ANKYLOSIS OF TEMPOROMANDIBULAR JOINT

By- Dr. Sonal Anchlia

ANATOMY

The TMJ is a diarthrodial, ginglymus, synovial joint that is capable of both rotational and translatory movements.

It is formed by the articulation of the **glenoid fossa** of the temporal bone and the head of the **condyle**.

TMJ ARTICULATION CONSISTS OF

Bony component

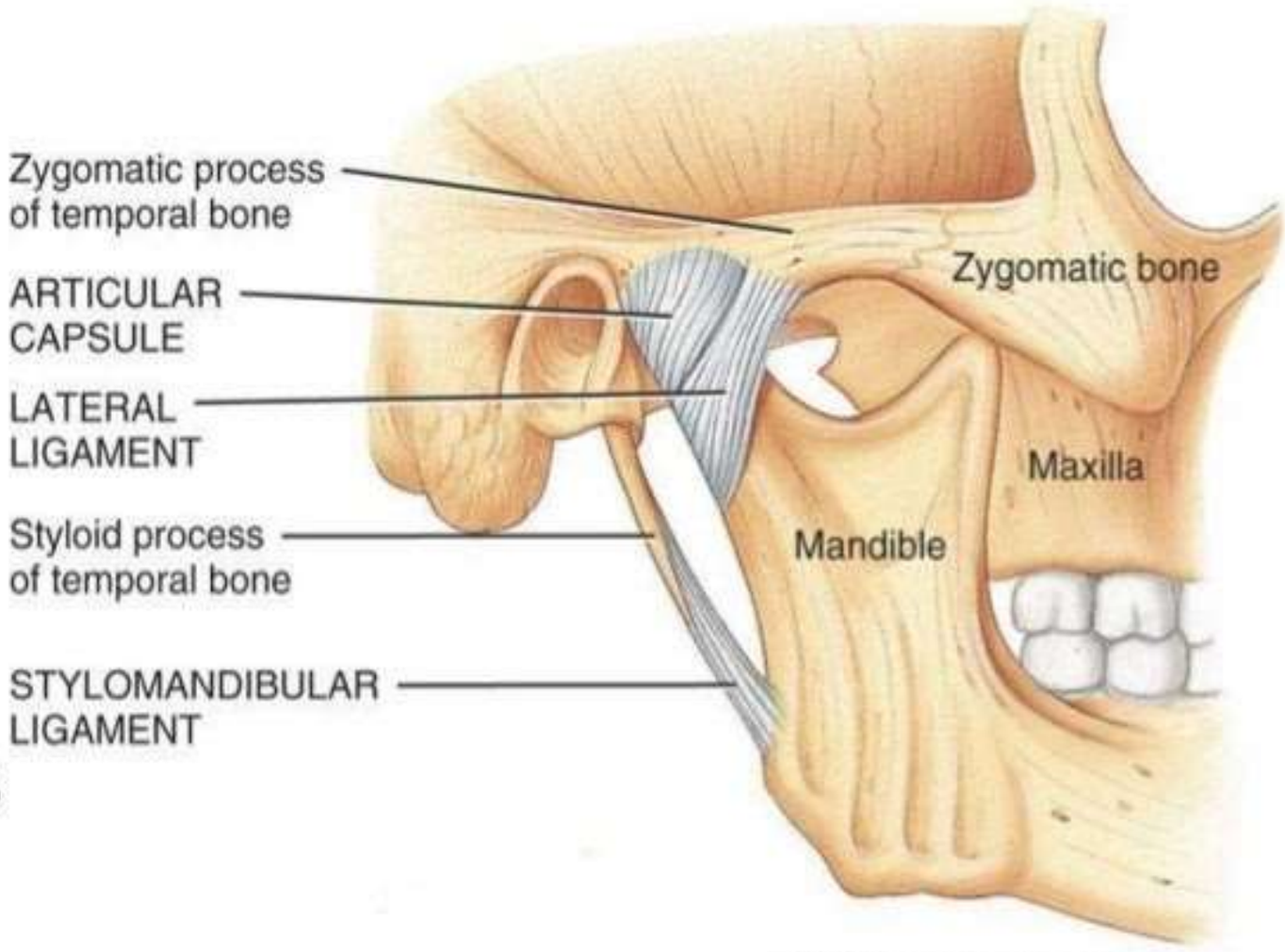
- Glenoid fossa
- Condyle

Intra articular disc

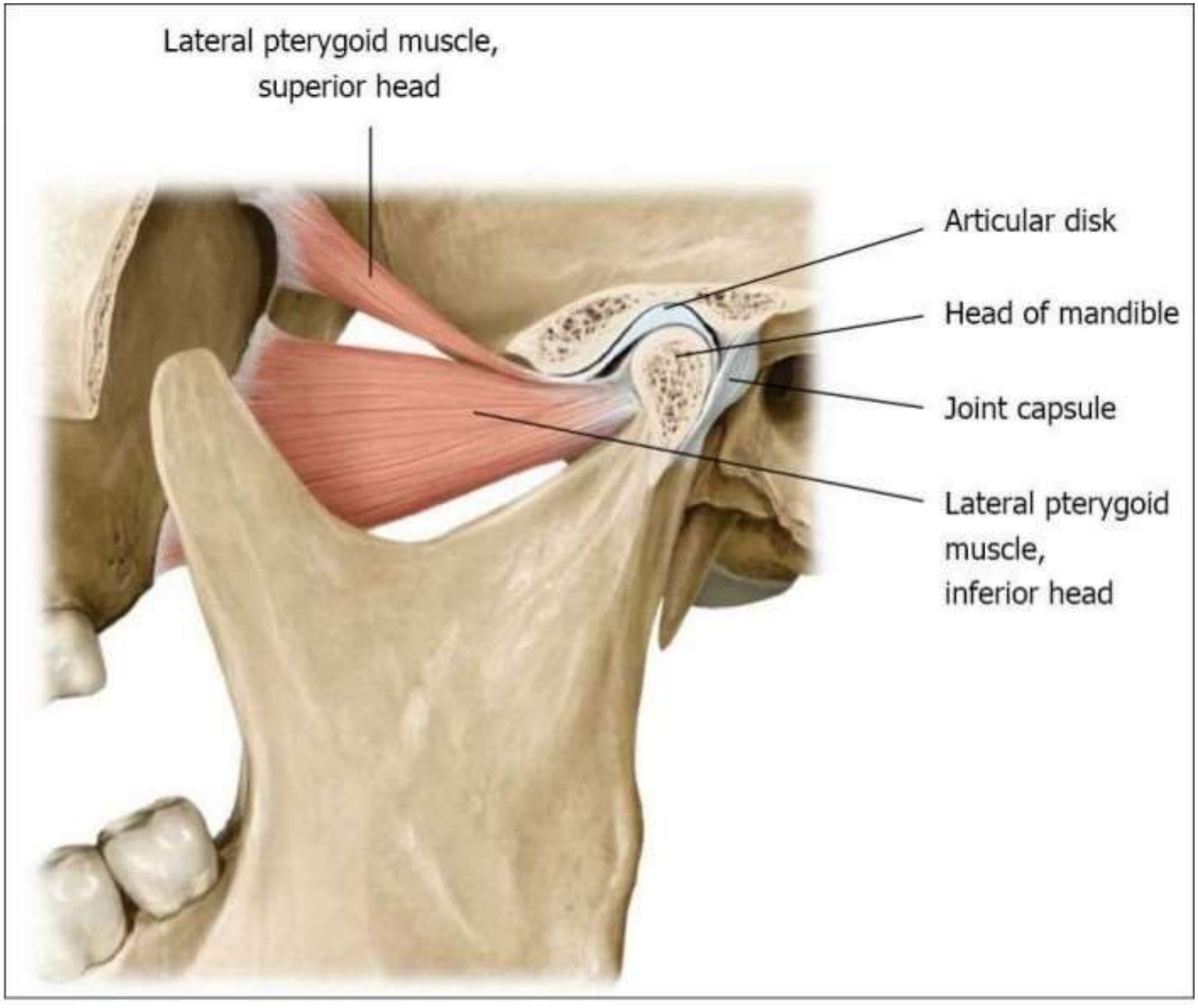
Joint fibrous capsule

Extracapsular ligaments

- lateral ligament
    - sphenomandibular ligament
    - stylomandibular ligament
    - fibrous capsule

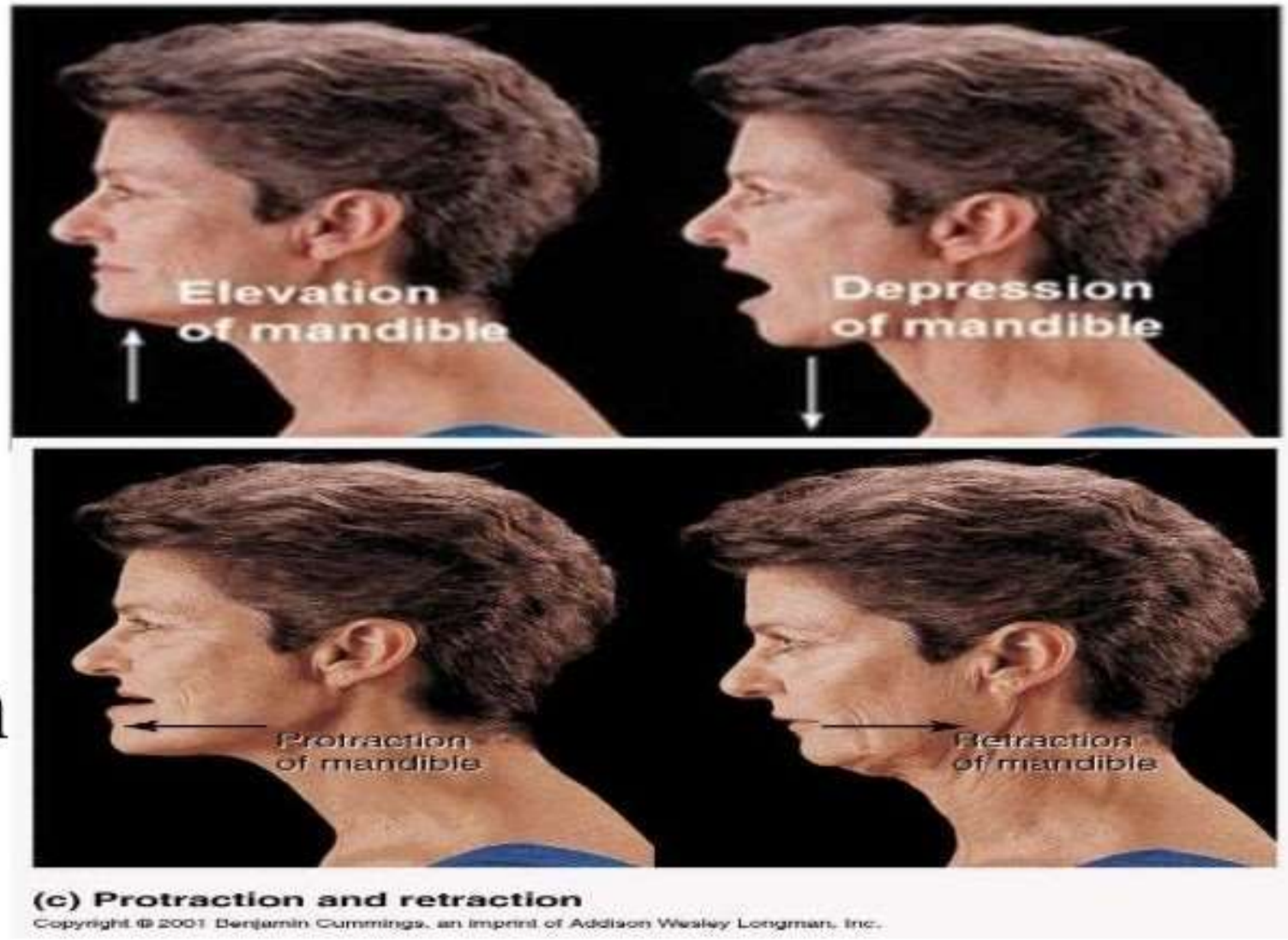


(a) Right lateral view


Lateral pterygoid muscle, superior head
Articular disk
Head of mandible
Joint capsule
Lateral pterygoid muscle, inferior head

MOVEMENTS OF TMJ

- **E**levation
- **D**epression
- **P**rotrusion
- **R**etrusion
- **L**ateral Excursion



(c) Protraction and retraction

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ANKYLOSIS OF TMJ

- **Ankylosis** is a Greek word that literally means a **"stiff joint"**.
- It refers to **partial or complete** inability to open the mouth which results in **functional or growth deformities** of the mandible.
- Ankylosis may range from a simple **fibrous restriction** of jaw movement to a **bone formation** within the joint restricting movement completely

ETIOLOGY

- **TRAUMA**
- Forcep delivery
- Intracapsular fractures
- Congenital
- **INFECTION AND INFLAMMATION**
- Otitis media
- Parotitis
- Mastoiditis
- **SYSTEMIC CAUSES**
- Scarlet fever
- Meningitis
- Small pox
- **OTHERS**
- Post surgery
- Malignancies
- Trismus

PATHOPHYSIOLOGY

INTRACAPSULAR FRACTURE OF BONE

↓

BLEEDING WITHIN JOINT CAVITY (HEMARTHROSIS)

↓

BONE FRAGMENTS WITH VERY HIGH OSTEOGENIC POTENTIAL

↓

ORGANISATION OF HAEMATOMA WITHIN JOINT

↓

CONVERSION TO FIBROUS TISSUE

↓

SUBSEQUENTLY TO BONE

CLASSIFICATION OF TMJ

- Based on the **type of tissue** causing the ankylosis:
  - Fibrous ankylosis
  - Bony ankylosis
- Based on **the side involved**:
  - Unilateral
  - Bilateral
- Based on the **severity** of the ankylosis:
  - Partial
  - Complete
- Based on **the type of etiology** for trismus:
  - Pseudoankylosis
  - True ankylosis

KAZANJIAN CLASSIFICATION

- Intra articular or true ankylosis
- Extra articular or false ankylosis

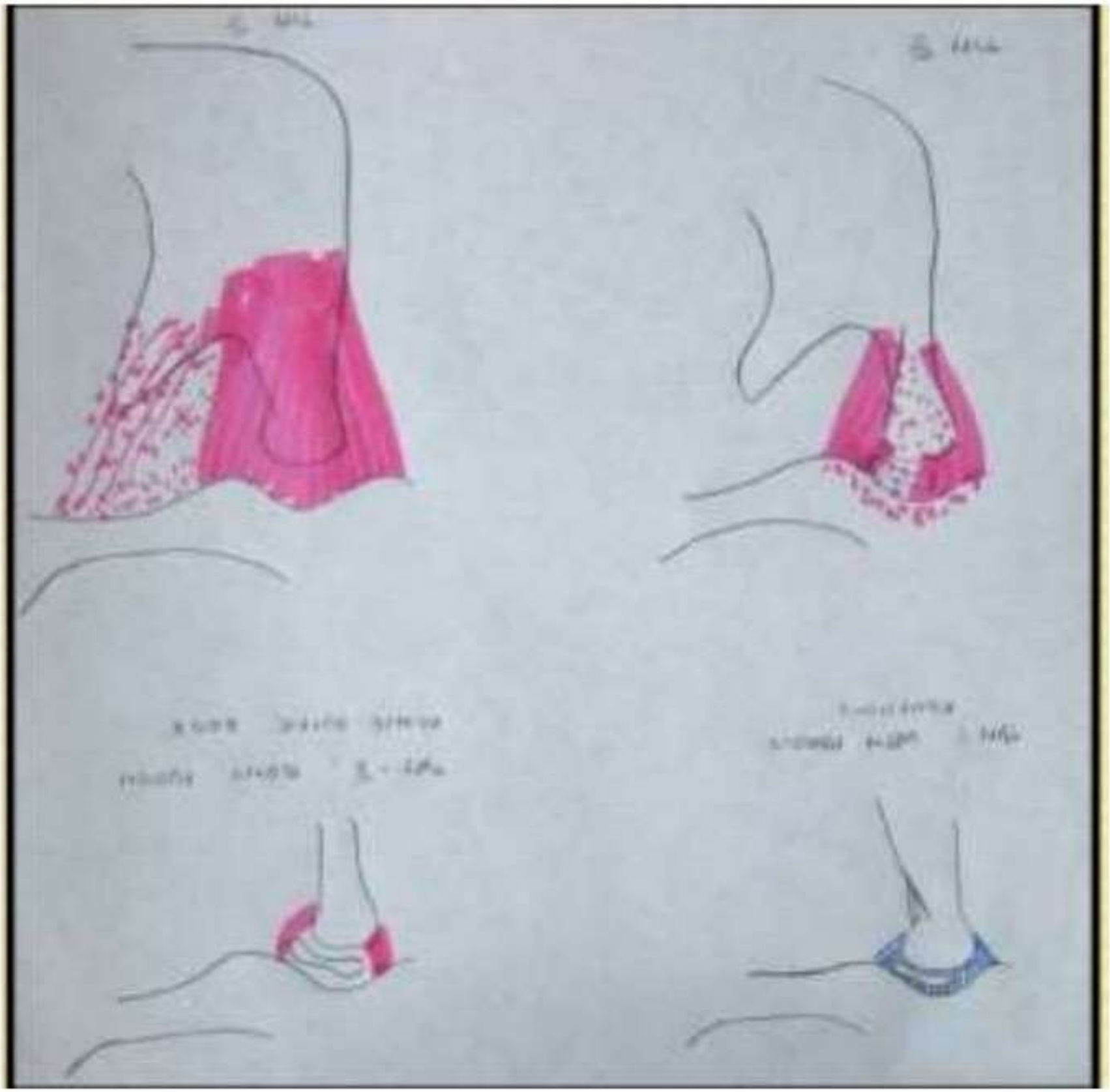
SAWHNEY'S GRADING OF ANKYLOSIS

- **TYPE 1:** Flattening or deformity of the condyle with little joint space seen on the radiograph. Extensive fibrous adhesions seen during operations.

- **TYPE 2:** Bony fusion of the outer edges of the articular surfaces with no fusion in the deeper areas of the joint.

- **TYPE 3:** A bridge of bone is seen between ramus of the mandible and zygomatic arch.

- **TYPE 4:** Entire joint is replaced by a mass of bone.



DIAGNOSIS

- History
- Clinical examination
- Investigation

HISTORY

- Accurate history is important to differentiate the conditions of pseudoankylosis & true ankylosis.
- History of the trauma either **directly to the joint or indirectly to the chin.**
- Duration of **trismus** should be asked.
- **Extracapsular causes** such as an untreated zygomatic arch fracture should be ruled out.
- History of **ear infection** in childhood.
- History of **forceps delivery** of the child.

CLINICAL EXAMINATION

- Restricted mouth opening, patient will complain of difficulty in mastication
- Protrusive movements are absent on involved side
- Partial mobility or complete immobility of the condyle is noticed on palpation

UNILATERAL ANKYLOSIS

- **F**acial asymmetry
- **A**ffected side appears normal
- **O**pposite side appears flat
- **C**hin deviated to ankylosed side
- **D**eep antegonial notch on ankylosed side
- **R**educed condylar movements on affected side
- **C**lass II malocclusion on affected side
- **D**ecreased mouth opening
- **P**osterior cross bite
- **P**oor oral hygiene

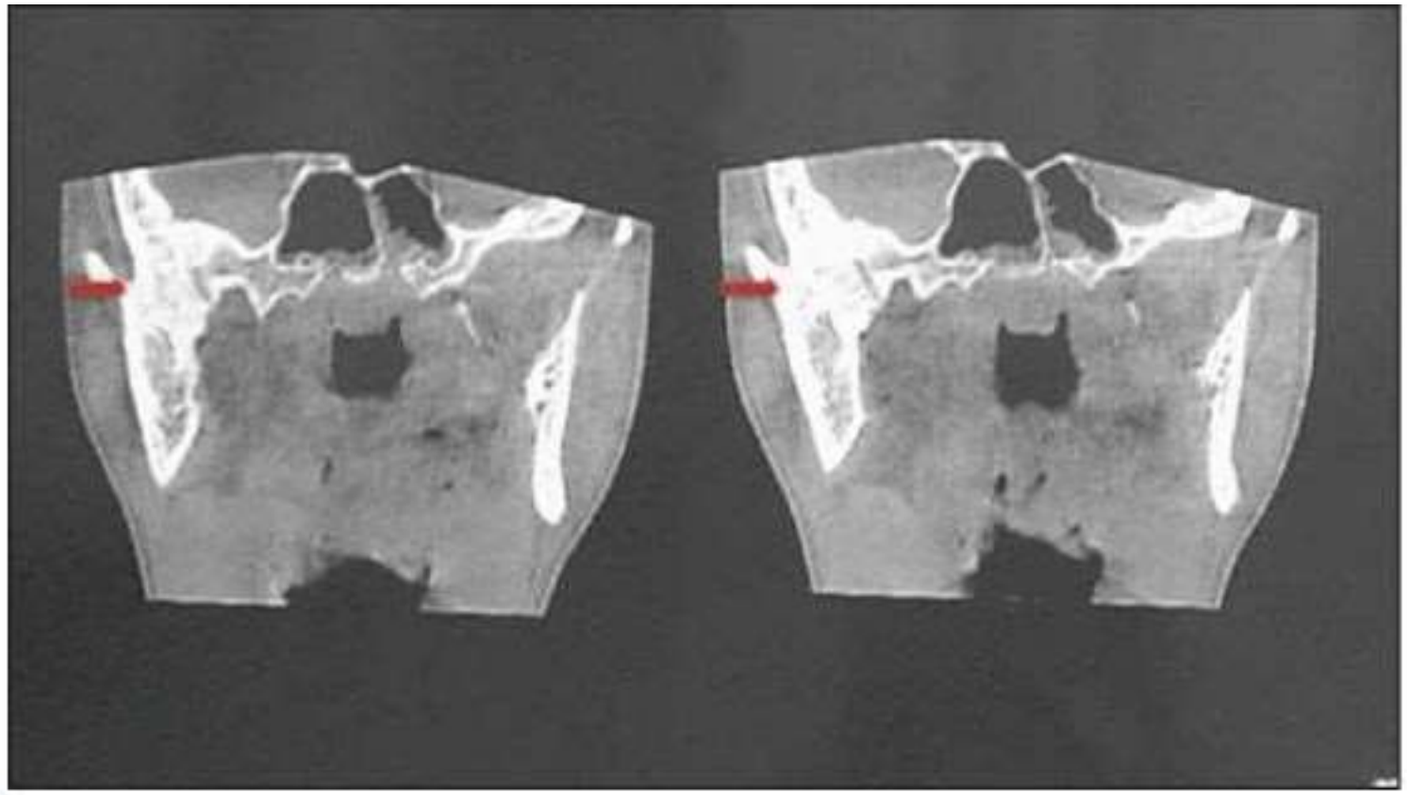
BILATERAL ANKYLOSIS

- **B**ird face
- **T**rismus
- **C**lass II malocclusion
- **D**eep antegonial notch
- **P**oor oral hygiene
- **C**rowding of teeth
- **P**rotrusion of upper anterior teeth
- **A**nterior open bite
- **N**o condylar movements palpable

INVESTIGATIONS

- Radiographic finding- are important in arriving at a final diagnosis
  - **Orthopantomograph**- will show both the joints picture which can be compared in unilateral cases.
  - **Lateral oblique view**- will give anteroposterior dimension of the condylar mass. Elongation of coronoid process can be seen.
  - **Cephalometric radiograph**- is taken to evaluate the associated skeletal deformities
  - **Posteroanterior radiograph-** will reveal the medio lateral extent of the bony mass. It will also highlight the asymmetry in unilateral cases
  - **CT scan-** very helpful guide for surgery. Relation to the medial cranial fossa, the anteroposterior width, mediolateral depth can be assessed. Any presence of fractured condylar head on the medial aspect of ramus can be located

CT SCAN



- This is helpful as it gives an accurate picture of the **proximity of the ankylotic mass to important structures** that cannot be seen on a radiograph.
- The proximity with **internal carotid artery** medially is very essential for surgical purpose.

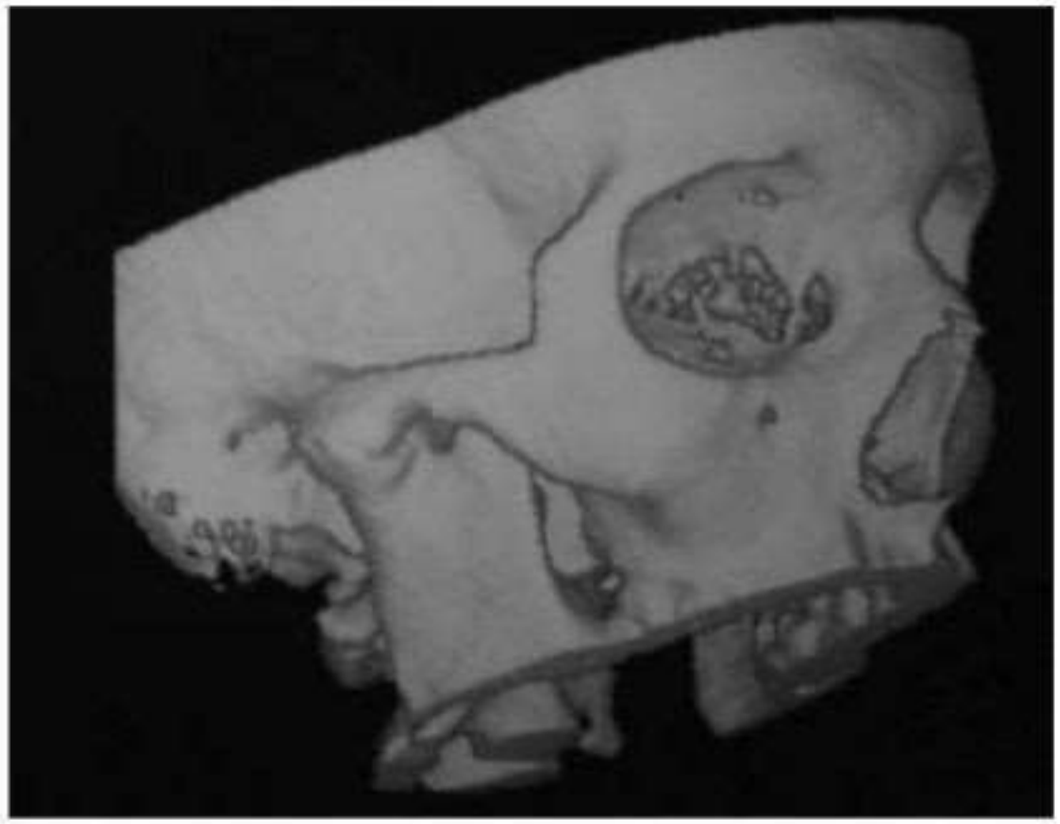


Fig. 1c. 3D CT-scan showing TMJ ankylosis at the right side

SEQUELAE OF AN UNTREATED ANKYLOSIS

- Facial deformity
- Speech difficulty due to decreased mouth opening, maloccluded teeth and tongue position.
- Nutritional deficiency
- Respiratory distress
- Malnutrition
- Malocclusion
- Poor oral hygiene

MANAGEMENT OF T.M.J. ANKYLOSIS

BASICALLY **THREE** TYPES:

- **C**ondylectomy
- **G**ap Arthroplasty
- **I**nterpositional Arthroplasty

PREOPERATIVE EVALUATION OF THE PATIENT

- A **detailed surgical profile** of the patient with ankylosis.
- **Preanasthetic evaluation** with specific importance to adequacy of mouth opening for intubation.
- **Temporal shave** for procedure involving temporal muscle/ fascia grafts.

ANASTHETIA FOR AN ANKYLOSIS PATIENT:

ALTERNATIVE METHODS ARE USED SUCH AS:

- **Blind** nasal/ **awake** nasal intubation
- Use of **fiberoptic** intubation
- **Retrograde** intubation
- In case where all these methods are not possible, a **temporal elective tracheostomy** is planned.

APPROACHES TO THE T.M.J.

1. **P**reauricular incision
2. **P**ostauricular incision
3. **H**emicoronal
4. **S**ubmandibular incision
5. **P**ost ramal
6. **E**ndaural incision

Blair's Inverted Hockey Stick Incision

Thoma's Angulated Incision

Dingman's Incision

Endaural Incision

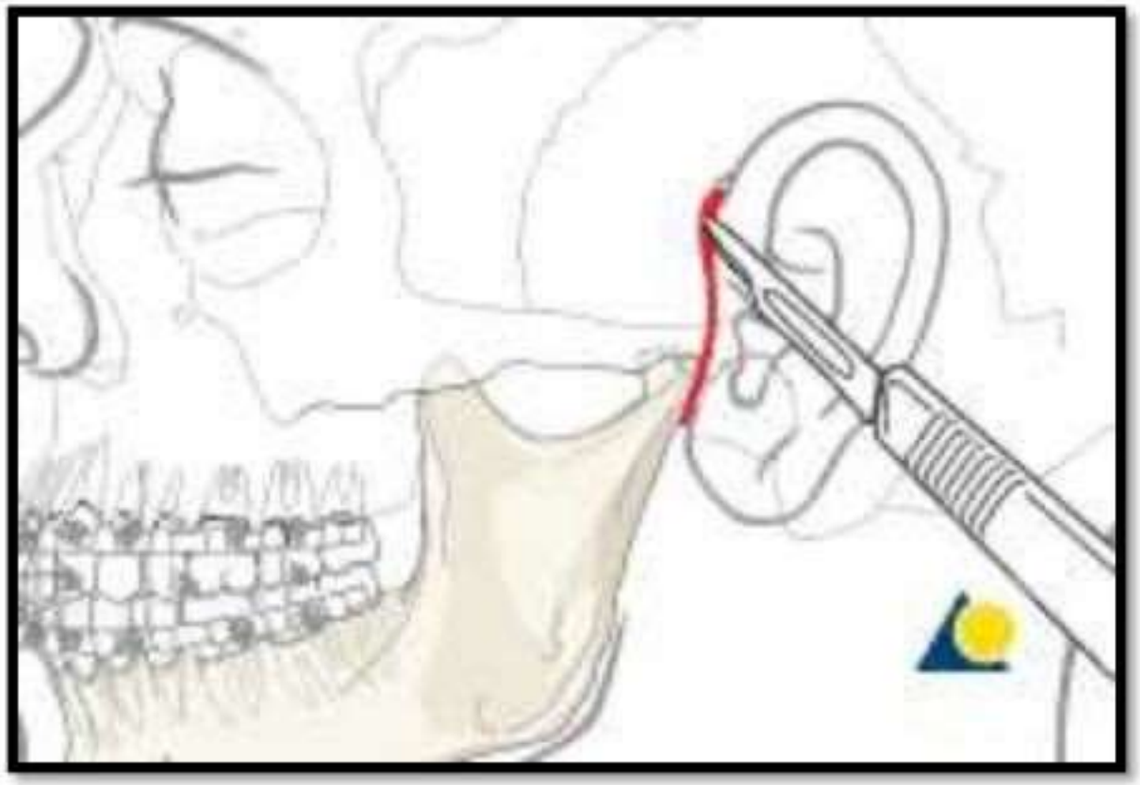
Popowich & Crane Incision

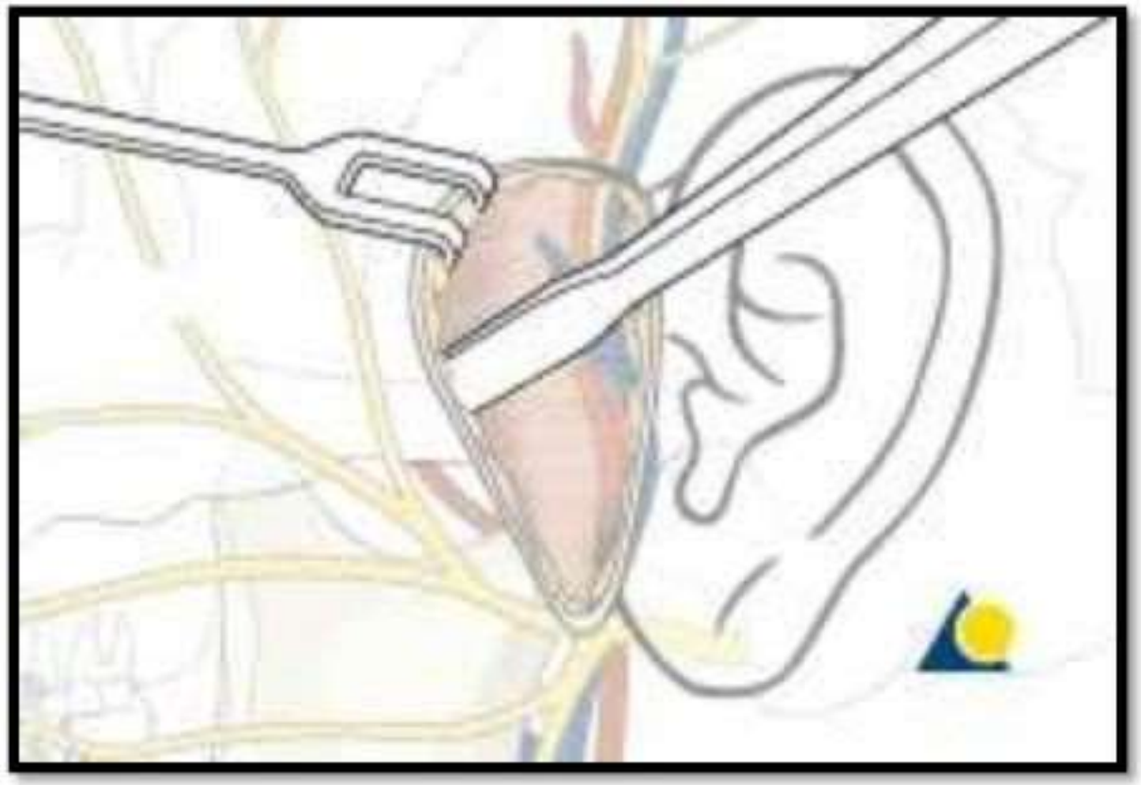
Posterior Auricular Incision

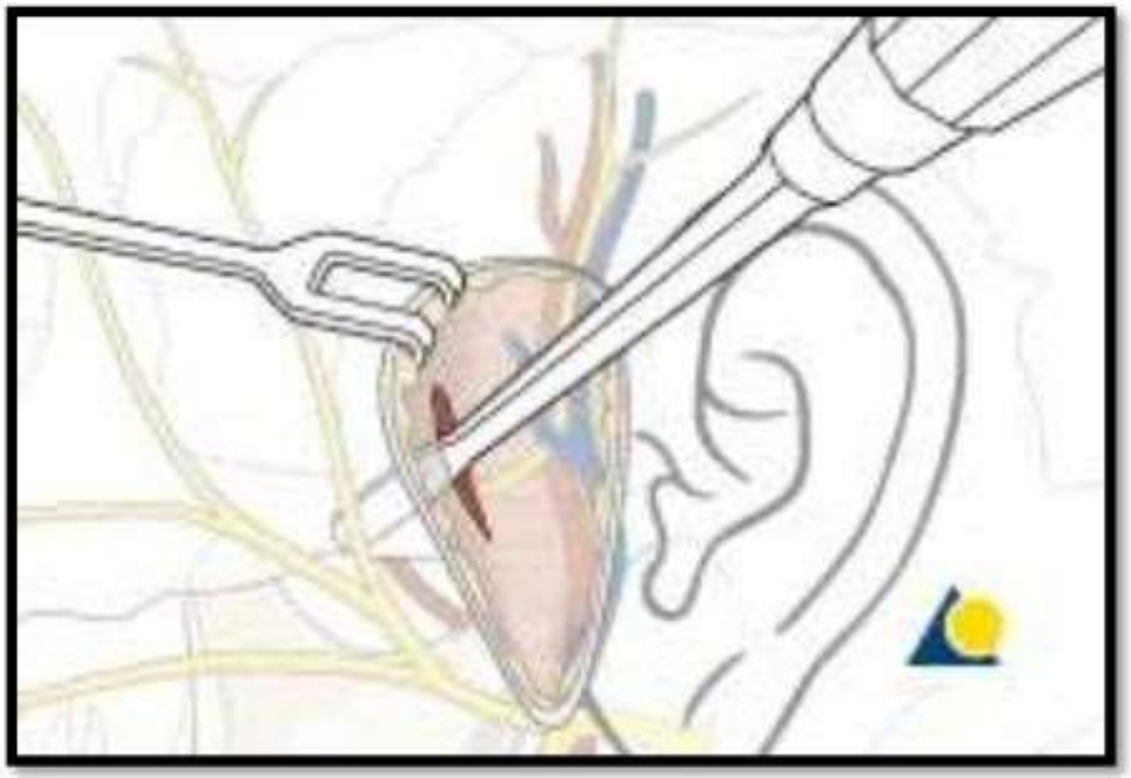
Post ramal

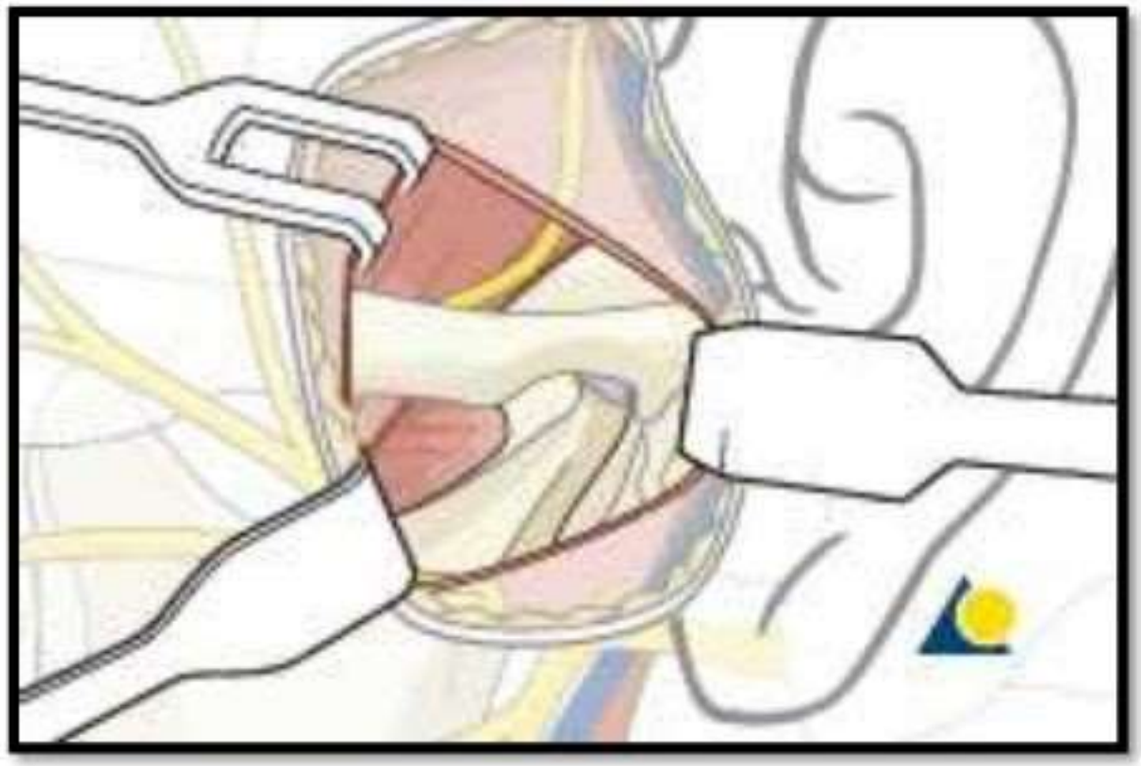
Submandibular

PRE AURICULAR APPROACH

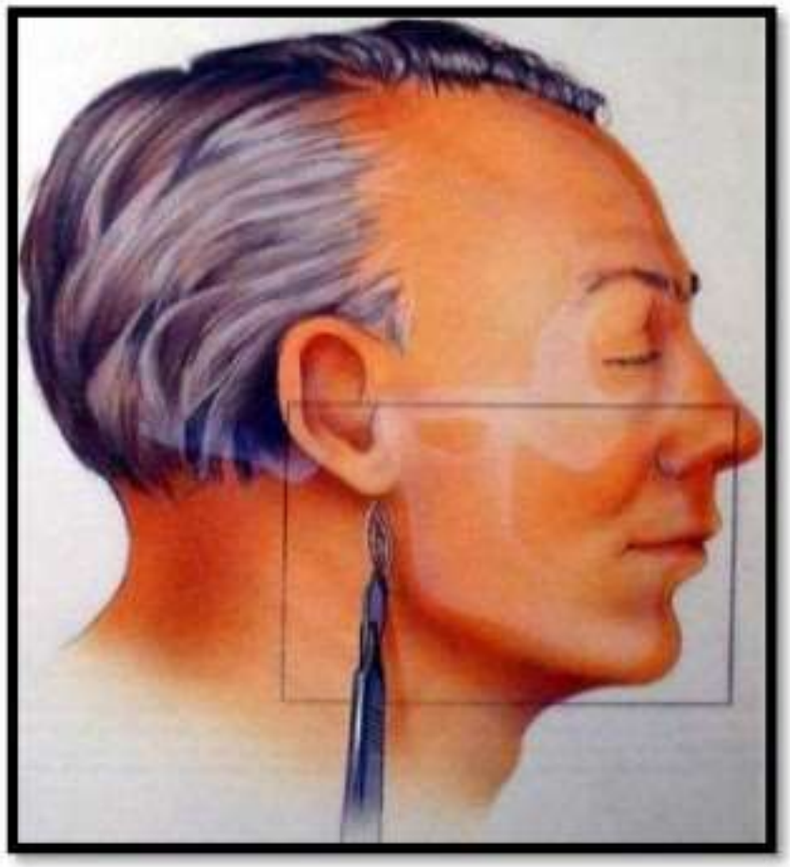


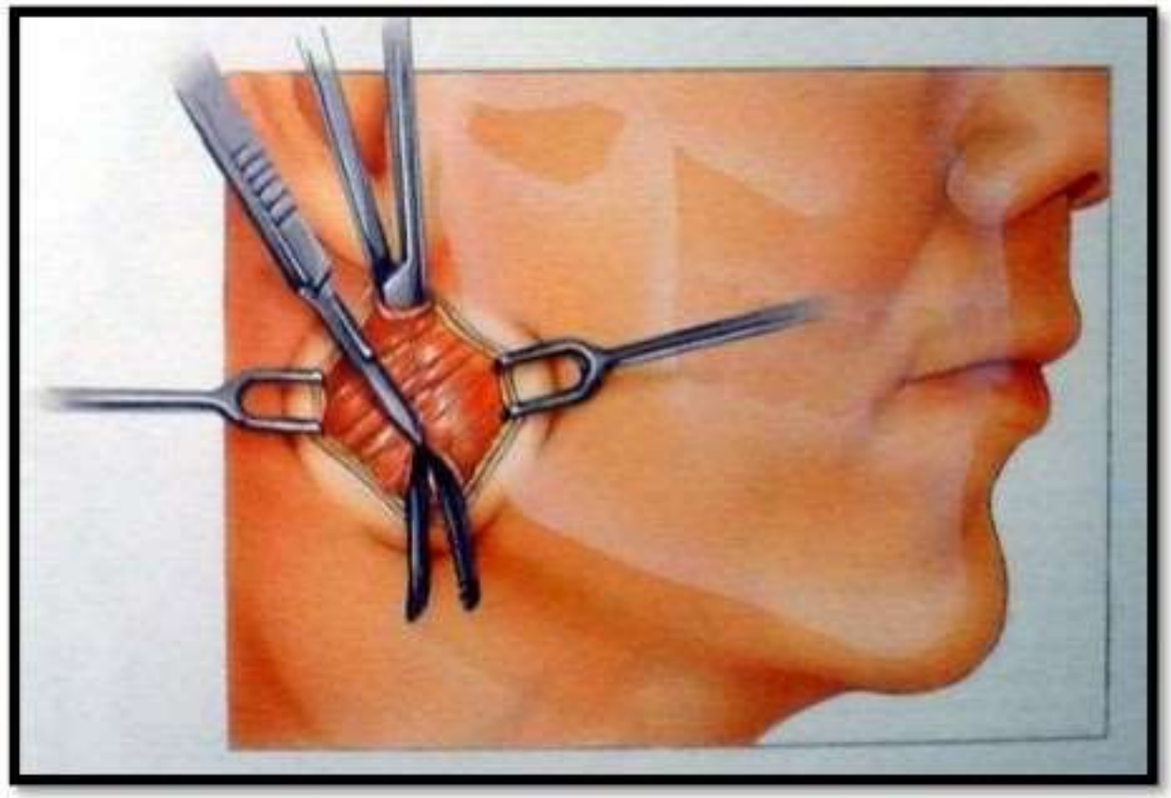


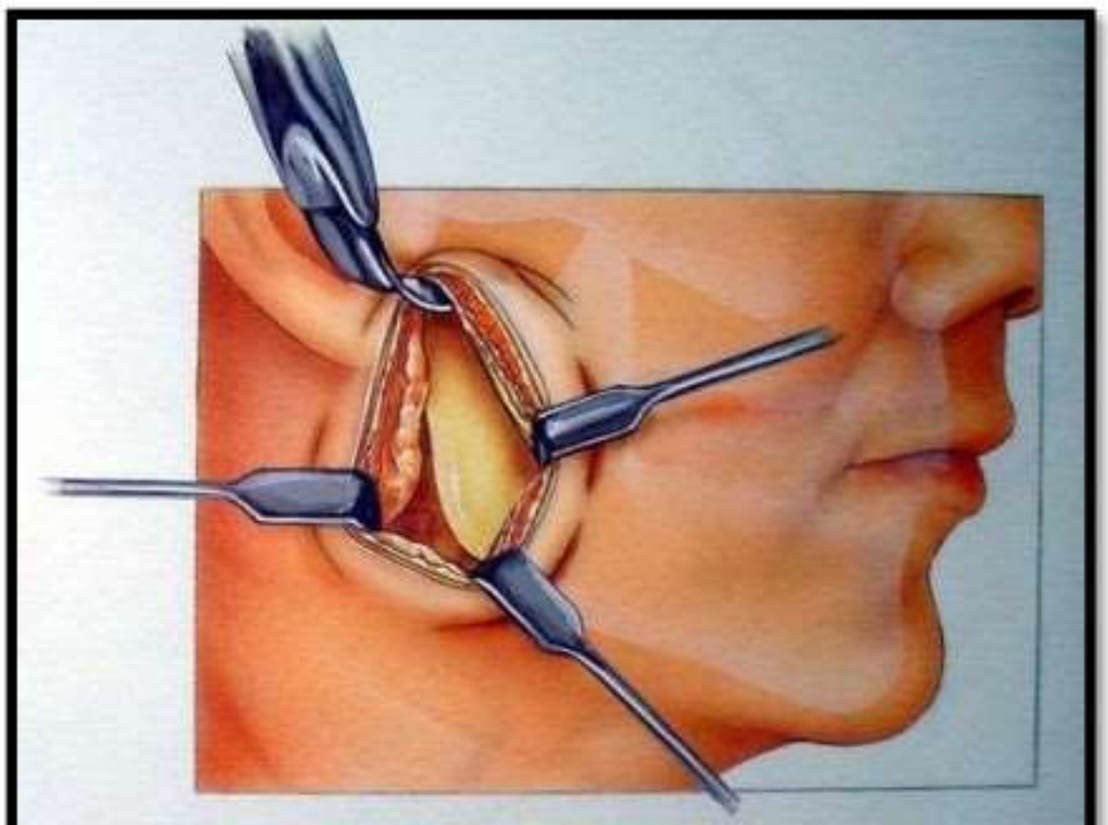


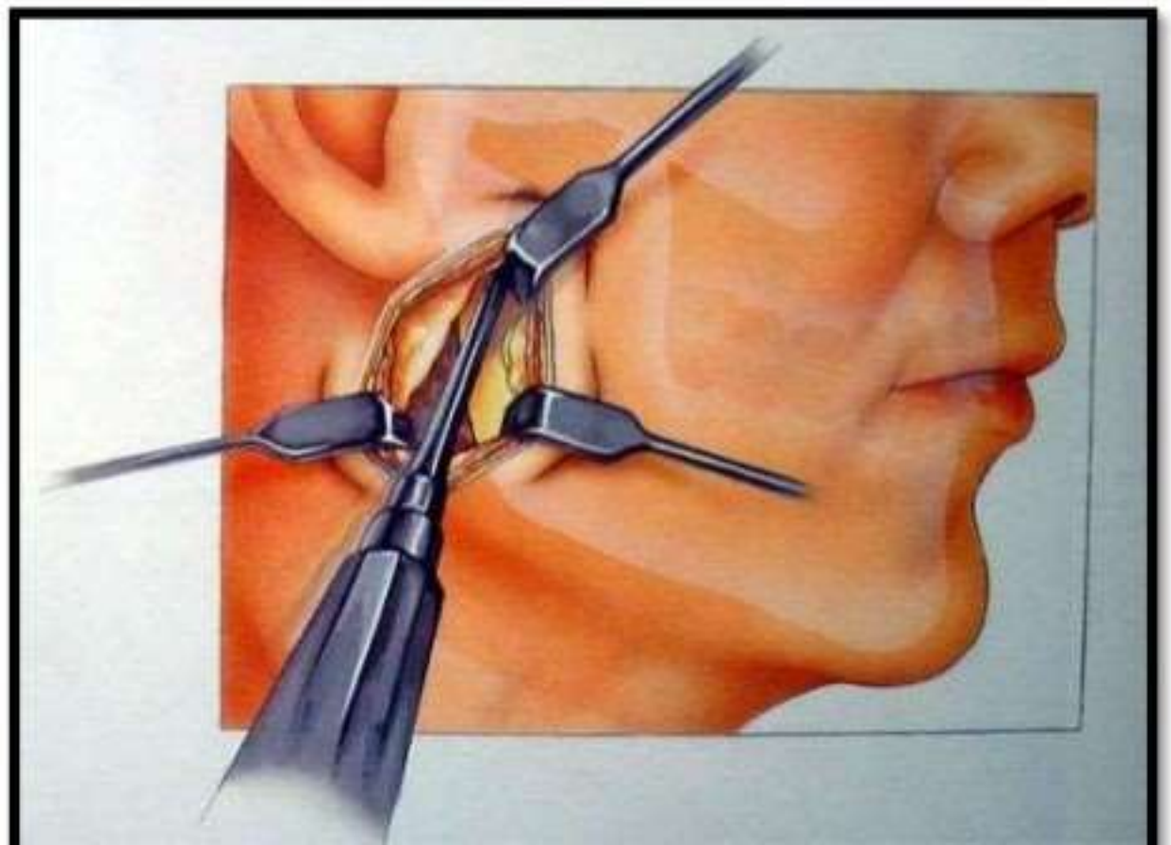


POST RAMAL APPROACH

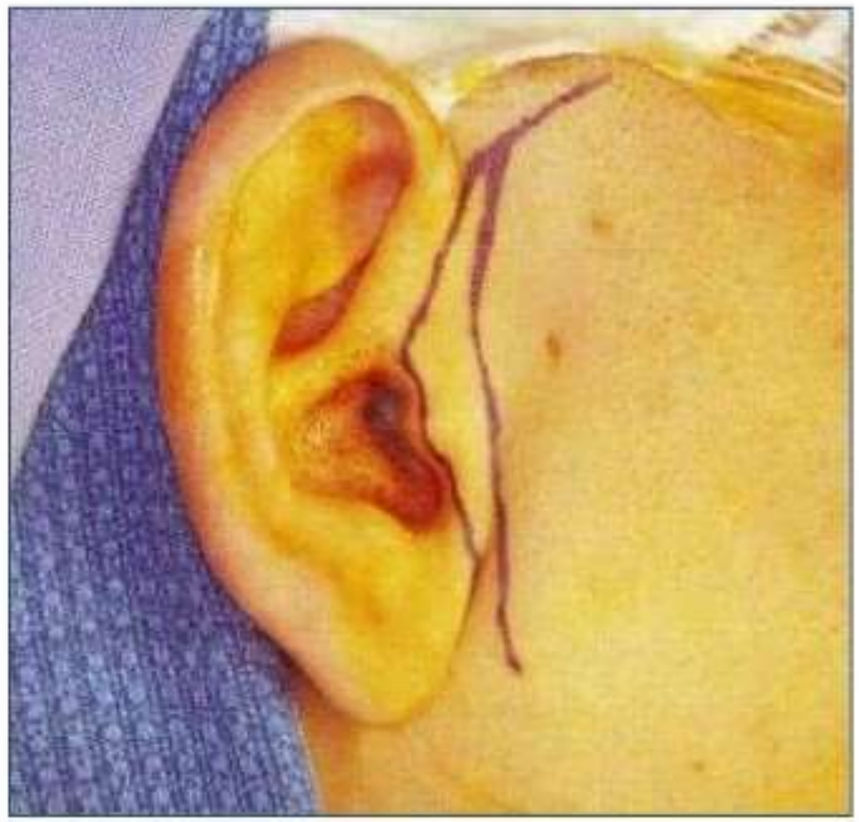


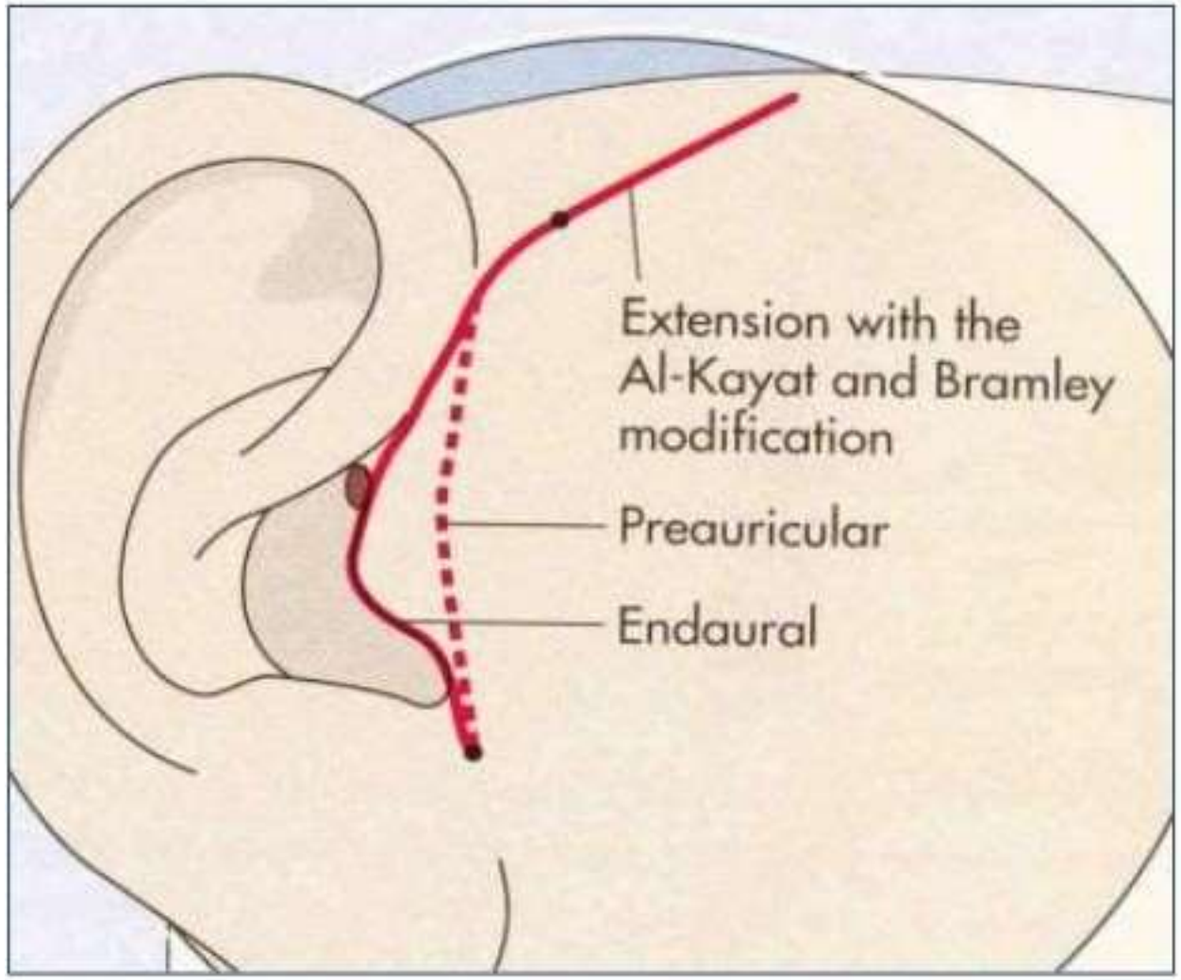


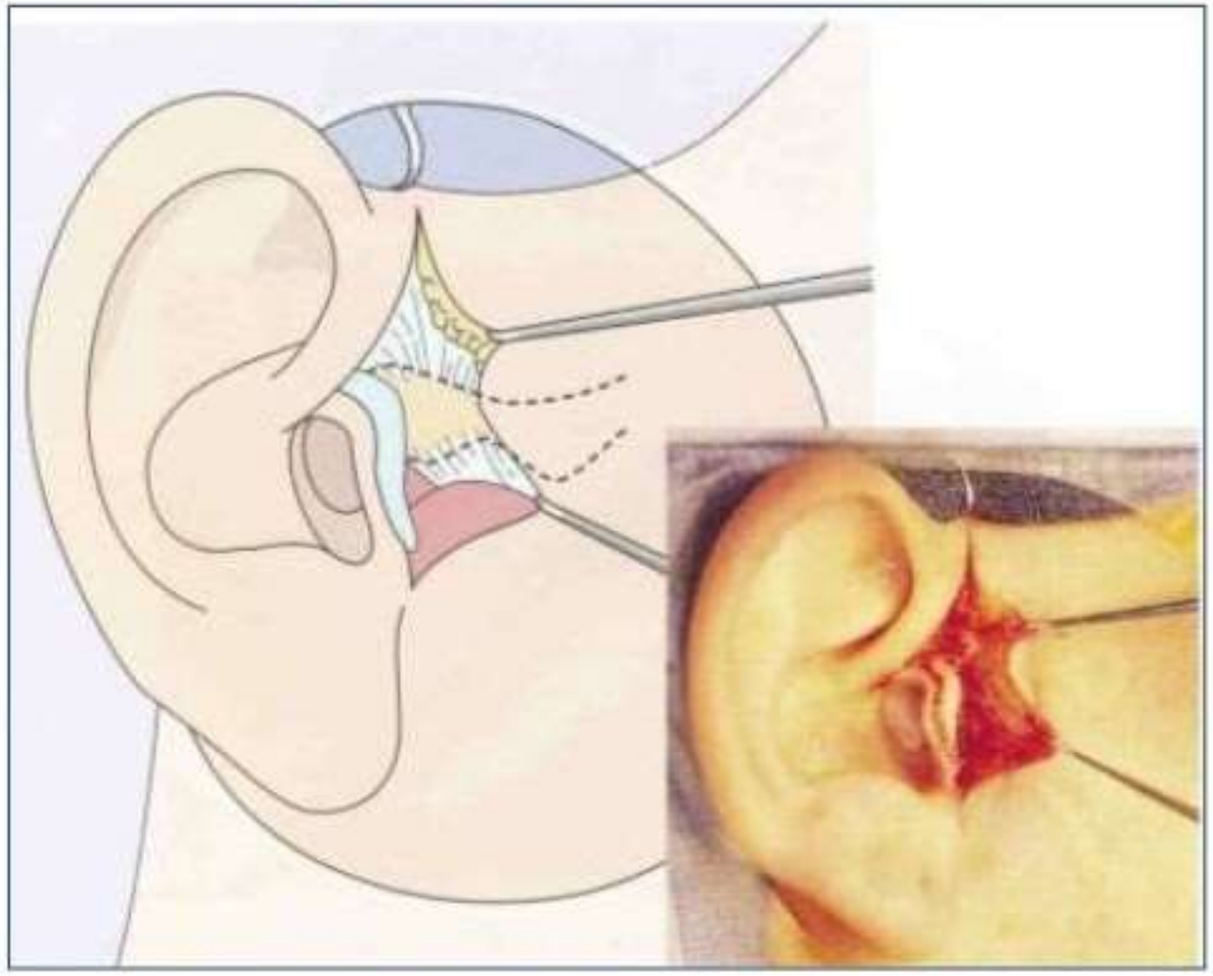




ENDAURAL INCISION



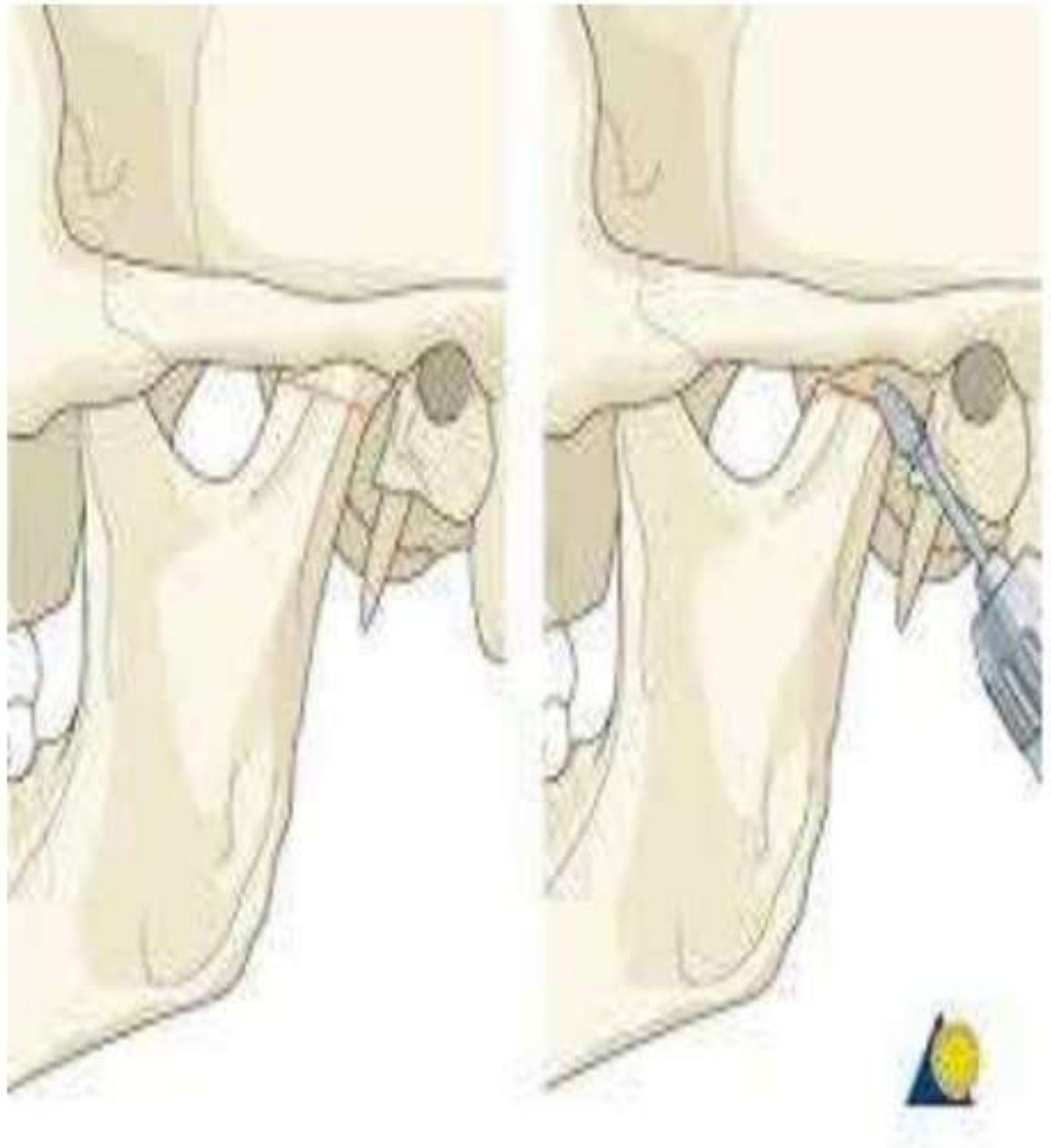




CONDYLECTOMY

- Done in case of ankylosis where anatomic features of the joint **are not completely** changed as in case of fibrous or partial ankylosis.
- An incision is placed and **the condylar region** is exposed.
- **A horizontal cut** is made at the region of the neck of the condyle.
- The head of the condyle is sectioned at the level of the **neck** and carefully separated.

- Since the superior attachment is not firm, it may be **detached and the entire head of the condyle is separated and removed**.
- The stump of the condyle at the **neck is smoothened** and thus a new joint is created here.



COMPLICATIONS

- Loss of vertical **height** of the ramus.
- In case of bilateral condylectomy, it may create an **anterior open bite**.
- In unilateral cases, there may be **deviation** of the jaw on opening.

GAP ARTHROPLASTY

- Gap Arthroplasty involves creation of **an anatomical gap** in the ankylosed segment to form an artificial joint space.
- Commonly done in cases of **complete ankylosis**.
- A gap in the bone is created to separate the ramus from the ankylosed mass in the glenoid fossa.
- **2 horizontal bony cuts** are made in the most superior aspect of the ramus and the wedge of the bone between these 2 cuts is removed.
- Care should be taken while removing the bone from the medial aspect as it is **close to the maxillary artery and carotid canal.**

- A gap of about **1-1.5 cm** is created and not interposed with any material.
- The mouth is forced open with the help of a mouth gag.
- The gap should be maintained by **active physiotherapy** of the joint to prevent reankylosis.
- When adequate movement cannot be brought about it may be required to **osteotomise the coronoid process also**.

Fig. 3. After the osteotomy, a gap of at least 15mm between the roof of the fossa and the mandible was made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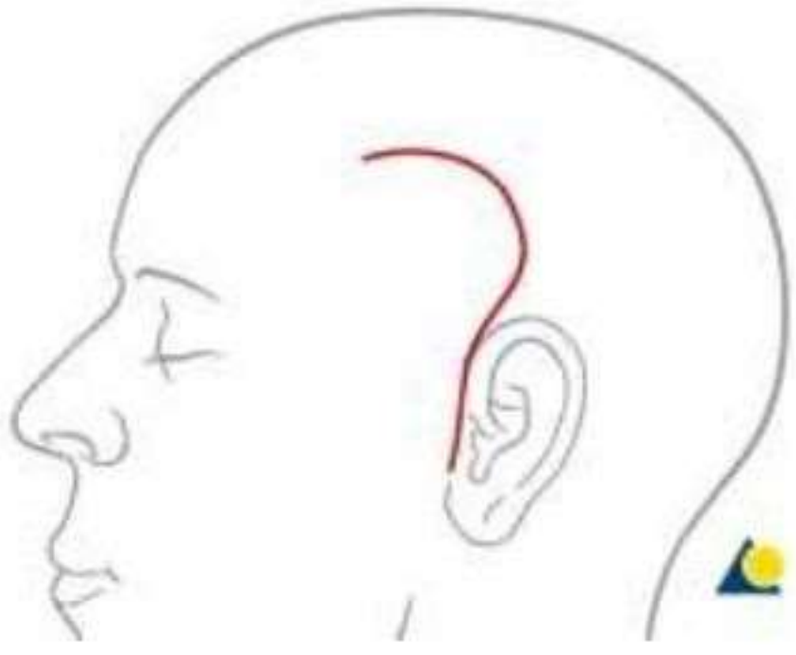
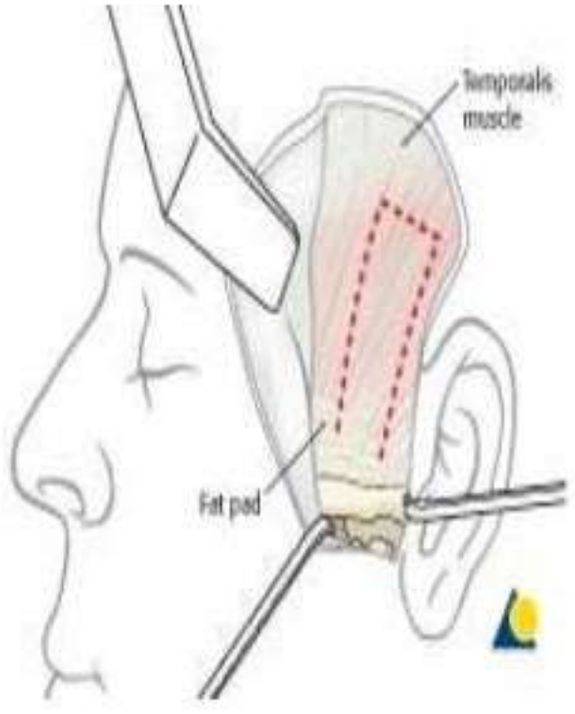
COMPLICATIONS

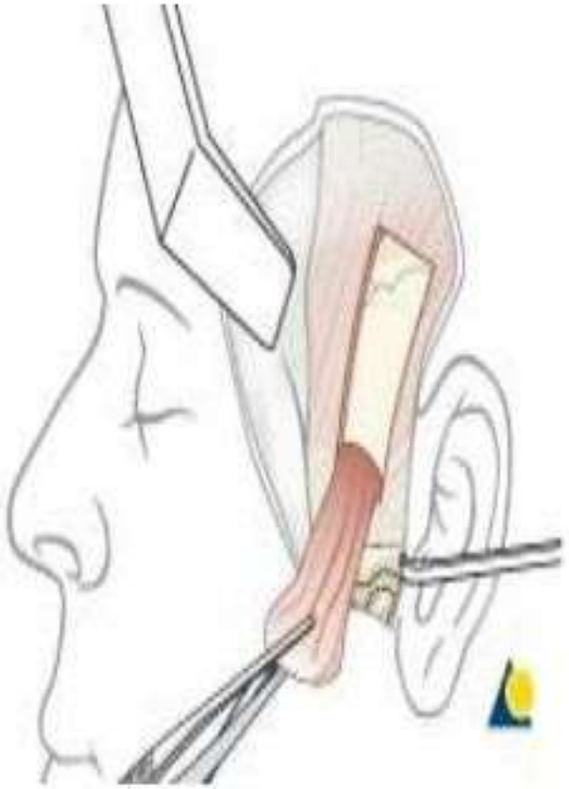
- It is difficult to remove the actual extent of the ankylotic mass as it is **not properly assessed medially**.
- Chances of creating **excessive gap** and reducing vertical height of ramus.
- **Anterior open bite** due to excessive bone removal.
- **Reankylosis** due to bony contact between the cut ends.

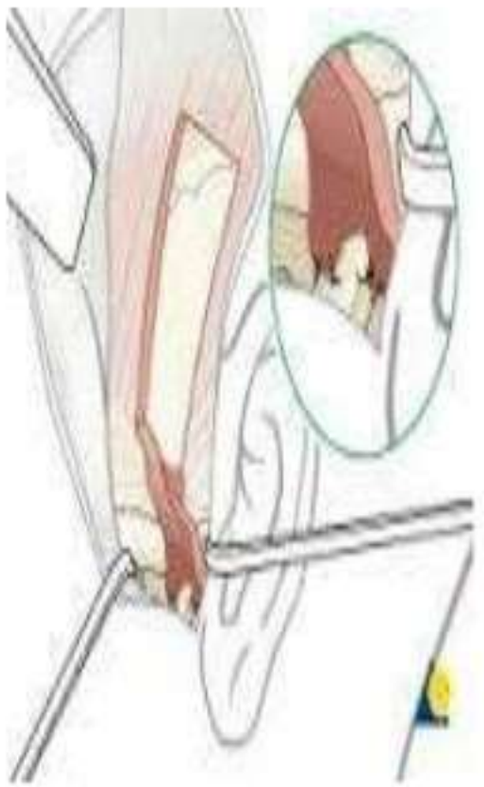
INTERPOSITIONAL ARTHROPLASTY

- When gap arthroplasty is done to release ankylosis, there are **chances of contact** between the bone ends to form a reankylosis.
- So **an interpositional material** is to be placed in between them to avoid contact and minimize chances of reankylosis.
- Materials which can be used are either **alloplastic or autogenous materials.**
- Procedure involves creating a gap and then inserting an interpositional material and stabilizing it.




Temporalis muscle
Fat pad





MATERIALS USED FOR INTERPOSITIONAL ARTHROPLASTY

- **ALLOPLASTIC MATERIALS:**

Non-Metallic - Silastic
- Acrylic
- Teflon
- Ceramic

Metallic - Tantalum plate
- Stainless Steel
- Titanium
- Gold

- **AUTOGENOUS MATERIALS**:
  - Costochondral graft
  - Metatarsal graft
  - Sternoclavicular joint
  - Auricular cartilage
  - Temporalis muscle or Fascia or both
  - Fascia lata
  - Dermis graft

COMPLICATIONS

- **Foreign body reaction** with alloplastic materials placed in surgical gap.
- Difficulty in suturing from the **medial** aspect.
- Complications associated with **second surgical site** in case of autogenous graft.
- Other complications as in gap arthroplasty.

KABAN'S PROTOCOL

- Aggressive total excision of the ankylotic segment in condylar region.
- **Coronoidectomy** on affected side to avoid temporalis muscle restriction.
- **Lining** with temporalis muscle or fascia or disc.
- If step 1,2,3 don't create enough opening, coronoidectomy of **opposite side** is done.
- Reconstruction of ramus with **costochondral junction**
- **Creation of open bite** to permit settling of graft for 3-6 months.
- Aggressive **physiotherapy**.

POST OPERATIVE PHYSIOTHERAPY

- Very important.
- Encourage the patient to start active exercise of the jaw as soon as it can be tolerated.
- **Initially**: pressure with finger or simple finger exercises to gently force the mouth open.
- **Later**: stick, tongue blade, mouth gag can be used for forceful mouth opening.
- **Medications** can be given to relieve pain and enable movements.
- **Heat application** to the region prior to exercise permits easy movement to relieve muscle spasm.

CAUSES OF RECURRENCE OF ANKYLOSIS

- Improper or inadequate surgical resection.
- Fracture of costochondral graft.
- Improper graft fixation.
- Inadequate physiotherapy.
- Increased osteogenic potential of the resected segments.

THANK YOU