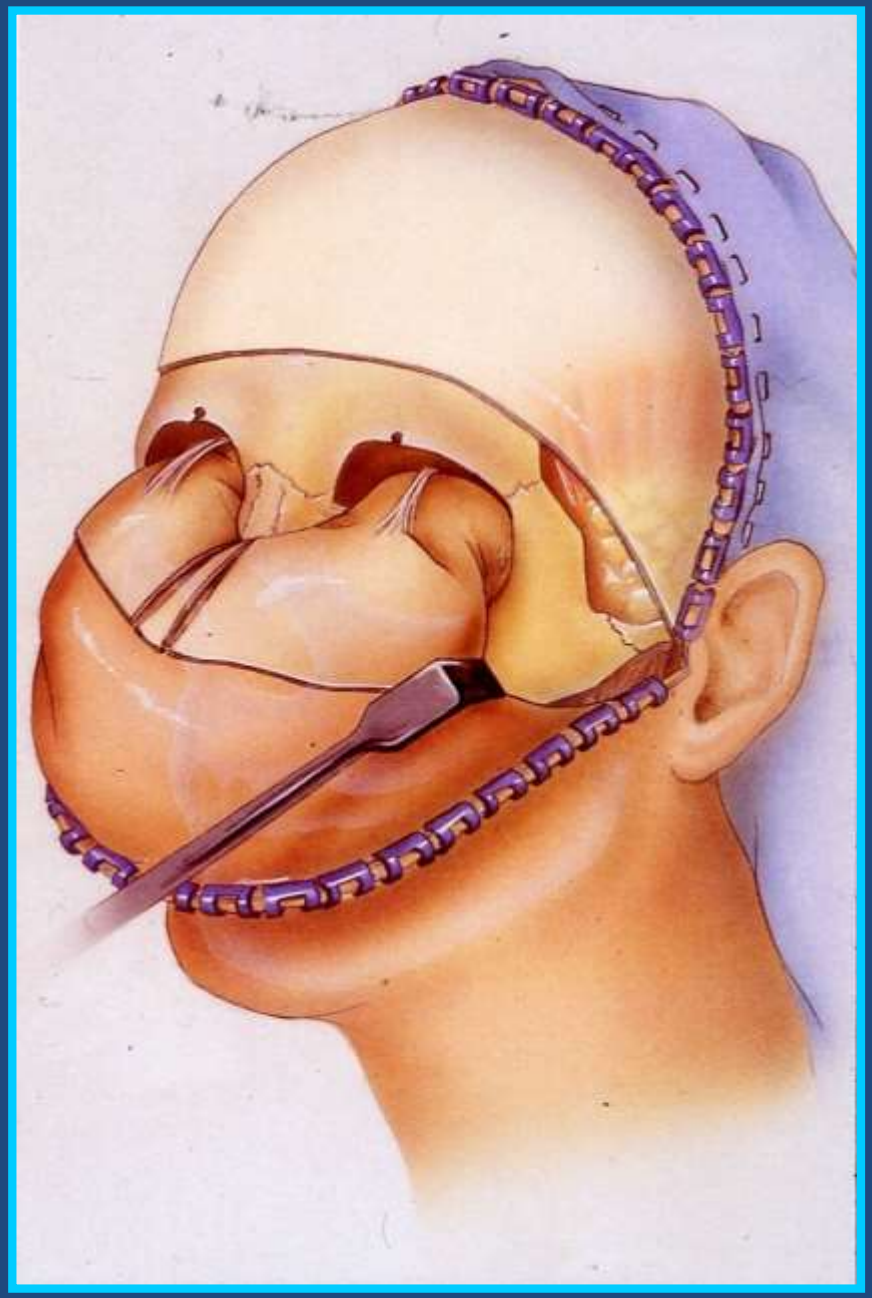
ORBITAL FRACTURE

OPEN REDUCTION - OSTEOSYNTHESIS

CORONARY INCISION



CORONARY INCISION



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REPRESENTATIVE CASES OF MIDDLE-THIRD FACIAL FRACTURES

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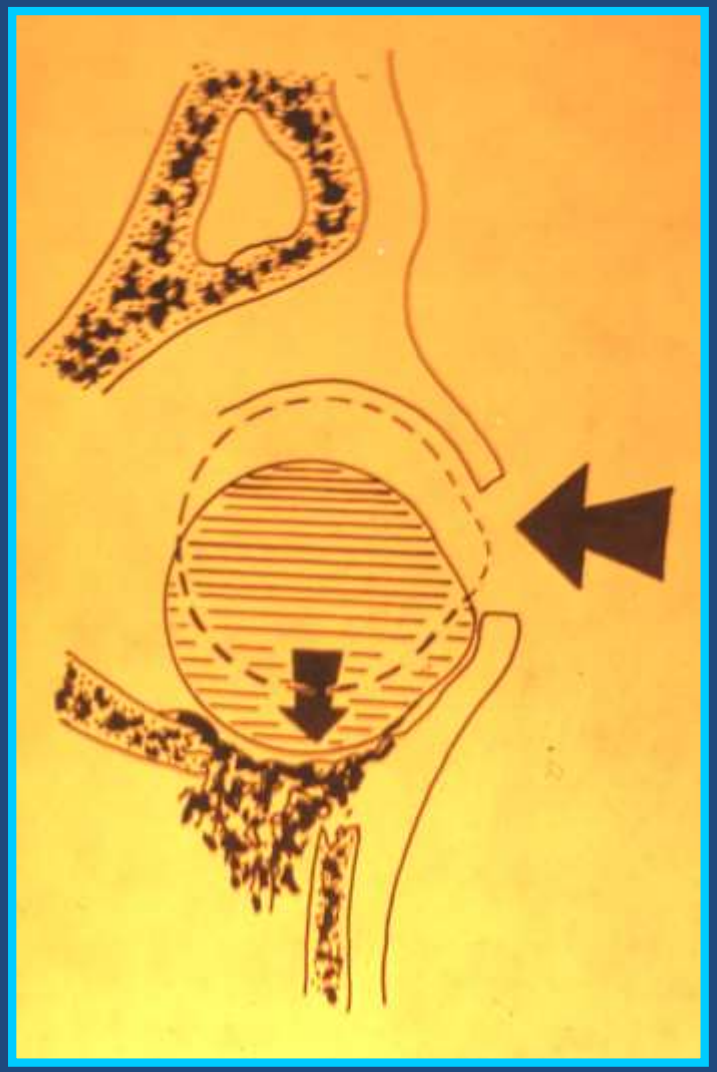
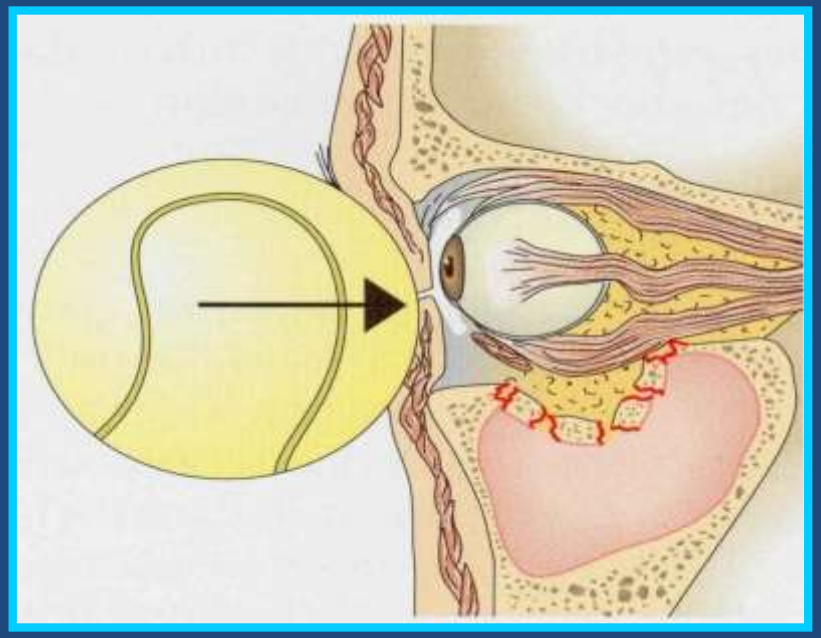
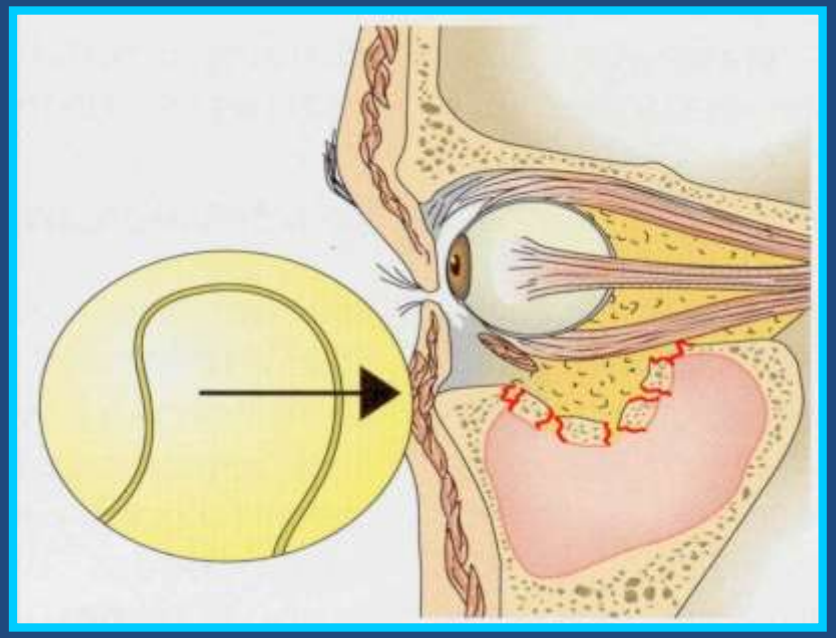
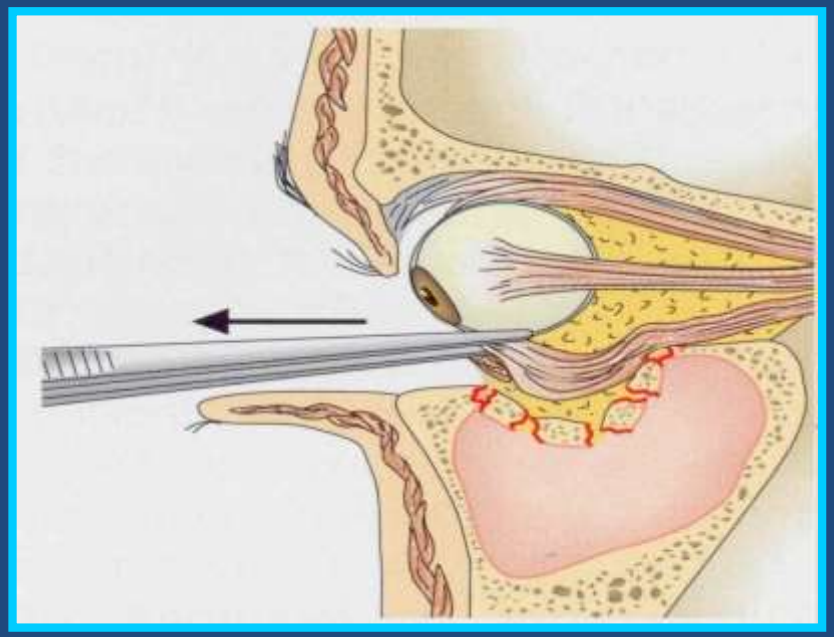
FRACTURE OF THE ORBTAL FLOOR

BLOW-OUT → Fracture only in the floor, not in the orbital walls



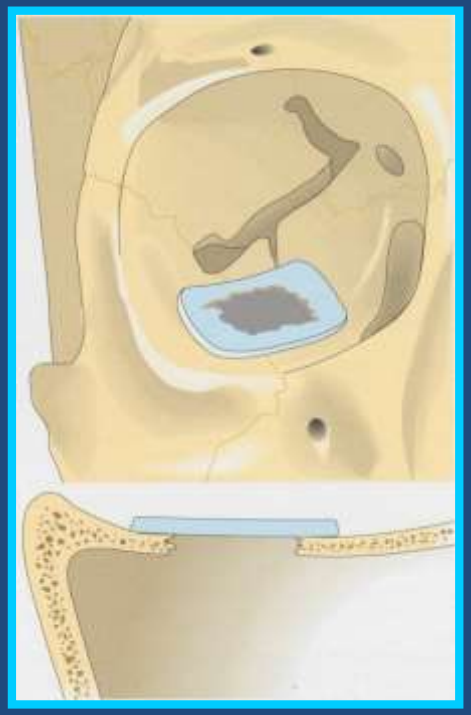




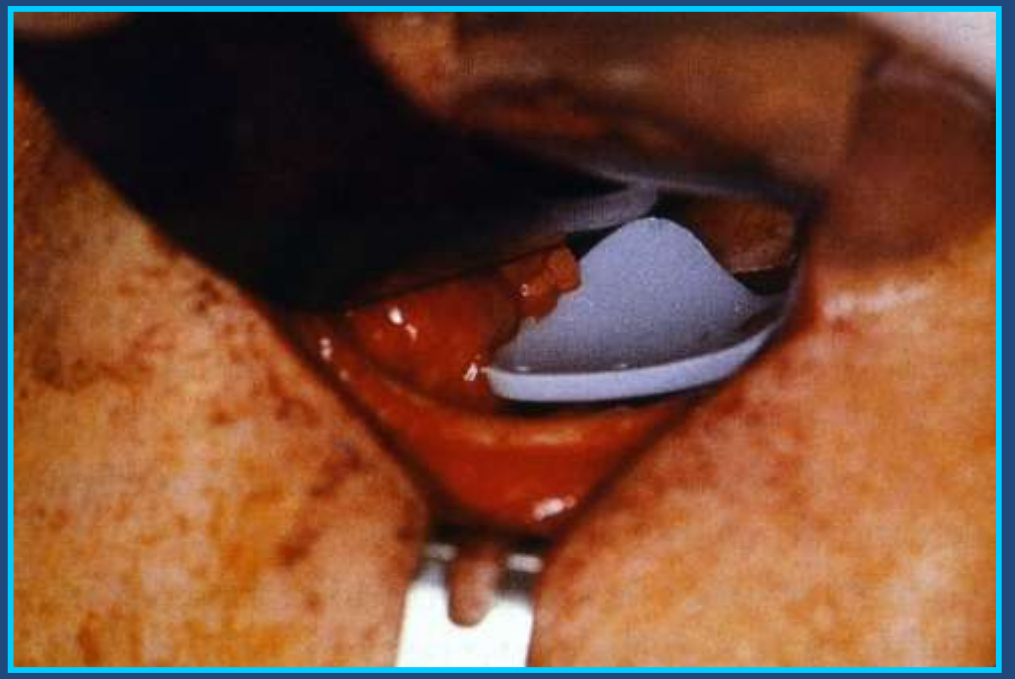


REPAIR OF THE DEFECT IN ORBITAL FLOOR FRACTURES

Small defect



- **Lyodura**



BLOW-OUT FRACTURE

The post-operative X-ray shows the meninge (Lyodura) placed on the floor defect

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LARGE DEFECT

REPAIR

- **A. Bone graft from the dome of the skull**
- **B. Cartilage from the auricle**
- **C. Titanium mesh**

A

B

- **A. Bone graft from the dome of the skull**
- **B. Cartilage from the auricle**

NEGLECTED ORBITAL FLOOR FRACTURE

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NEGLECTED ORBITAL FLOOR FRACTURE

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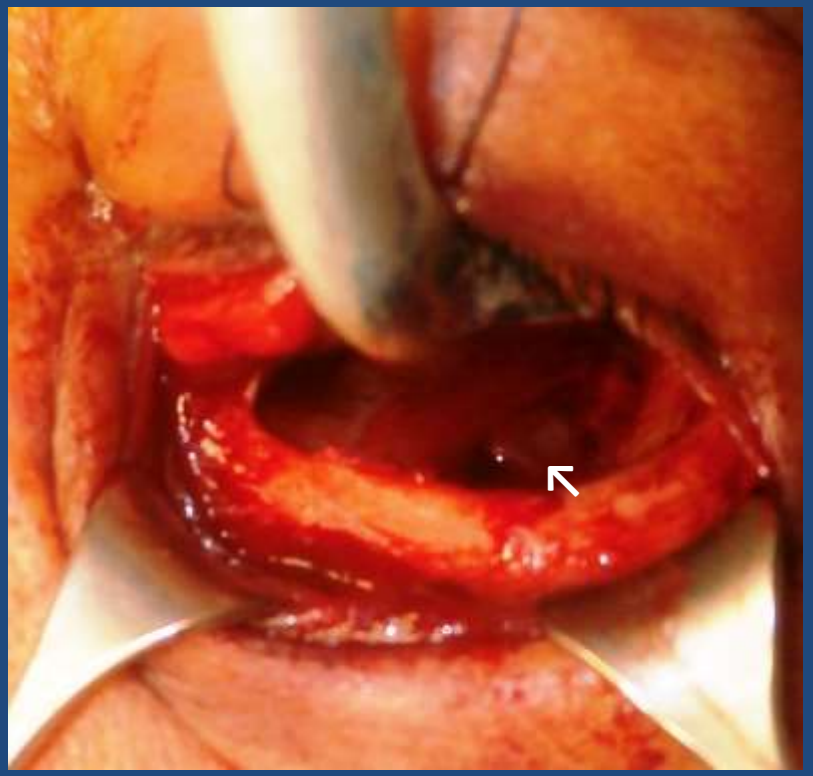
ORBITAL FLOOR FRACTURE



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ORBITAL FLOOR FRACTURE

CT (sagittal section)

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BLOW-OUT FRACTURE

Open reduction. A titanium mesh was placed in the floor defect

MIDDLE THIRD FACIAL FRACTURES

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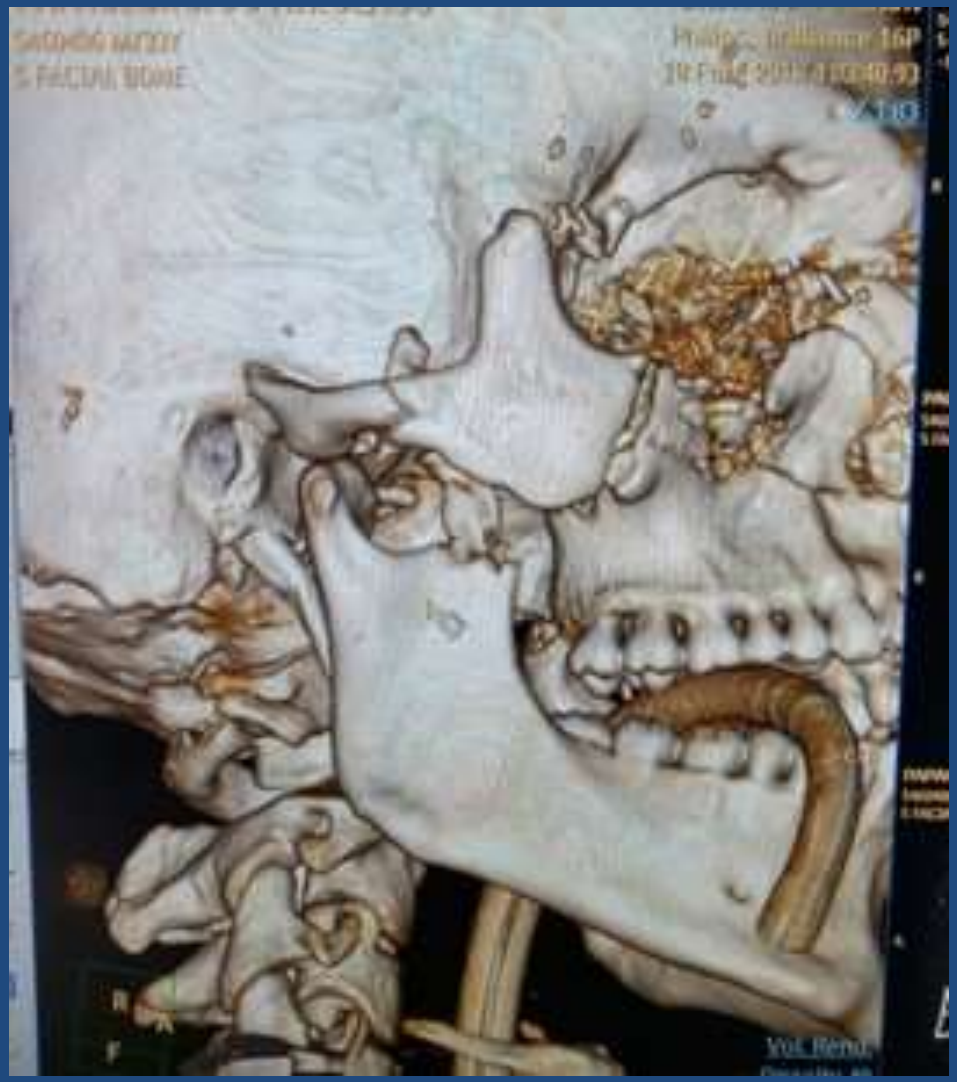
MIDDLE THIRD FACIAL FRACTURES



PREOPERATIVE X-RAYS

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MIDDLE THIRD FACIAL FRACTURES

PREOPERATIVE X-RAYS

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MIDDLE THIRD FACIAL FRACTURES

POSTOPERATIVE X-RAYS

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MIDDLE THIRD FACIAL FRACTURES

THE PATIENT AFTER THE FIRST OPERATION

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MIDDLE THIRD FACIAL FRACTURES

3-D PRINTER
CAD-CAM TECHNOLOGY

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MIDDLE THIRD FACIAL FRACTURES

BILATERAL PLACEMENT OF TITANIUM MESH ON THE ORBITAL FLOOR

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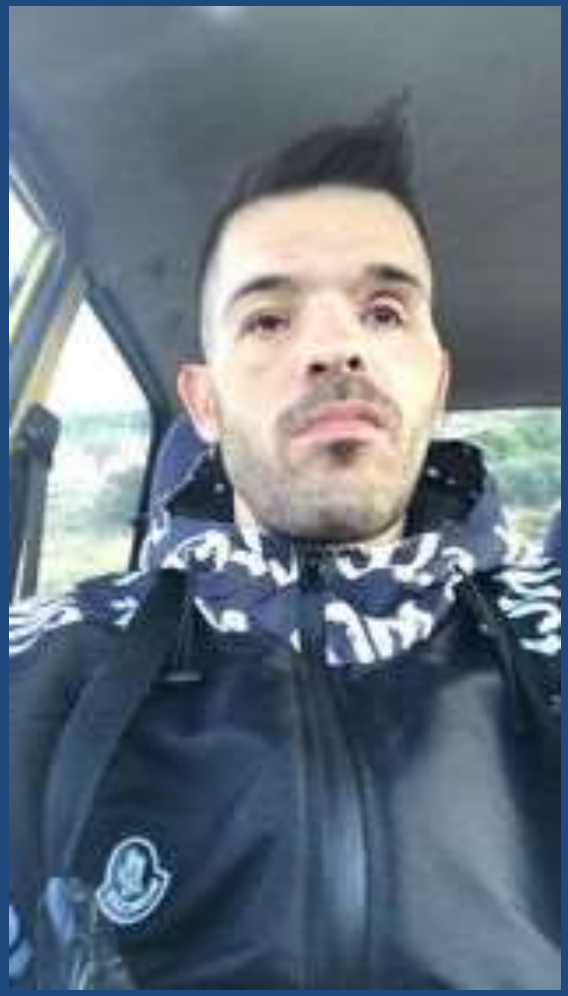
MIDDLE THIRD FACIAL FRACTURES



THE PATIENT 1 YEAR AFTER THE SECOND OPERATION

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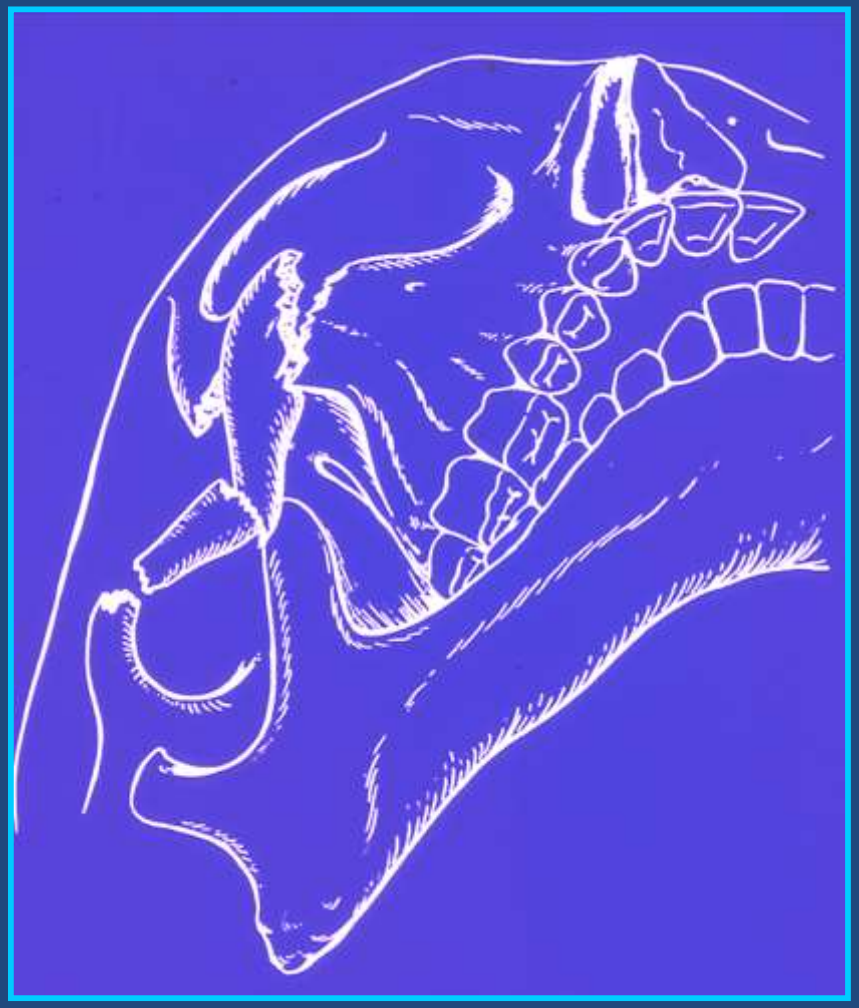
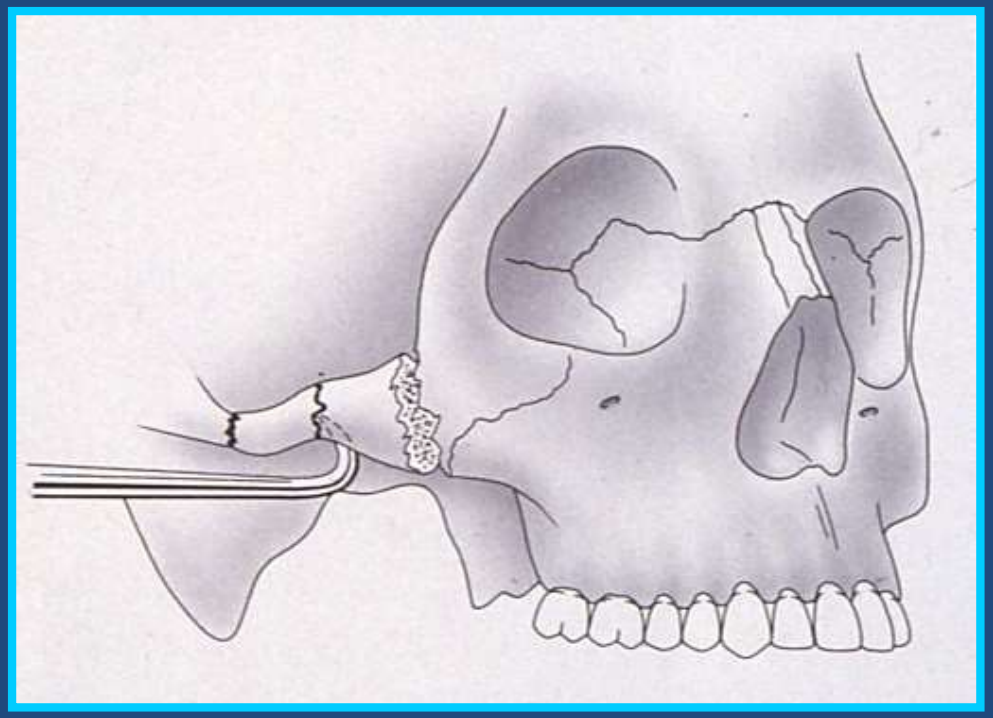
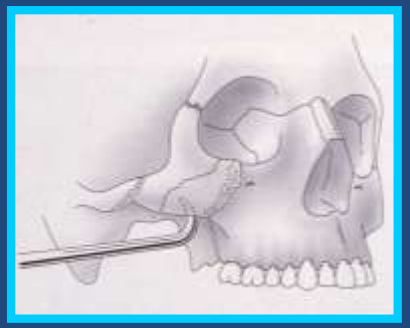
ZYGOMATIC ARCH FRACTURES







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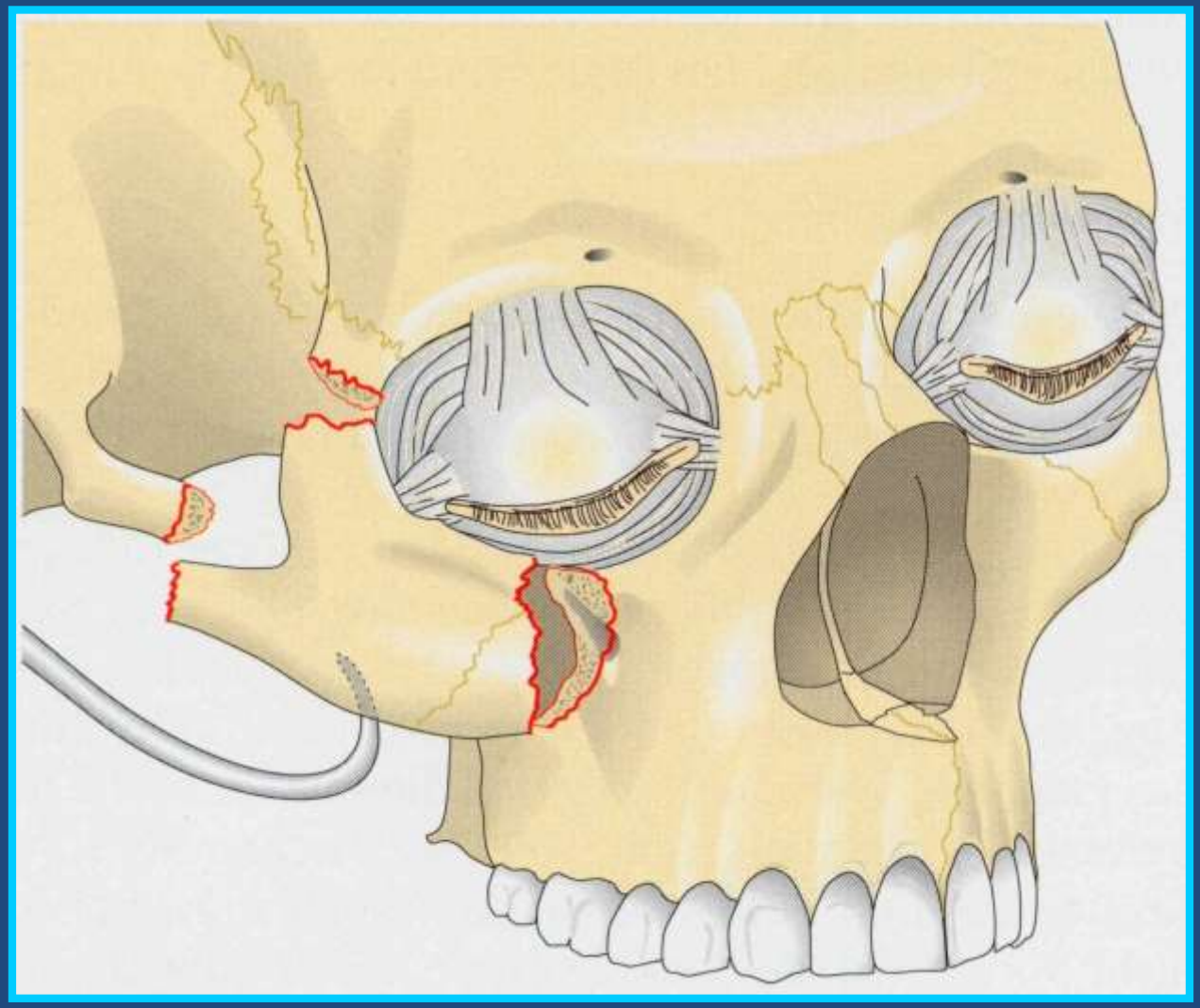
ZYGOMATIC ARCH FRACTURE



Closed reduction

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ZYGOMATIC ARCH FRACTURES

ZYGOMATIC ARCH FRACTURES

Closed reduction

ZYGOMATIC ARCH FRACTURE
OPEN REDUCTION

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ZYGOMATIC ARCH FRACTURE

OPEN REDUCTION

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ZYGOMATIC ARCH FRACTURE
OPEN REDUCTION

PRE-OPERATIVE X-RAY

POST-OPERATIVE X-RAY

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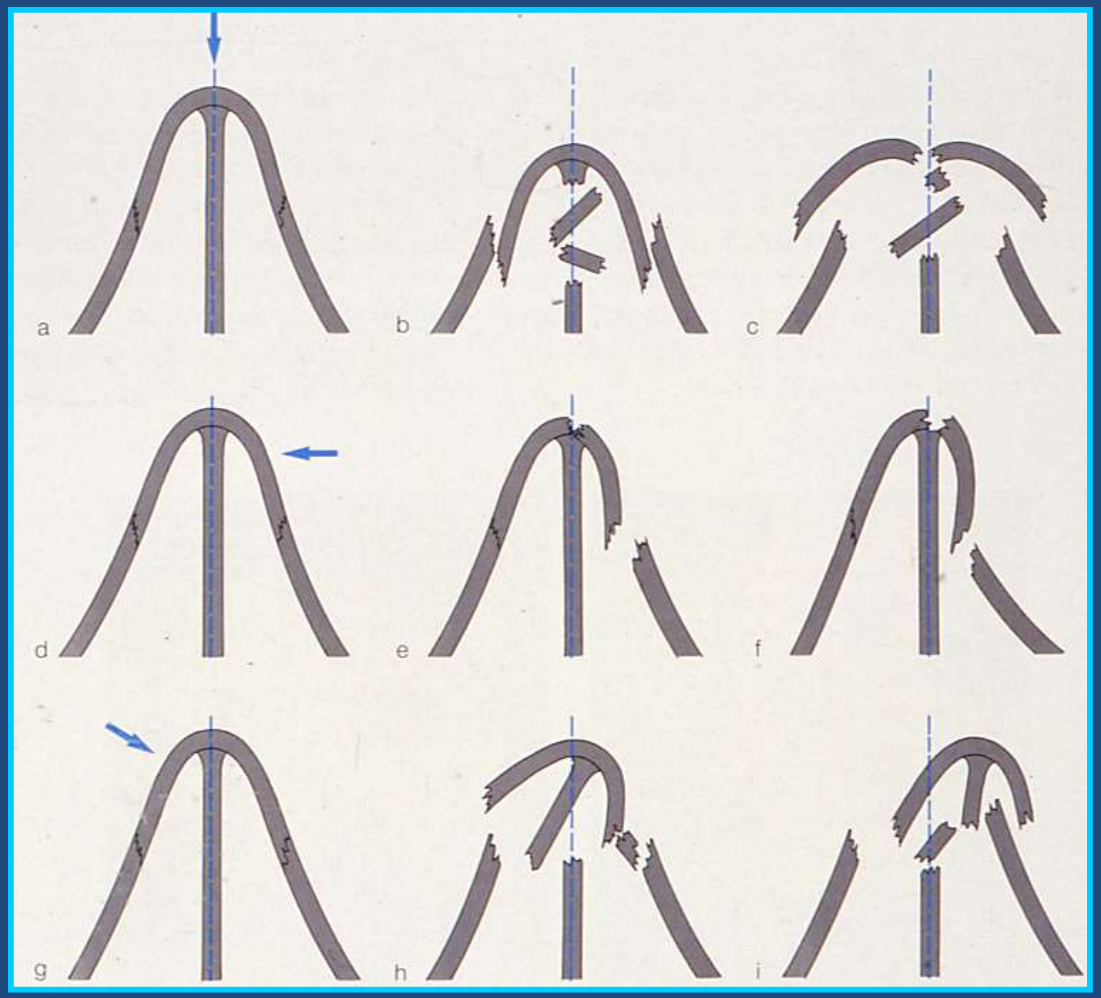
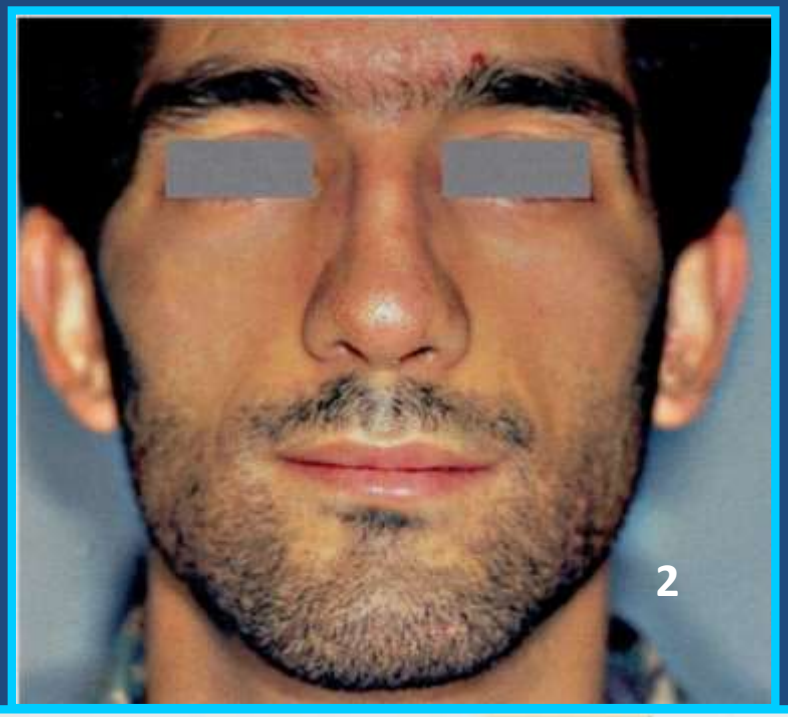
FRACTURE OF NASAL BONES

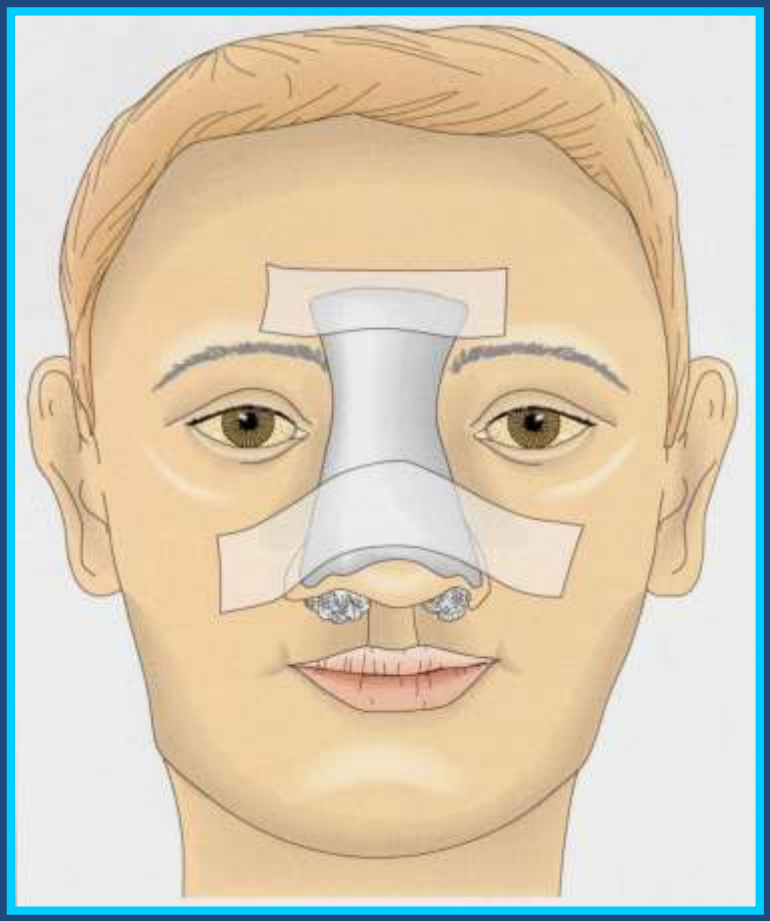


FRACTURE OF NASAL BONES



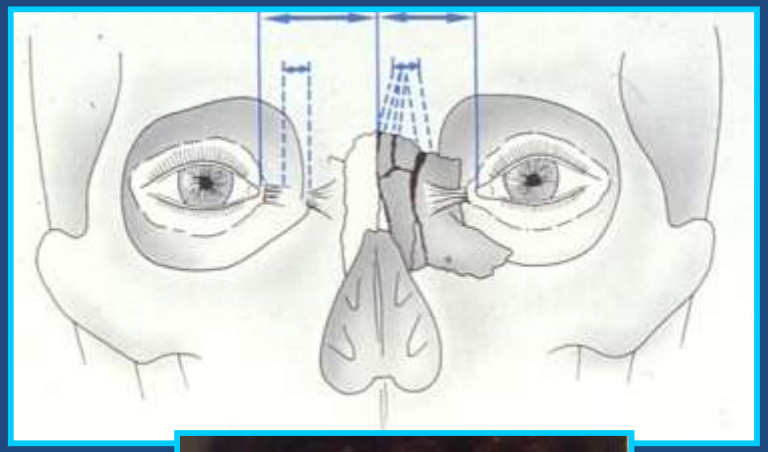
1. Preoperatively. The nose is wide
2. Postoperatively

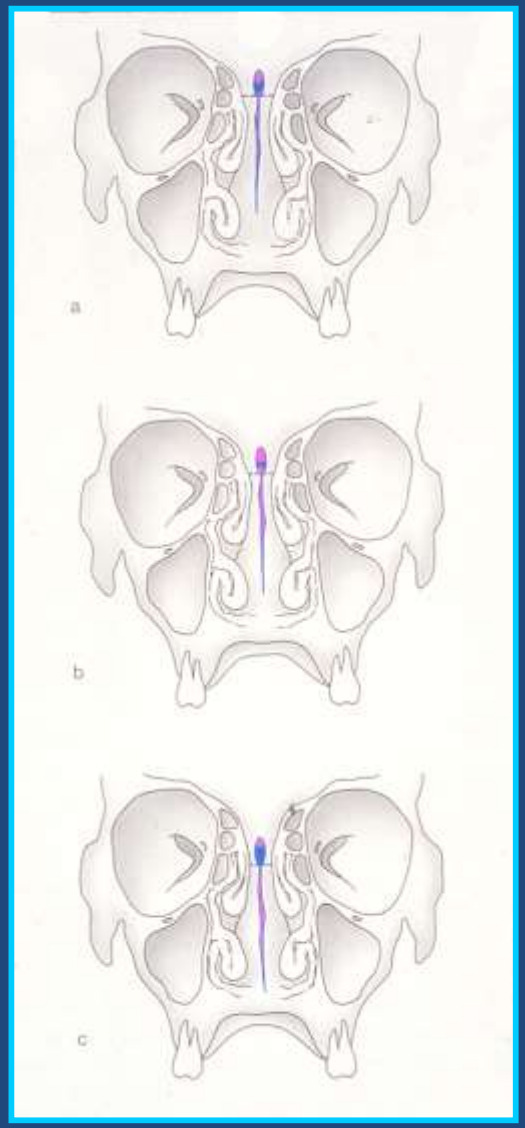
FRACTURE OF NASAL BONES



After reduction, a splint is placed to stabilize the nasal bones

NASAL ORBITAL ETHMOID FRACTURE





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NASAL ORBITAL ETHMOID FRACTURE

Coronal approach

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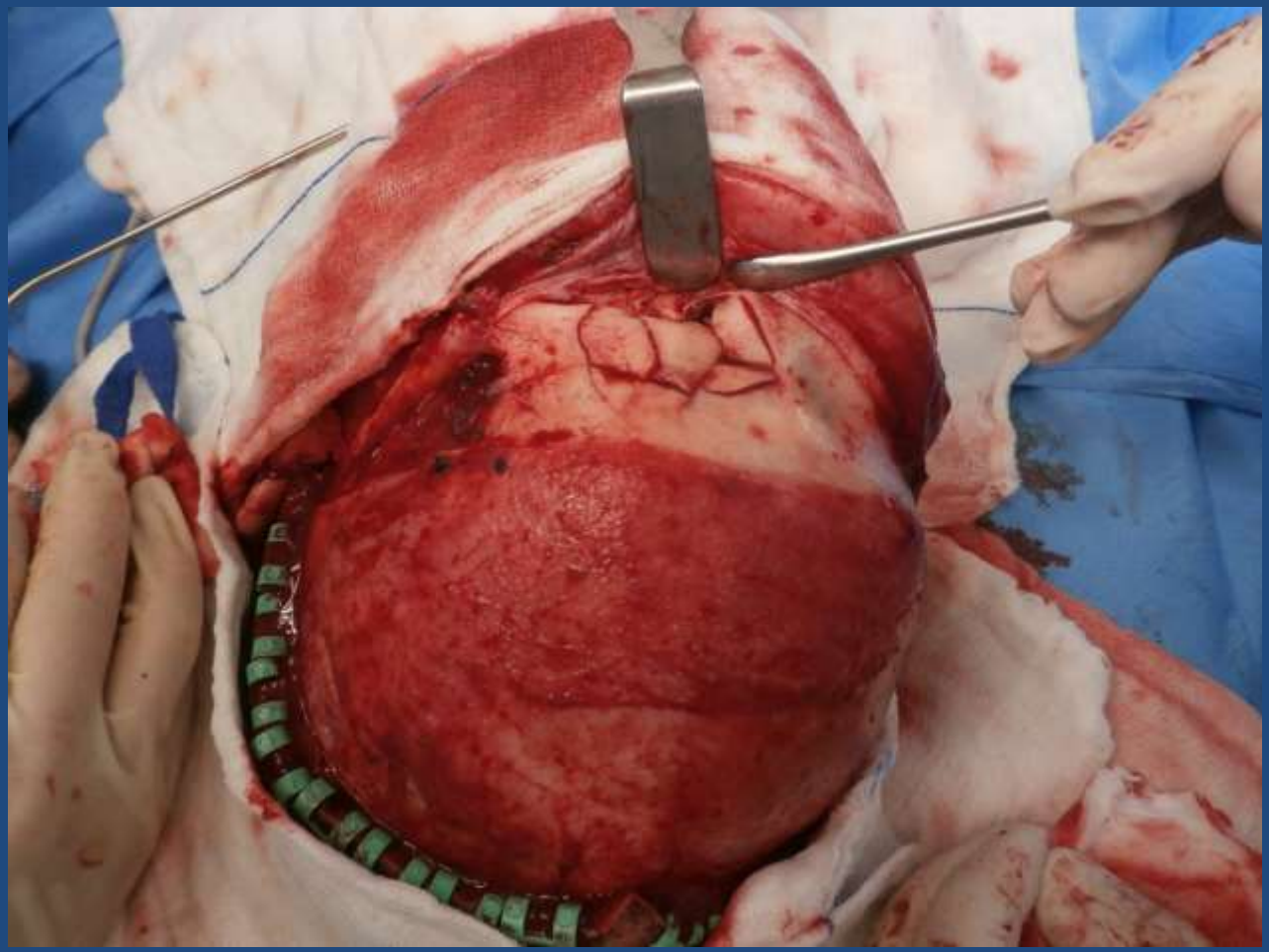
FRACTURE OF THE FRONTAL BONE

INDICATIVE FRACTURE POINTS

- **Open wound of the area**
- **Local ecchymosis or hematoma**
- **Anosmia**
- **Supraorbital nerve hypoesthesia**
- **Leakage of cerebrospinal fluid (CSF) from the wound or nose (rhinorrhea)**
- **Presence of air in the brain (pneumencephalus) in fracture of the posterior wall of the frontal sinus and rupture of the dura mater**

FRACTURE OF THE FRONTAL BONE



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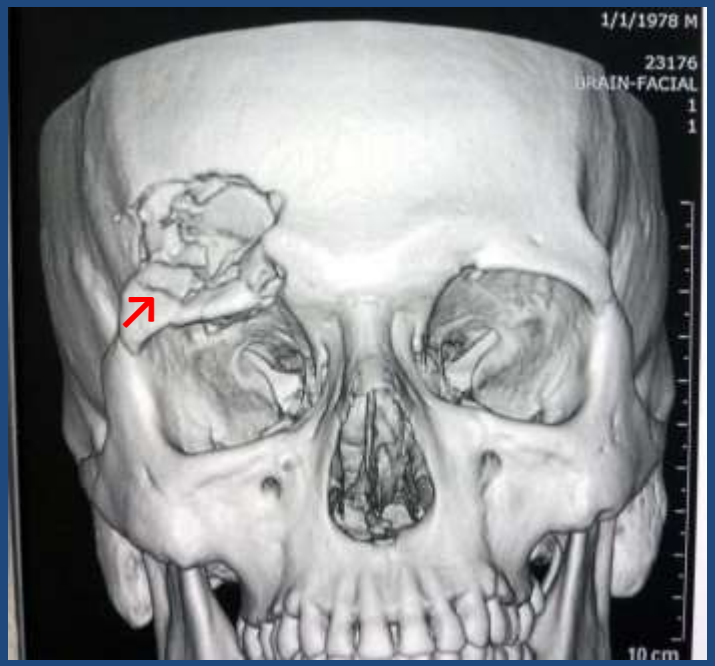
FRACTURE OF THE FRONTAL BONE

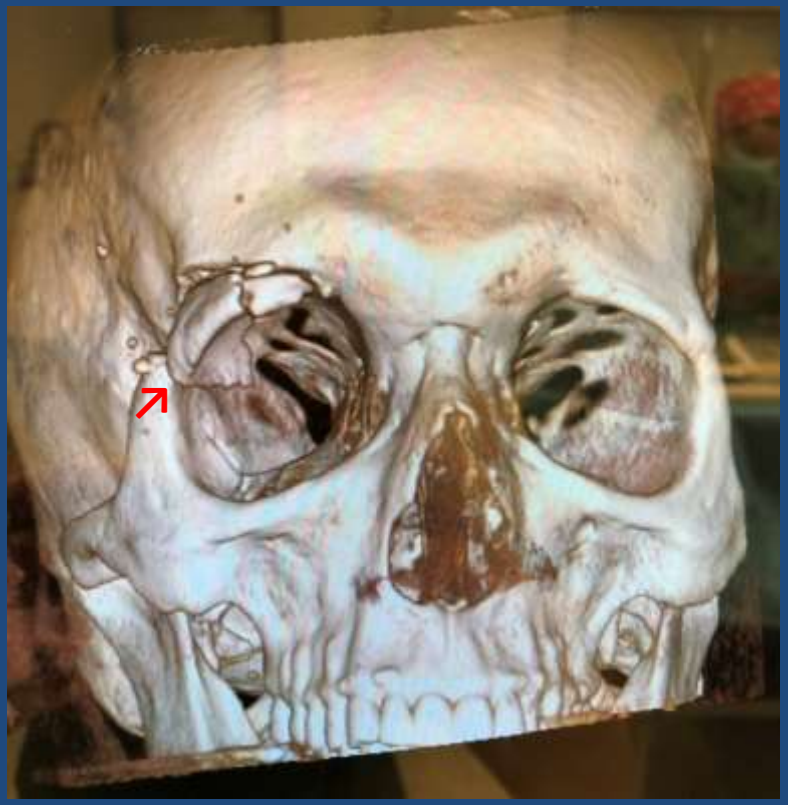
Access was through the wound

FRACTURE OF THE FRONTAL BONE



A titanium mesh was fitted

FRACTURE OF THE ORBITAL ROOF



FRACTURE OF THE ORBITAL ROOF

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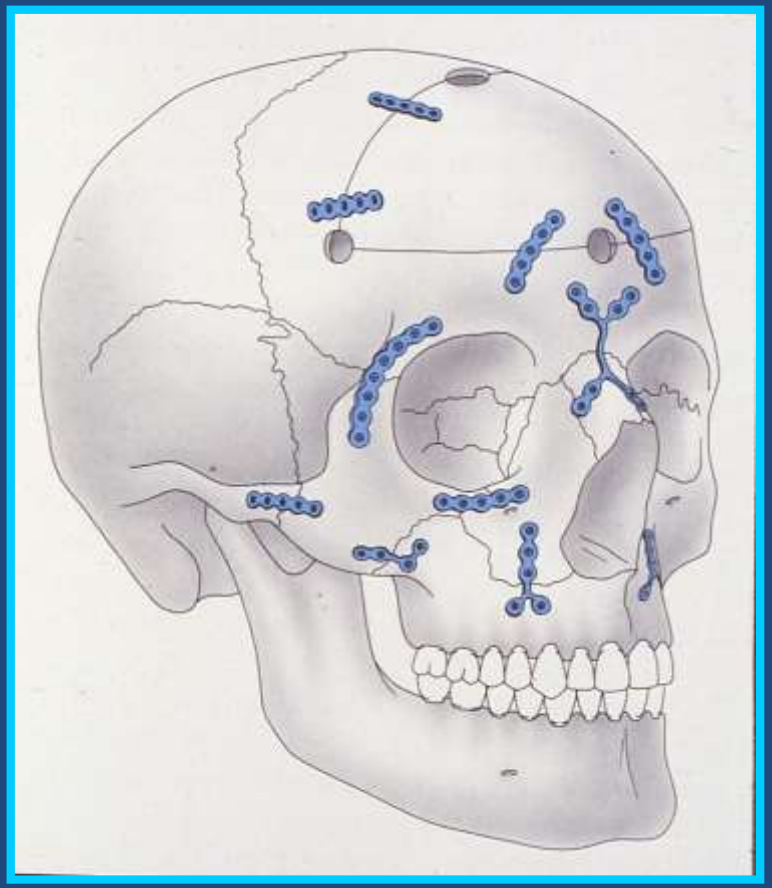
PANFACIAL FRACTURES



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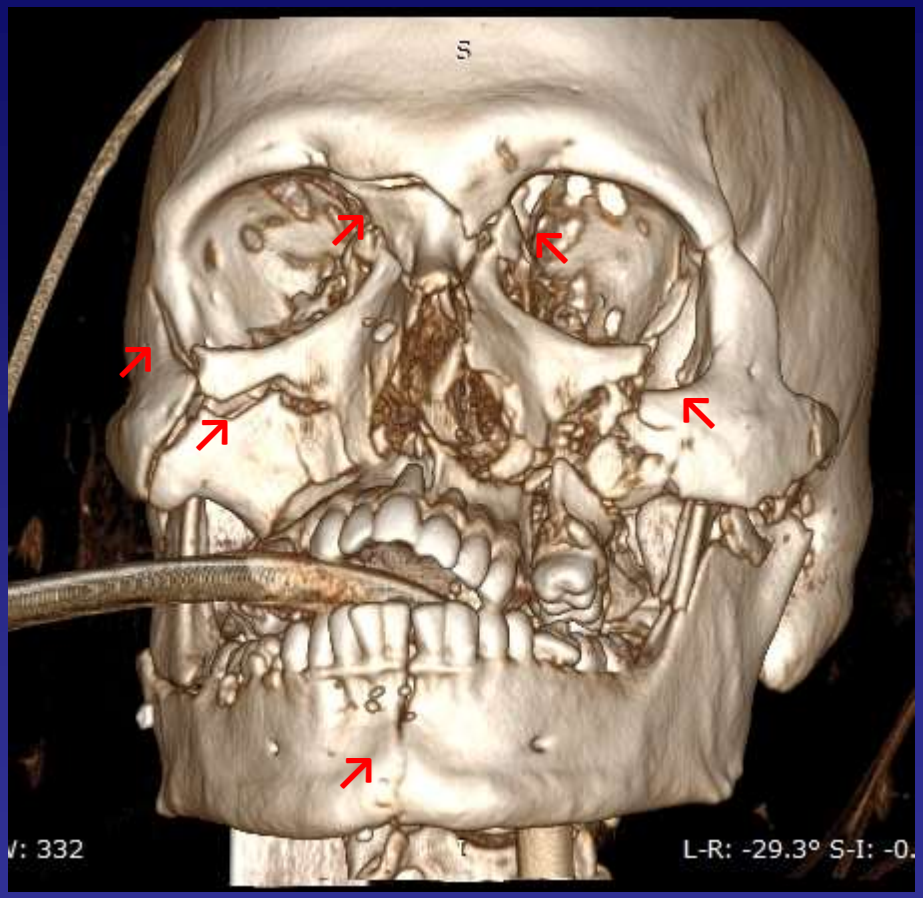
PANFACIAL FRACTURES



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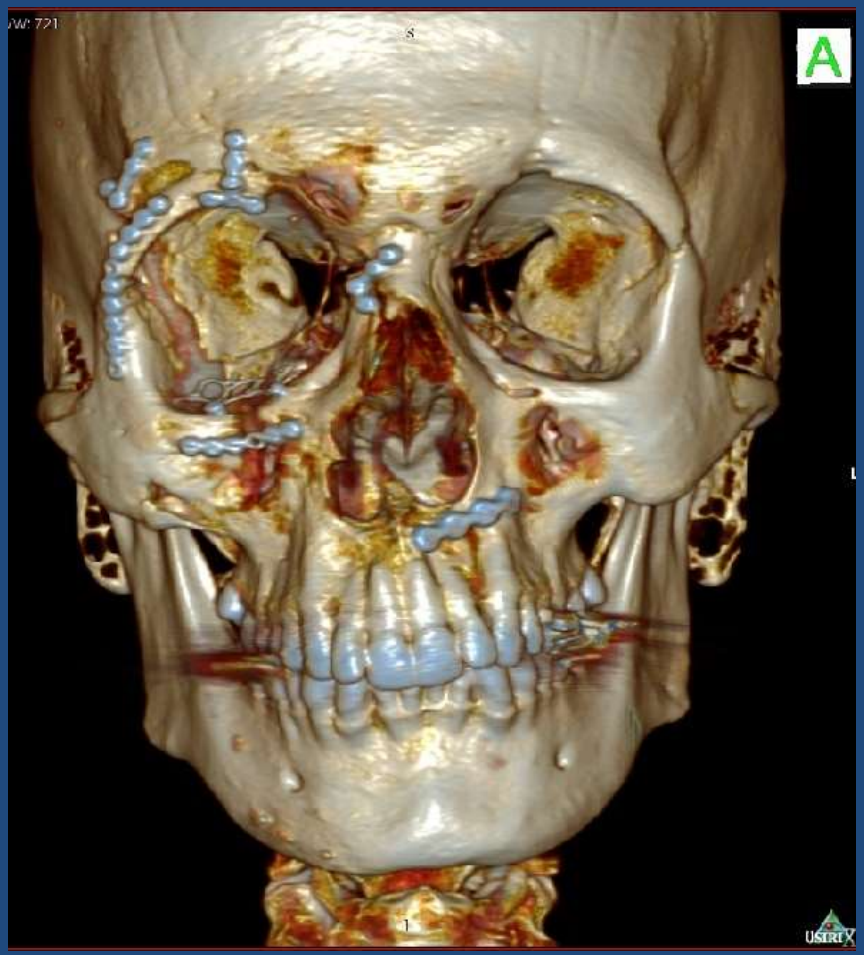
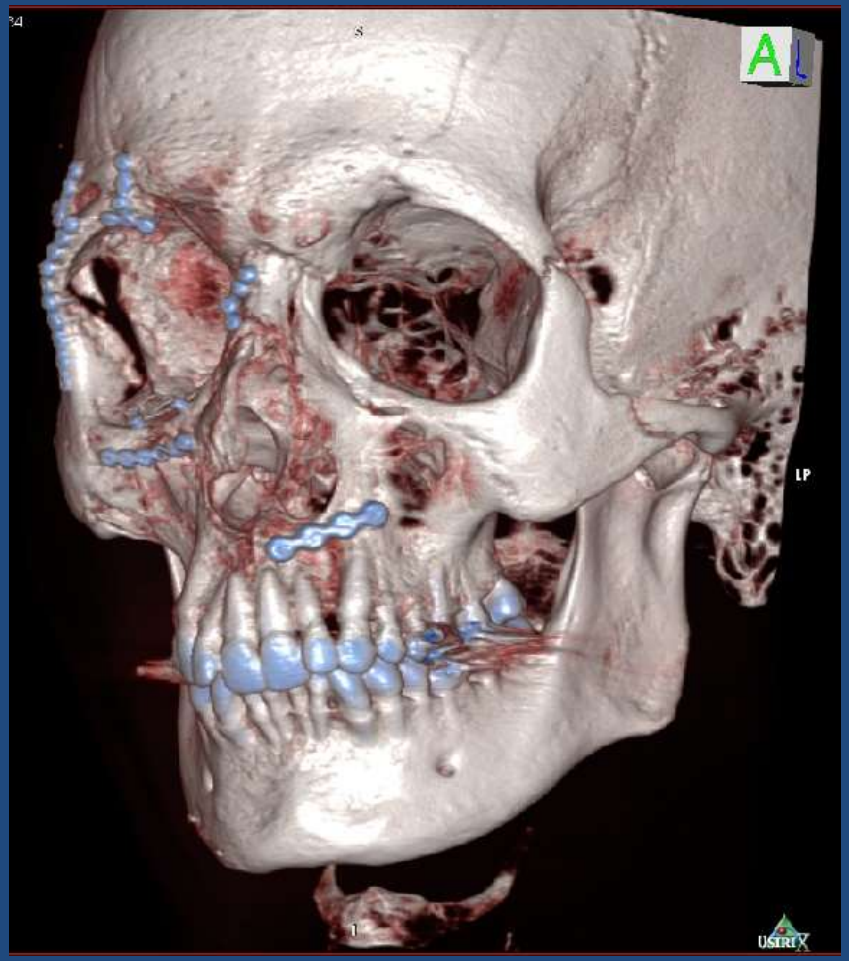
PANFACIAL FRACTURES





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PANFACIAL FRACTURES

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PANFACIAL FRACTURES

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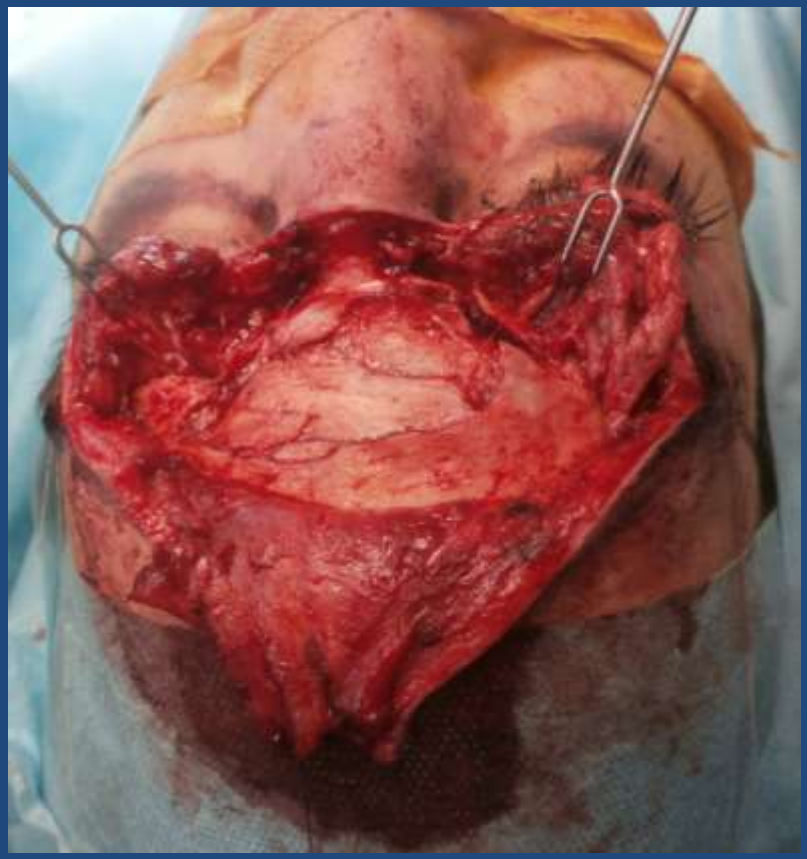

Intraoperative stages

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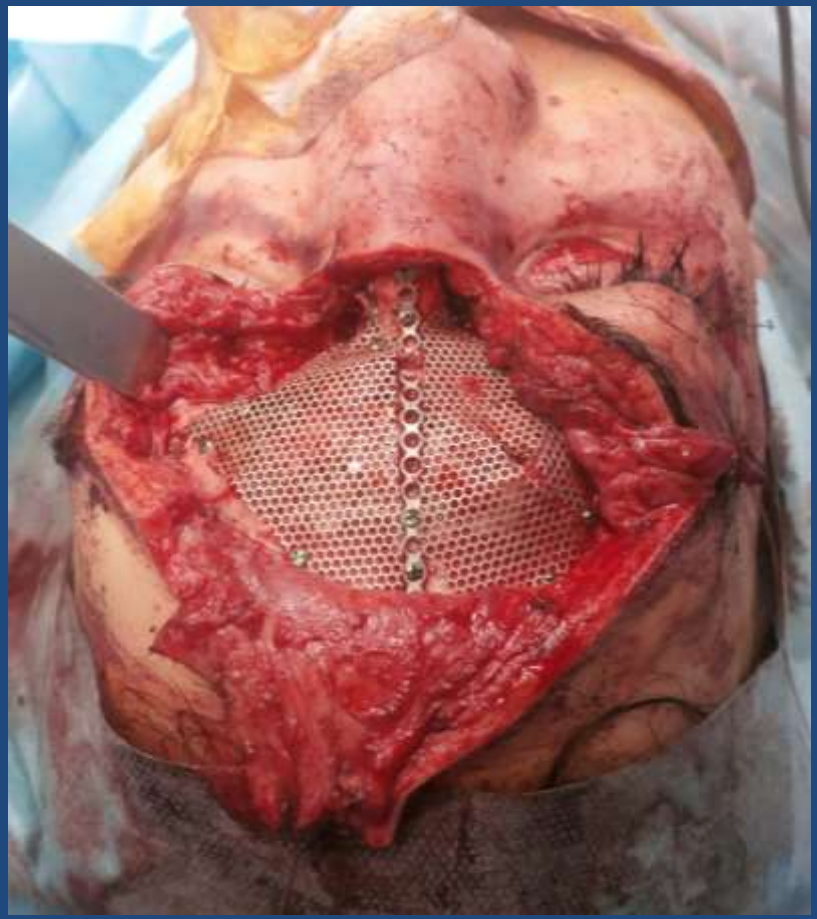
PANFACIAL FRACTURES

Intraoperative stages

PANFACIAL FRACTURES



Intraoperative stages

PANFACIAL FRACTURES

The patient postoperatively

PANFACIAL FRACTURES

3D postoperative computed

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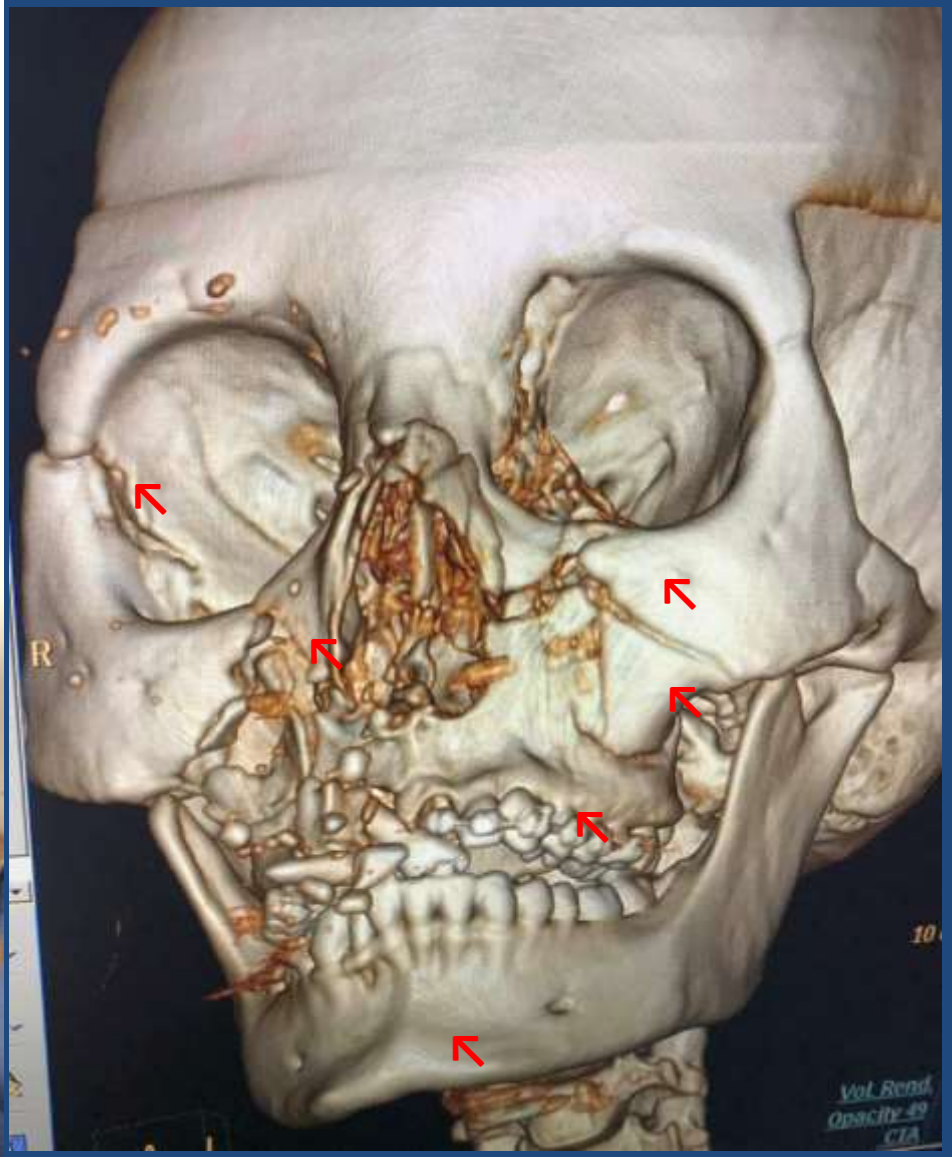
PANFACIAL FRACTURES



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PANFACIAL FRACTURES

SUBMENTAL INTUBATION

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