# Preprosthetic Surgery-Hard Tissue

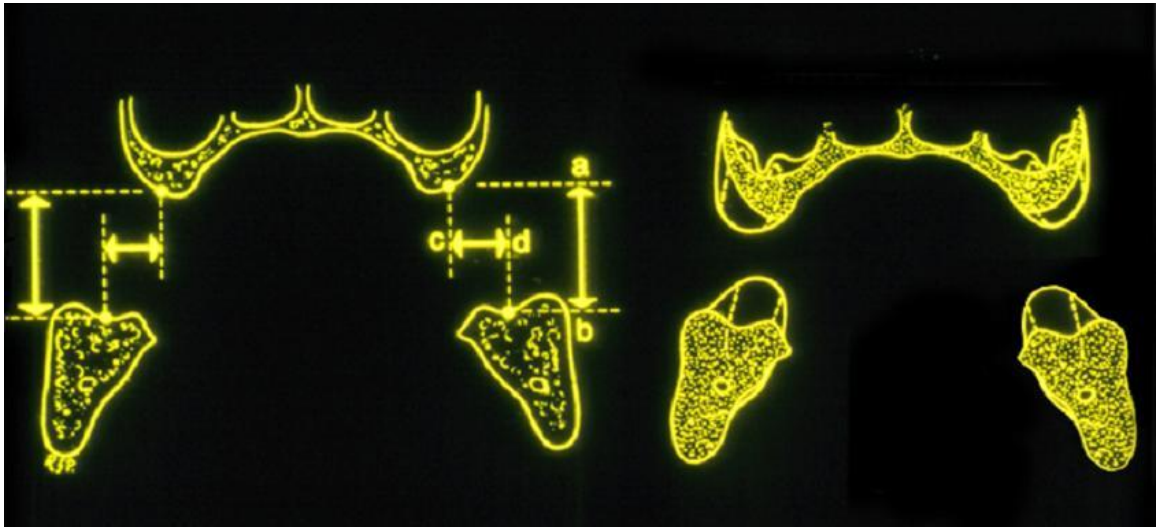
# Introduction

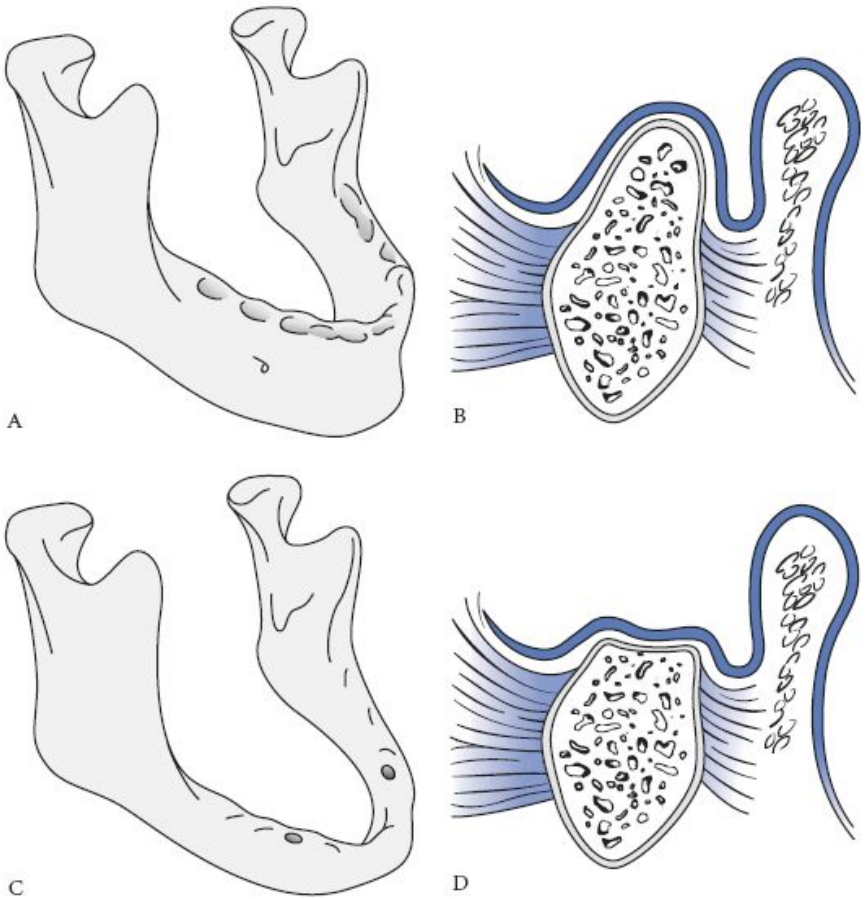
- Preprosthetic surgery is carried out to reform /redesign soft/hard tissues, by eliminating biological hindrances to receive comfortable and stable dentures

- Objective is to provide a better anatomic environment & create proper supporting structures for denture construction

# Alveolar bone resorption

- Rate & pattern of alveolar process resorption

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B
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# Ideal edentulous ridge

For dental rehabilitation a healthy and an ideal edentulous ridge is required(Goodsell)

- Adequate bony support
- Adequate soft tissue covering
- No undercuts
- No bony or soft tissue protuberances
- Adequate vestibular depth
- No muscle fibres should dislodge prosthesis
- No scar bands
- Satisfactory relation of maxillary & mandibular ridge
- No soft tissue hypertrophies

# Patient evaluation & treatment planning

History & Physical Examination

Chief Complaint & Expectations

Esthetics & Functional Goals

Patient Psychology

Intra – Oral Examination

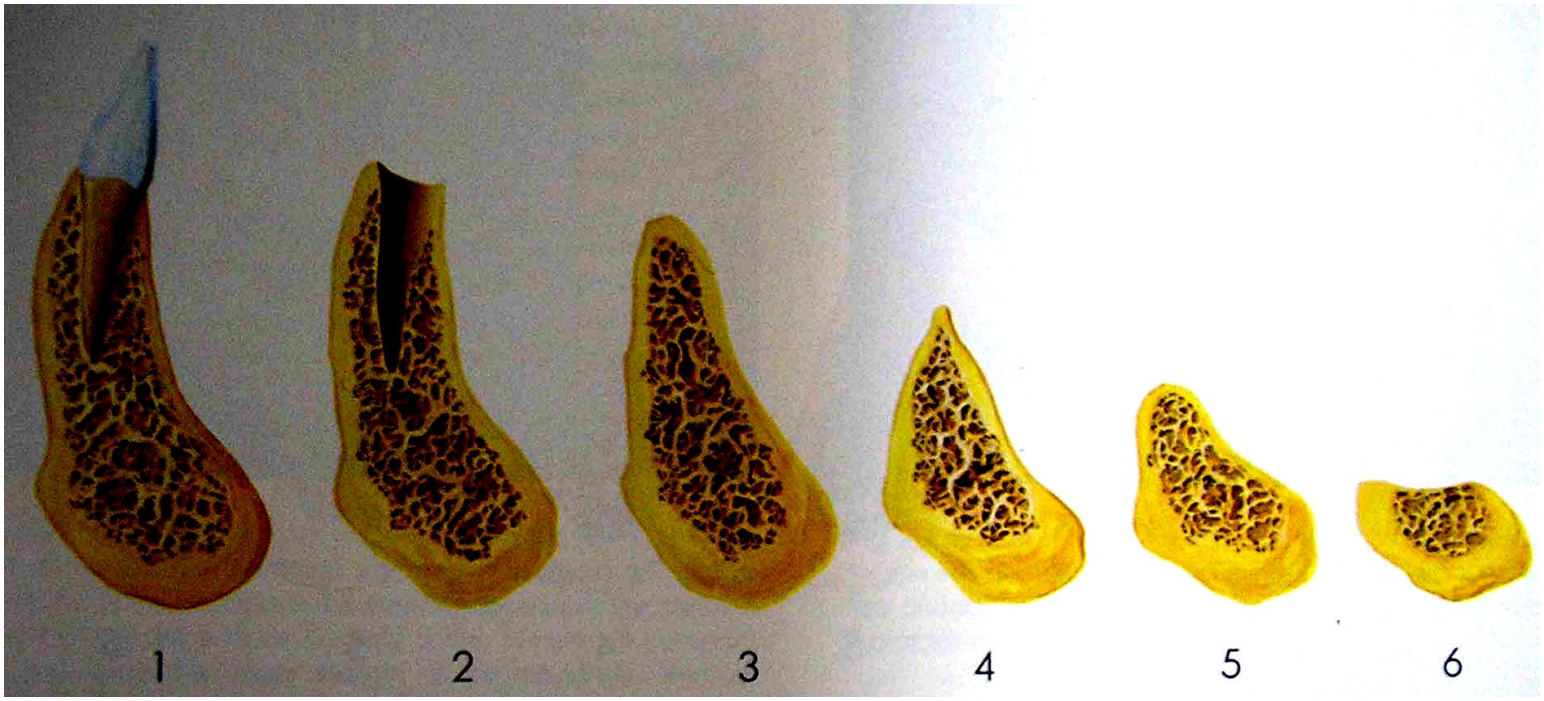
# Intra oral examination

- ***BONY TISSUE***
  - Undercuts / Protuberances
  - Ridge Form And Contour
  - Tori & Buccal Exostosis
  - Location Of Mental Foramen & Neurovascular Bundles
  - Maxillary & Mandibular A-P And Vertical Relation
- ***RADIOGRAPHS***

Pathology / Impacted Teeth / Remaining Roots / Maxillary Sinus

- ***SOFT TISSUE***
  - Keratinised Mucosa / Hypermobile Fibrous Tissue
  - Vestibular Depth
  - High Frenal Attachments
  - Position Of Mylohyoid & Genial Muscles

# Classification of edentulous alveolar ridge – Cawood & Howell



# Goals

- To provide adequate height, length , breadth, width and shape of residual ridge.
- To help in proper speech & deglutition
- Satisfy aesthetic concerns of patients
- Remove hard & soft tissue protuberances & undercuts
- Provide adequate vestibular depth
- Facilitate implant placement

- Provide appropriate frenal attachment
- Achieve proper jaw relationship
- Relocate the mental nerve & establish correct vestibular depth
- Reduce the pain & discomfort produced by the denture pressure on a narrow alveolar ridge

# Indications

- Complete or partial edentulism secondary to early tooth loss
- Naturally occurring reduction of the residual bony ridge
- Pain
- Dysfunction

- Disproportionate growth of jaws or facial skeleton producing mechanically impossible conditions for mastication & denture retention
- Craniofacial deformity
- Oligodontia or anadontia
- Enhanced gag reflex

# Contraindications

- General contraindications to surgery
- Generalized bone disorders
- Patient on bisphosphonate therapy
- Patient with history of head & neck irradiation

# Classification

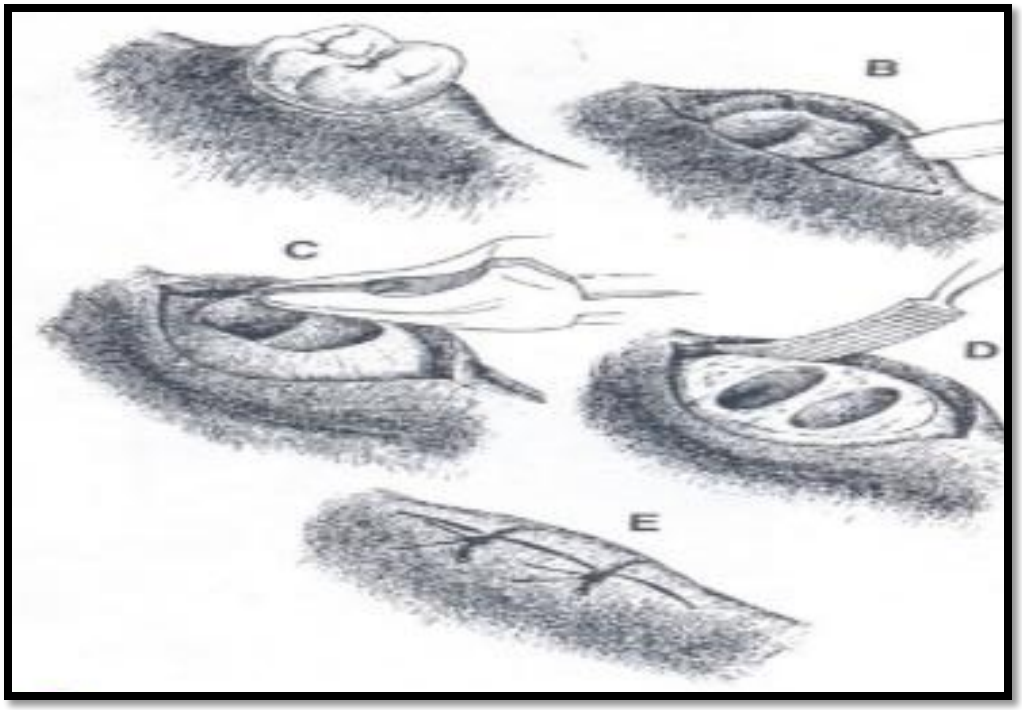
- Alveolar ridge correction
- Alveolar ridge extension
- Alveolar ridge augmentation

# Alveolar ridge correction

| Hard tissue Surgeries | Soft Tissue Surgeries |
|---|---|
| Alveolectomy | Removal of redundant crestal soft tissue |
| Primary alveoloplasty | Frenectomy- labial & lingual |
| Secondary alveoloplasty | Excision of epulis & palatal papillary hyperplasia |
| Excision of tori | |
| Reduction of genial tubercles | |
| Reduction of mylohyoid ridge | |
| Maxillary tuberosity reduction & exostosis removal | |

# Alveolectomy

- The excision of a portion of the alveolar process(Boucher 1974)



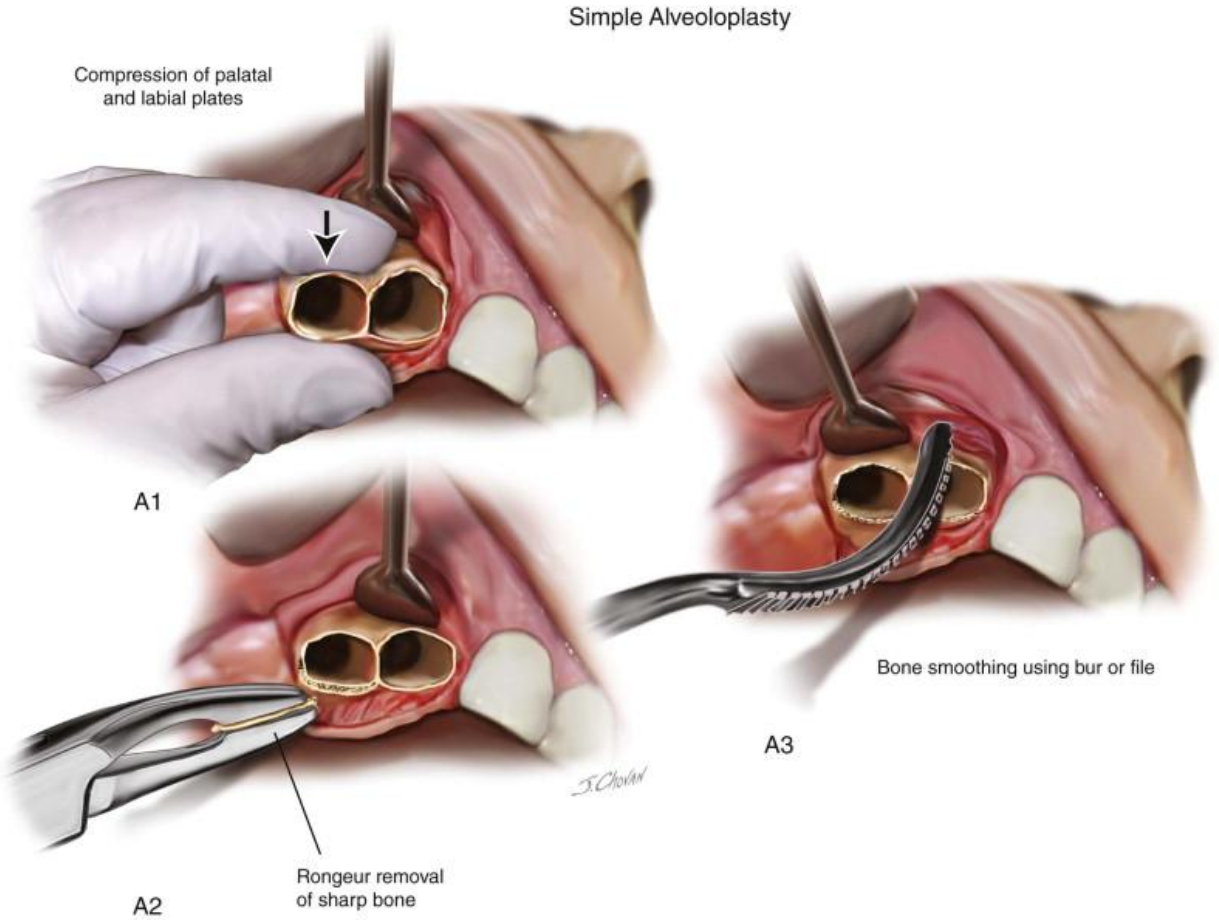
# Alveoloplasty

Recontouring of the alveolar process

Goals

- Optimal ridge contour
- Broad alveolar ridge
- The ridge need not be smooth but sharp irregularities should be removed & edges rounded
- The mucosa should be uniform- for even transmission of masticatory forces

# Alveola

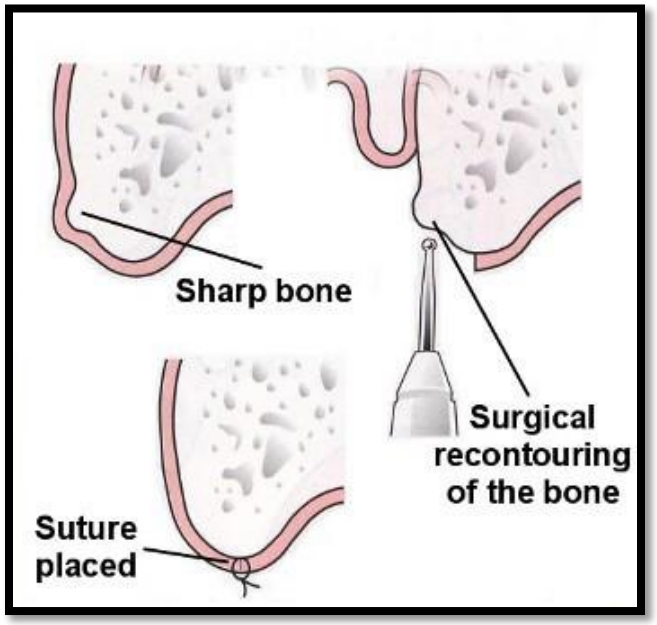

Simple Alveoloplasty
Compression of palatal and labial plates
A1
Rongeur removal of sharp bone
A2
Bone smoothing using bur or file
A3

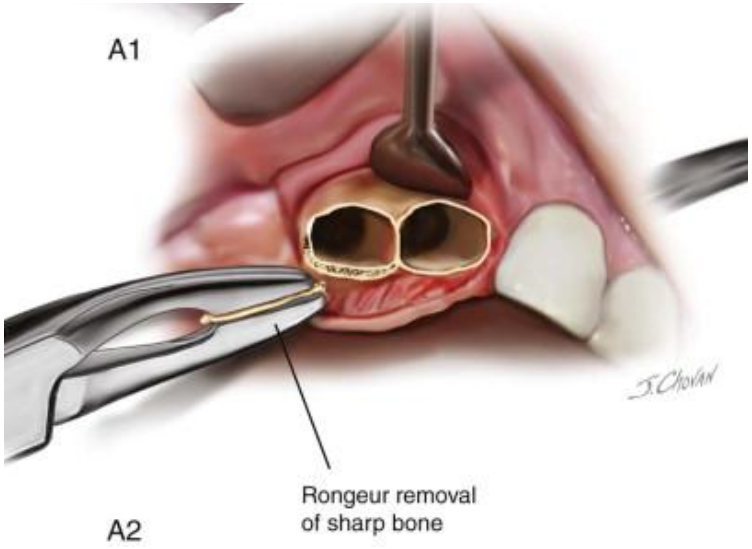
# Primary alveolopasty

Alveolar bone remodeling surgery done at the time of extraction

Indications

- Prominent & dense alveolar bone
- Done prior to the construction of an immediate denture




# Secondary alveoloplasty

- Corrective surgery done on the edentulous ridge for irregularity after the initiation of extraction socket healing.

# Intraseptal alveoloplasty

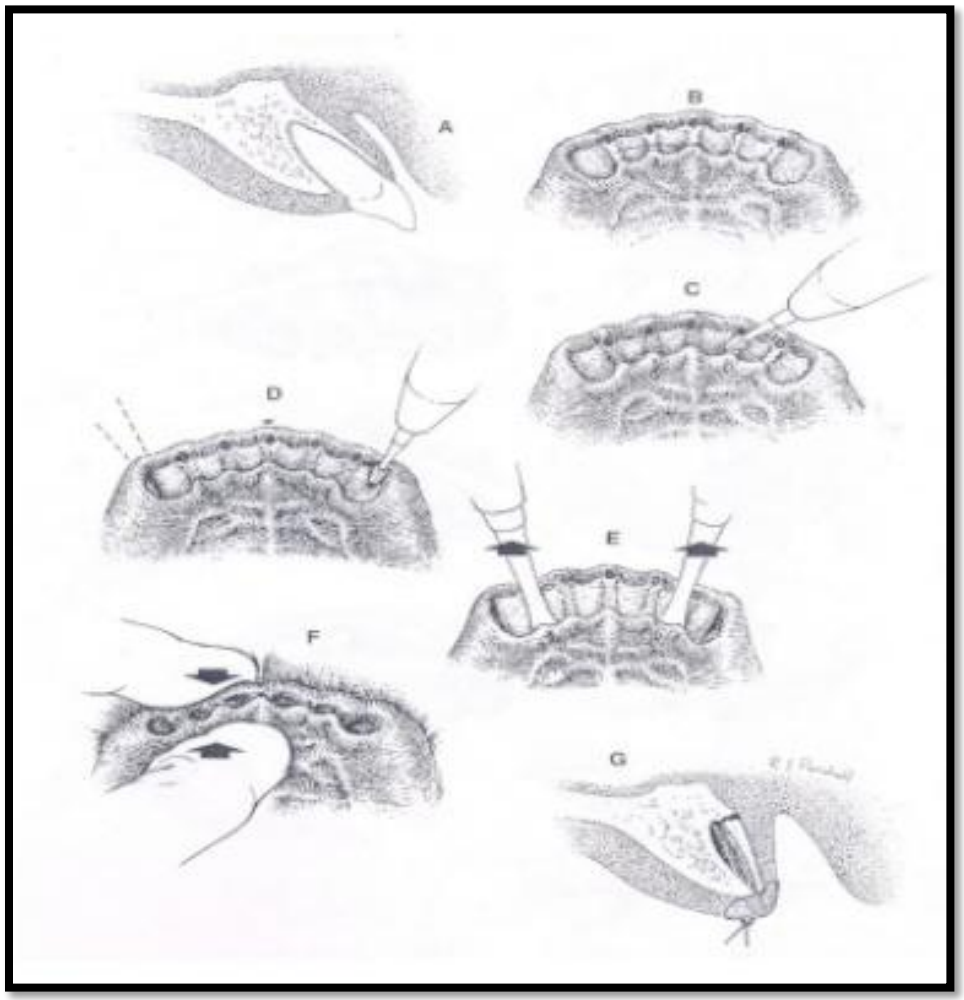
| Dean's intraseptal alveoloplasty | Obwegeser's modification |
|---|---|
| Only done in maxillary anterior region to reduce gross maxillary overjet | Both labial & palatal cortices are repositioned |
| Mostly done immediately after extraction of anterior teeth | Done when the anterior overjet is too gross that cannot be reduced by labial plate repositioning |

# Dean’s alveoloplasty

Indications

- Decrease gross maxillary overjet
- Adequate bone height
- Multiple extractions
- Retains the labial cortical bone
- Reduces resorption of bone postoperatively
- The prominence of labial & buccal alveolar margin is reduced to facilitate the reception of dentures

# Dean’s alveoloplasty




Interdental septal bone is cut from canine - canine

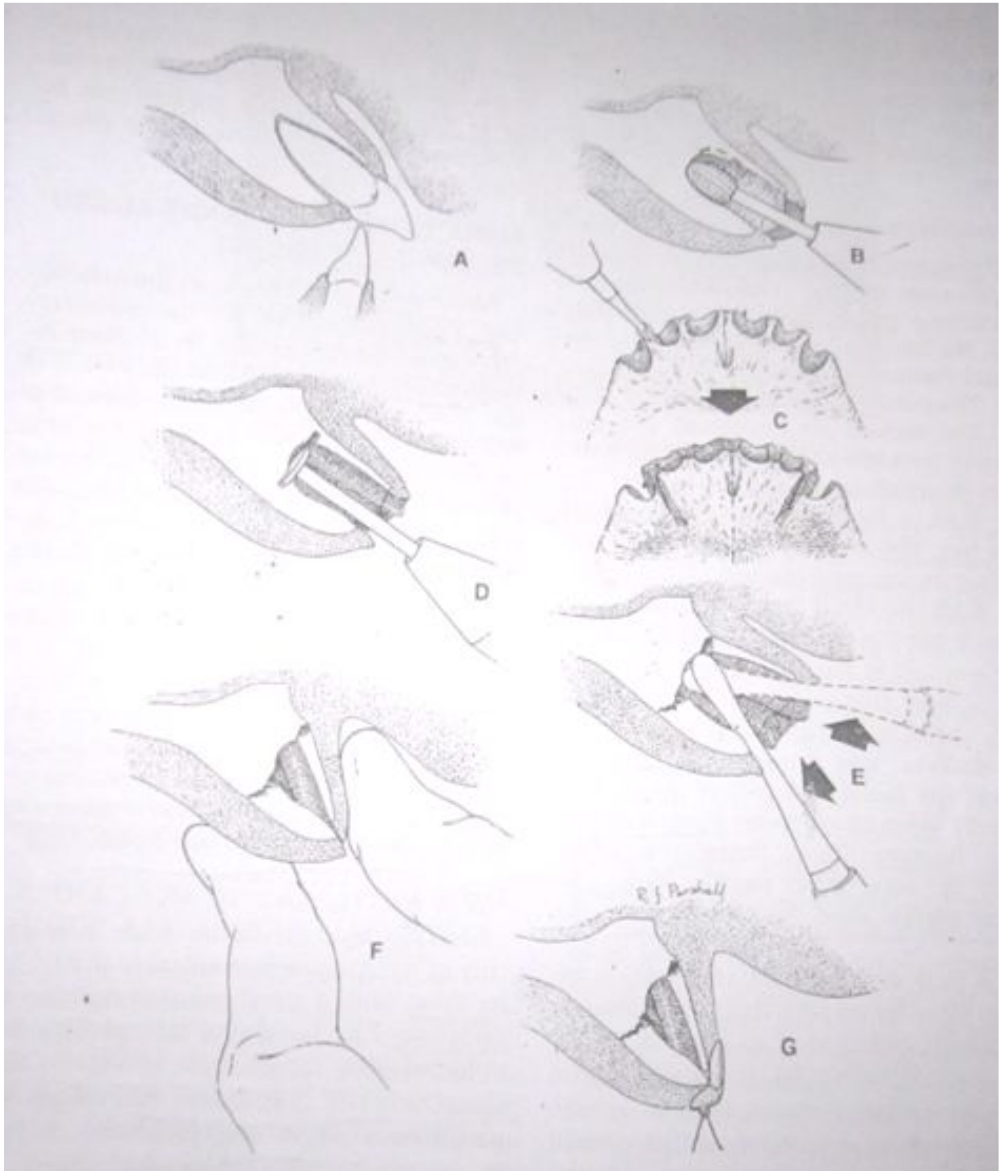
Vertical cuts are made only in labial cortex

# Obwegeser's alveoloplasty

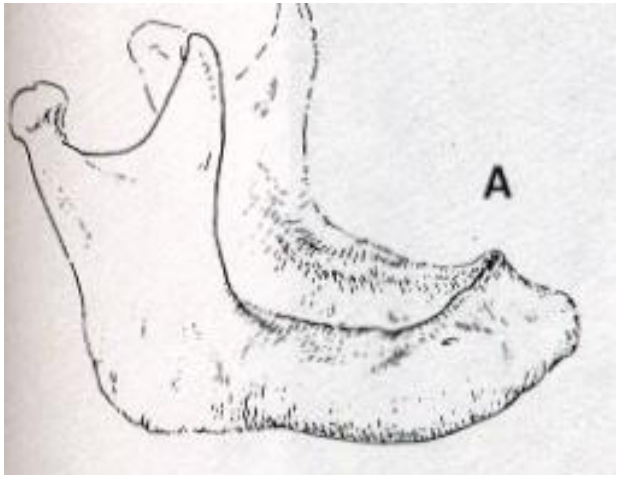
Advantages

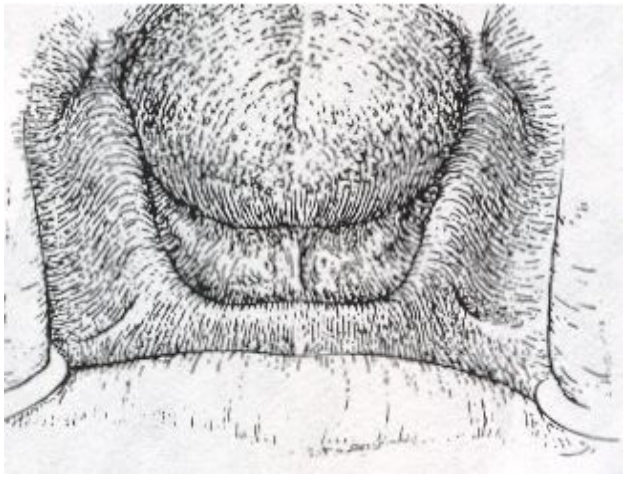
- Recontour both the palatal & labial surfaces of the anterior alveolar process

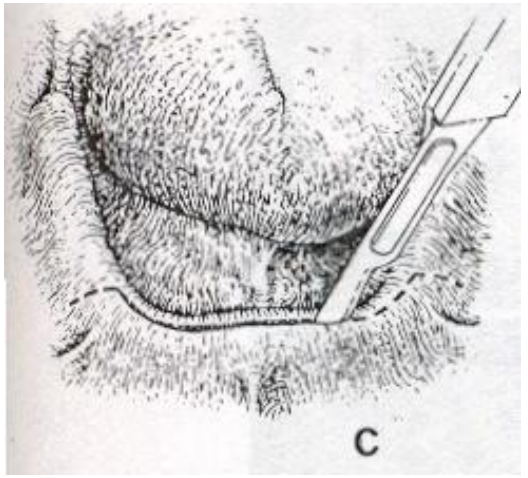
- Especially in extreme premaxillary protrusion

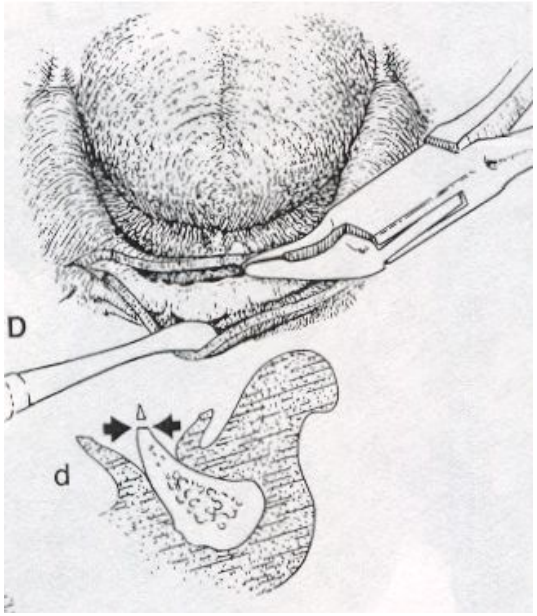


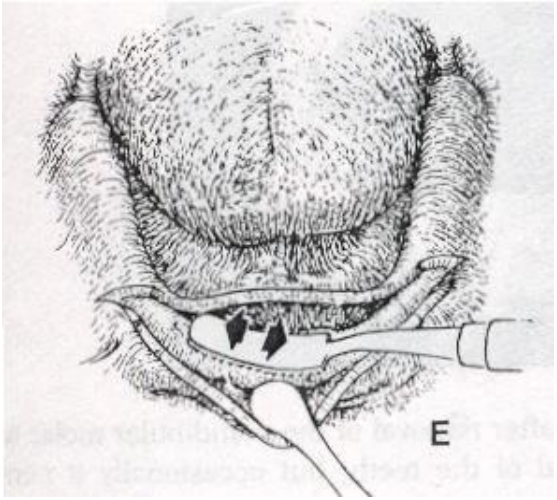
# Reduction of knife edge ridge

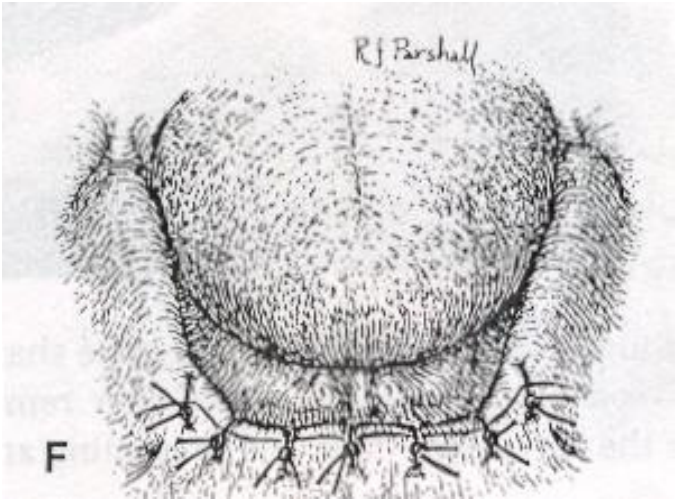




# Reduction of mylohyoid ridge

The mylohyoid ridge should be reduced whenever the ridge is found to be at the same level as or a higher level than the alveolar process(**Gilles**).

If the mucosa becomes traumatized, ulcerated & fails to heal- then reduction is needed.

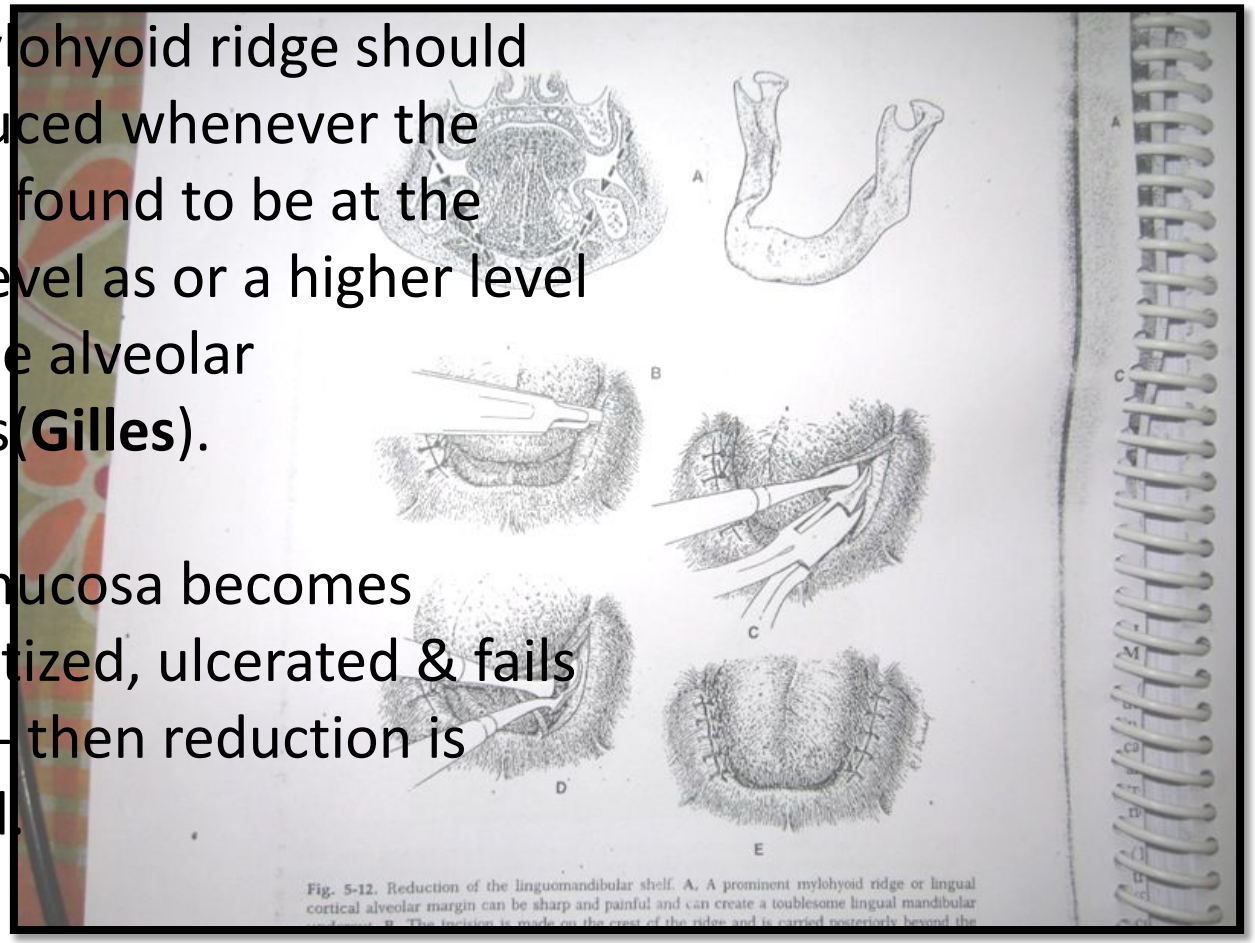
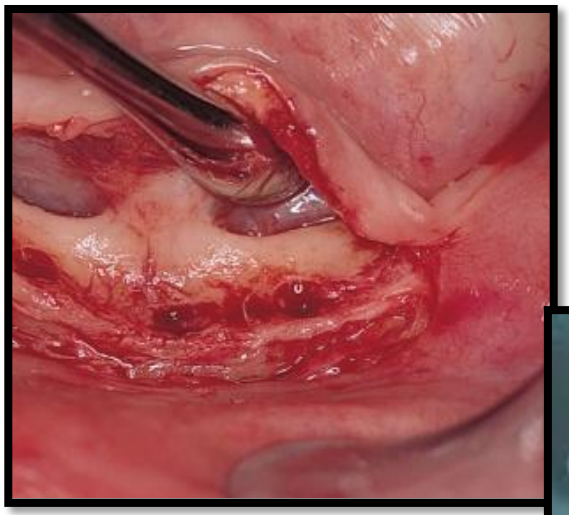
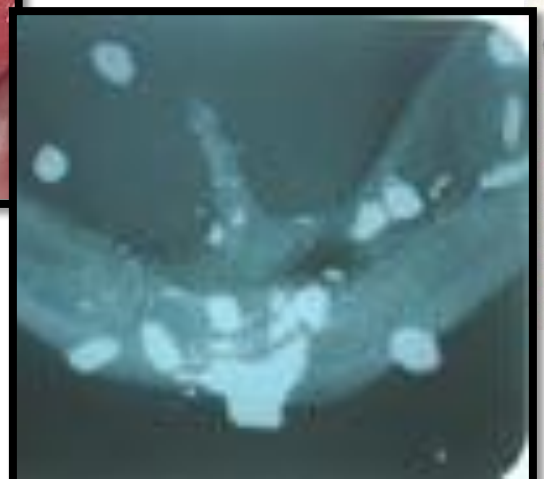


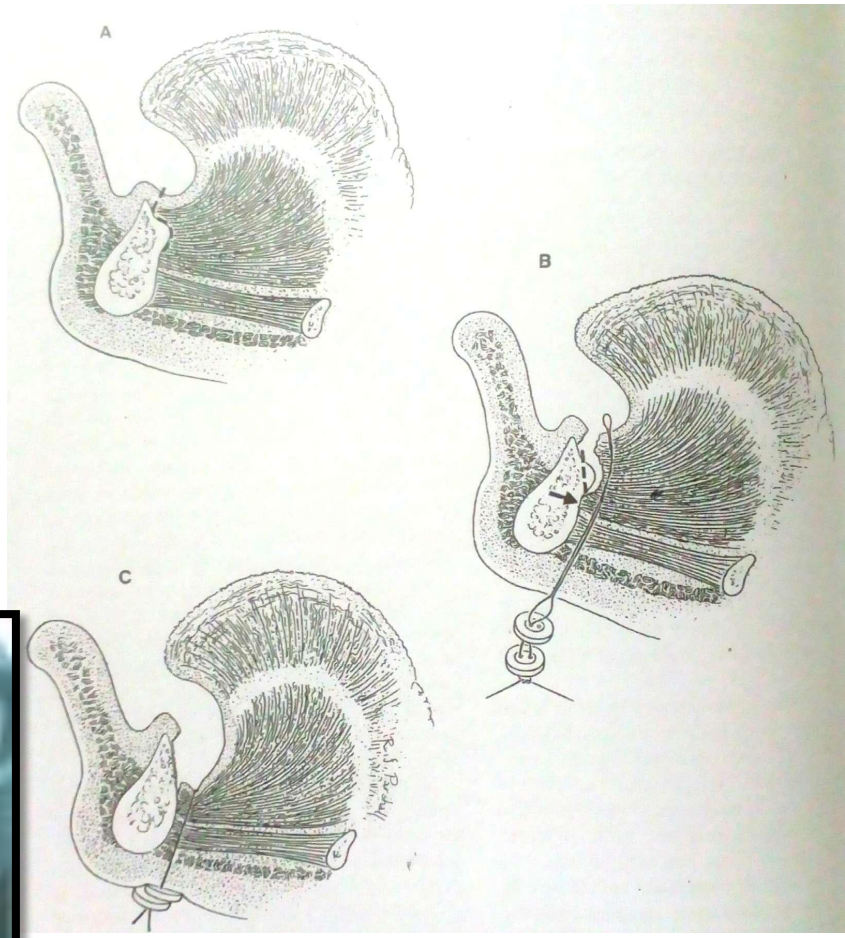

Fig. 5-12. Reduction of the linguomandibular shelf. A, A prominent mylohyoid ridge or lingual cortical alveolar margin can be sharp and painful and can create a troublesome lingual mandibular

# Reduction/resection of the genial tubercles

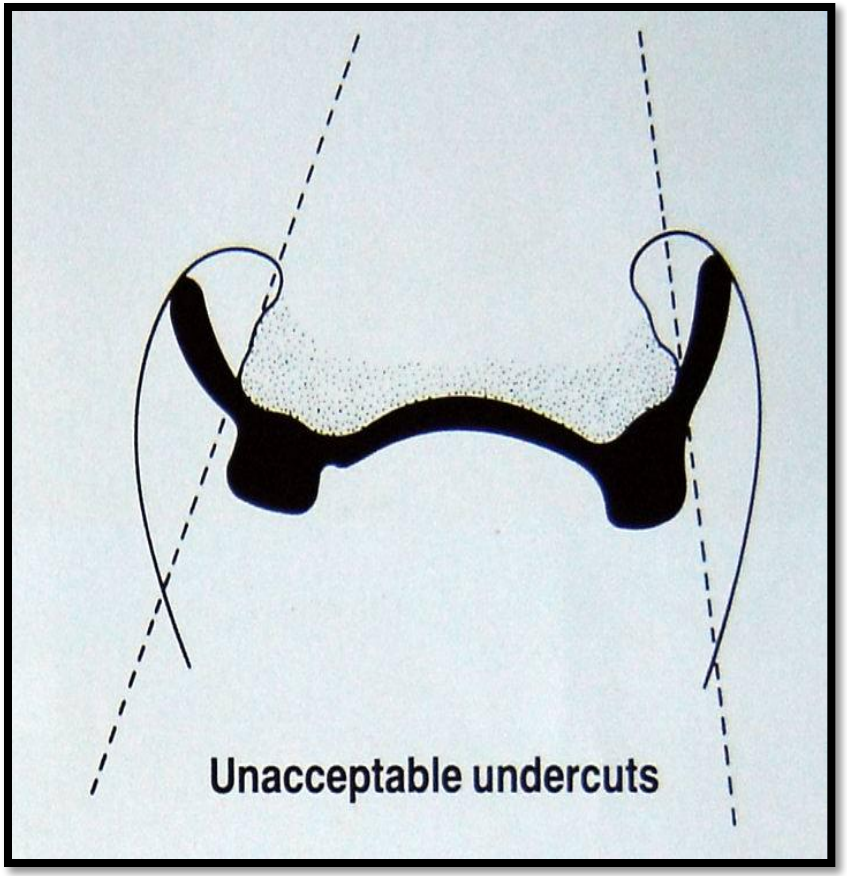
The superior & lateral fibers of genioglossus muscle are detached

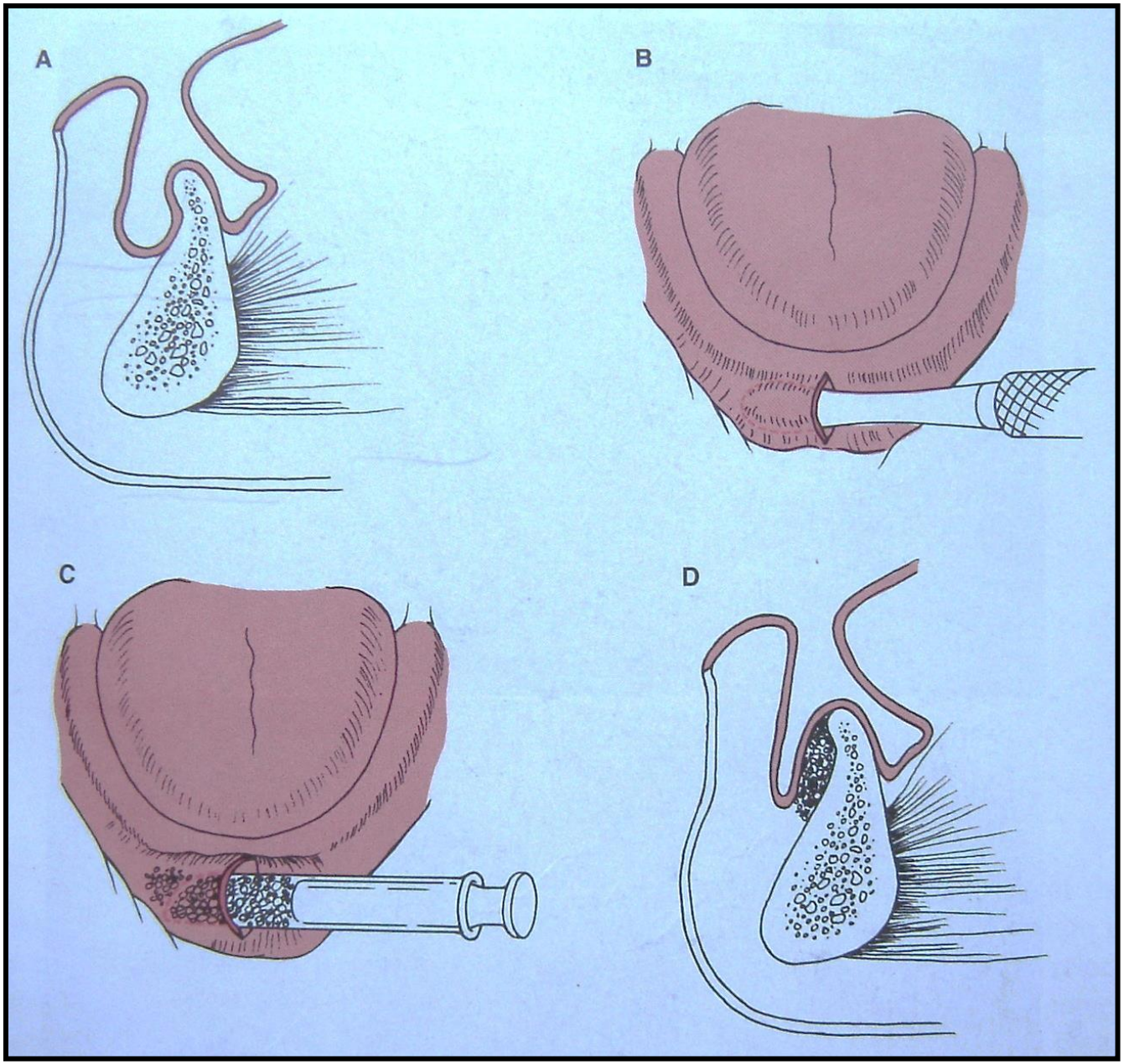






# Ridge undercuts

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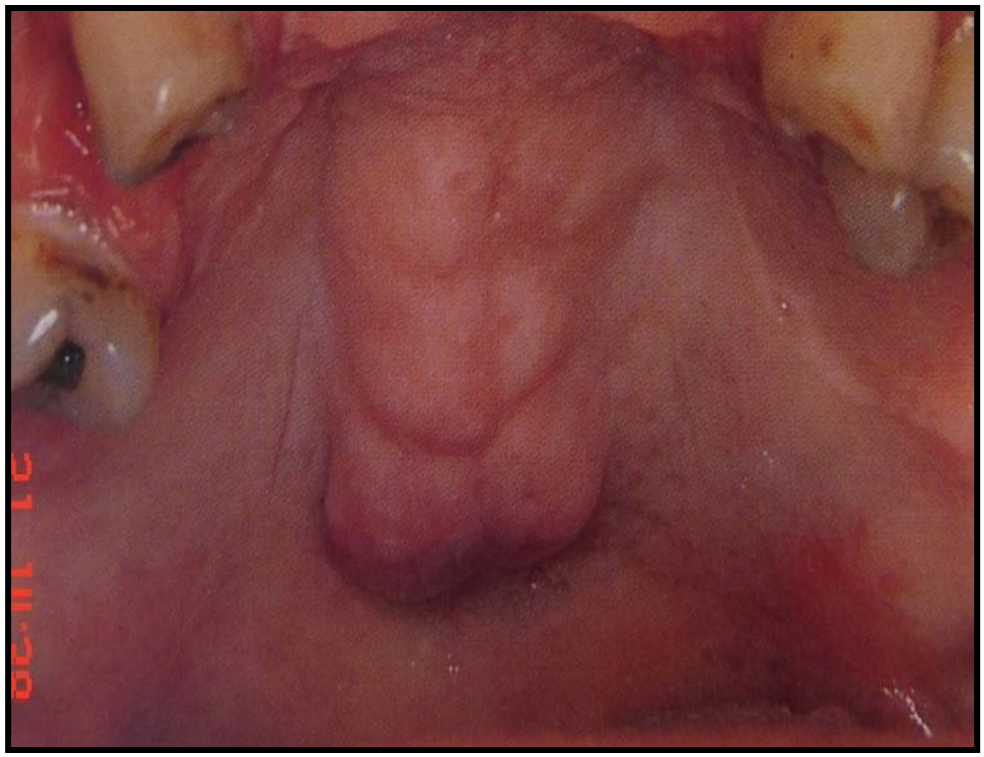
# Excision of tori

- Torus is exostosis/overgrowth of cortical/cortico-cancellous bone

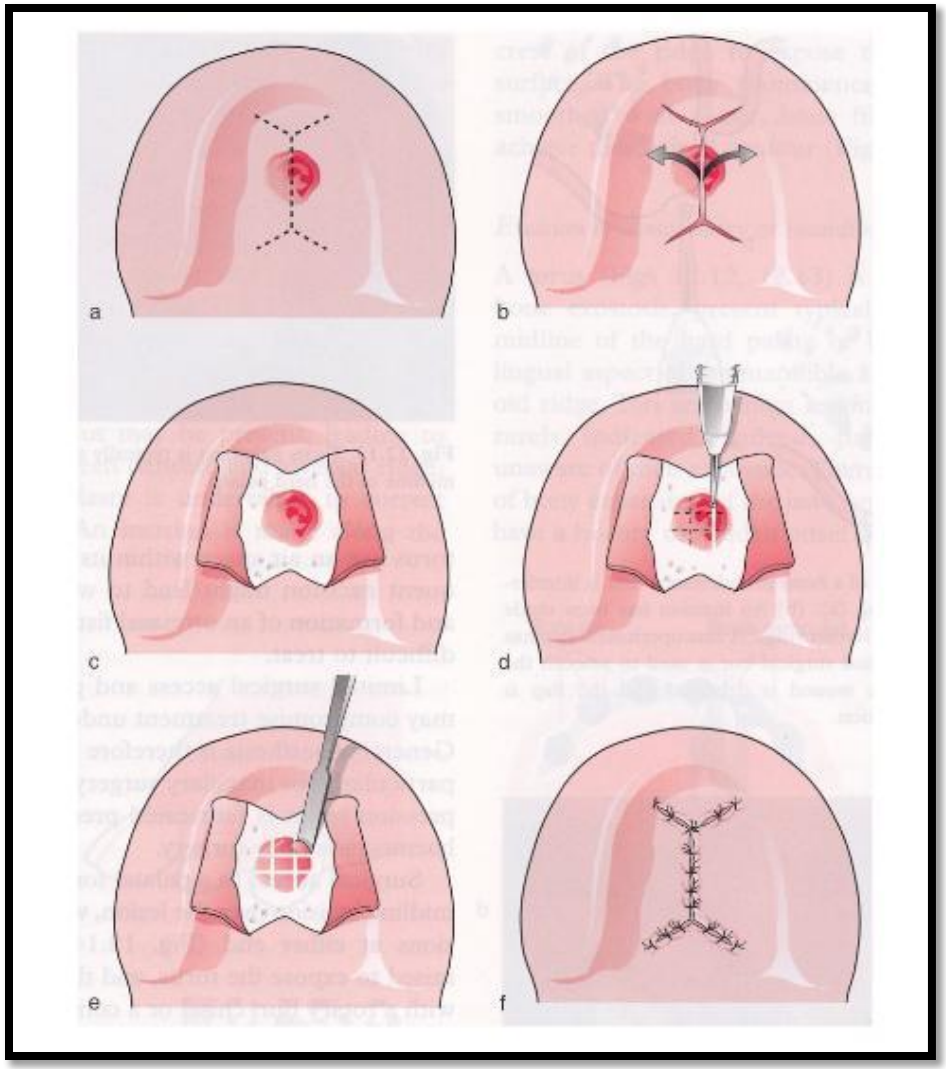


# Maxillary torus removal

Indications for removal

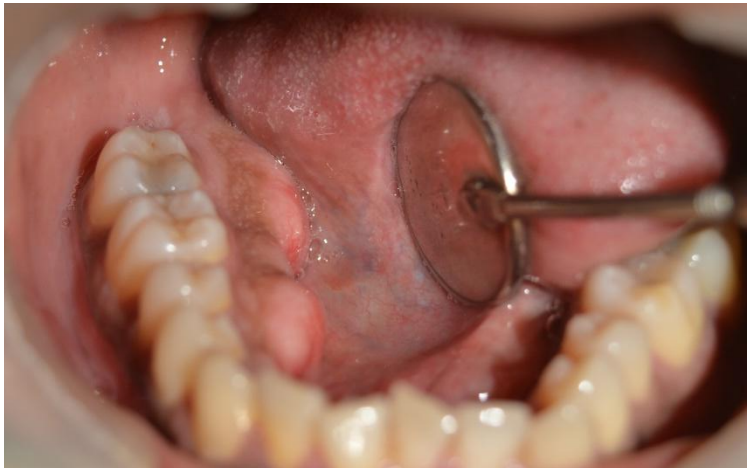
- When they are so large that they interfere with speech
- Mucosa becomes traumatized, ulcerates & fails to heal because of its poor vascularity
- It interferes with the design & construction of dentures

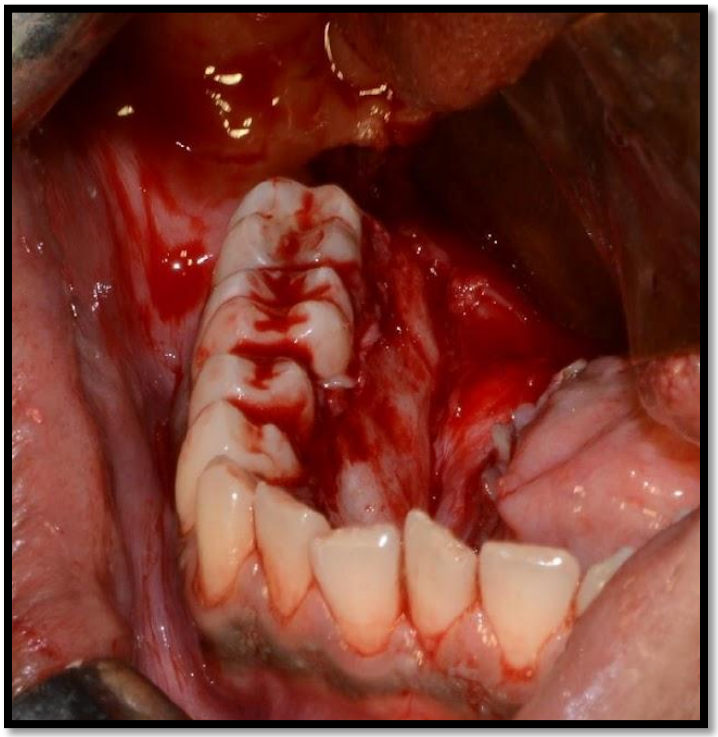
# Excision of palatal torus

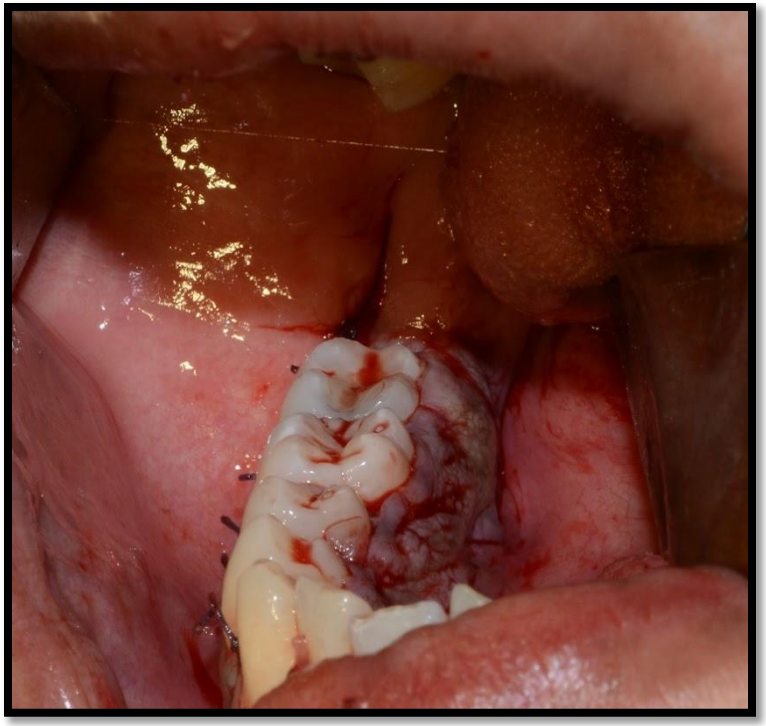


# Mandibular torus removal

- Tori causing lingual undercuts and interfering with lingual flange extension of the planned prosthesis.
- When the mucosal covering is ulcerated.
- Large tori interfering with speech and deglutition

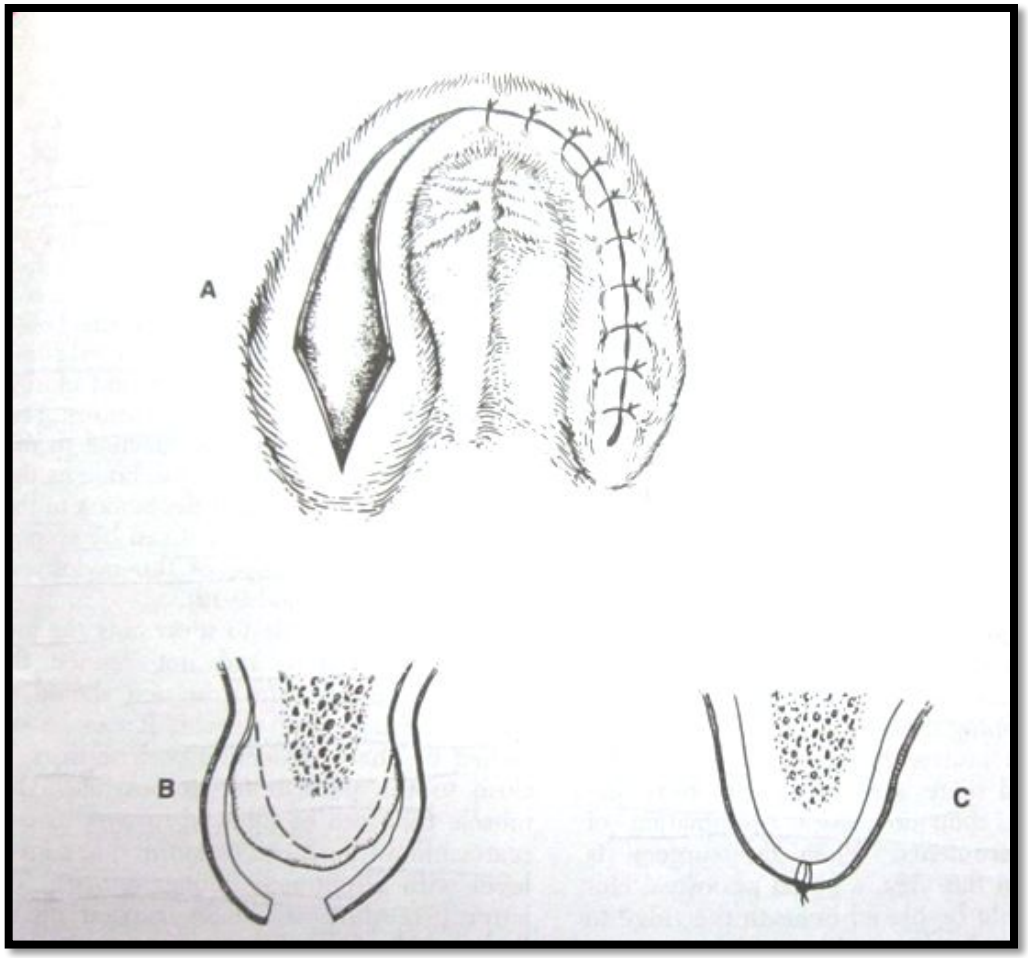






# Reduction of maxillary tuberosity

- If insufficient space exits between the tuberosity & the ascending ramus of the mandible for the denture flange to fit in without any difficulty during opening & closing of the mouth.



# Ridge Augmentation

Indications

Progressive loss of denture stability and retention.

Loss of alveolar ridge height, width and decreased vestibular depth and denture bearing area.

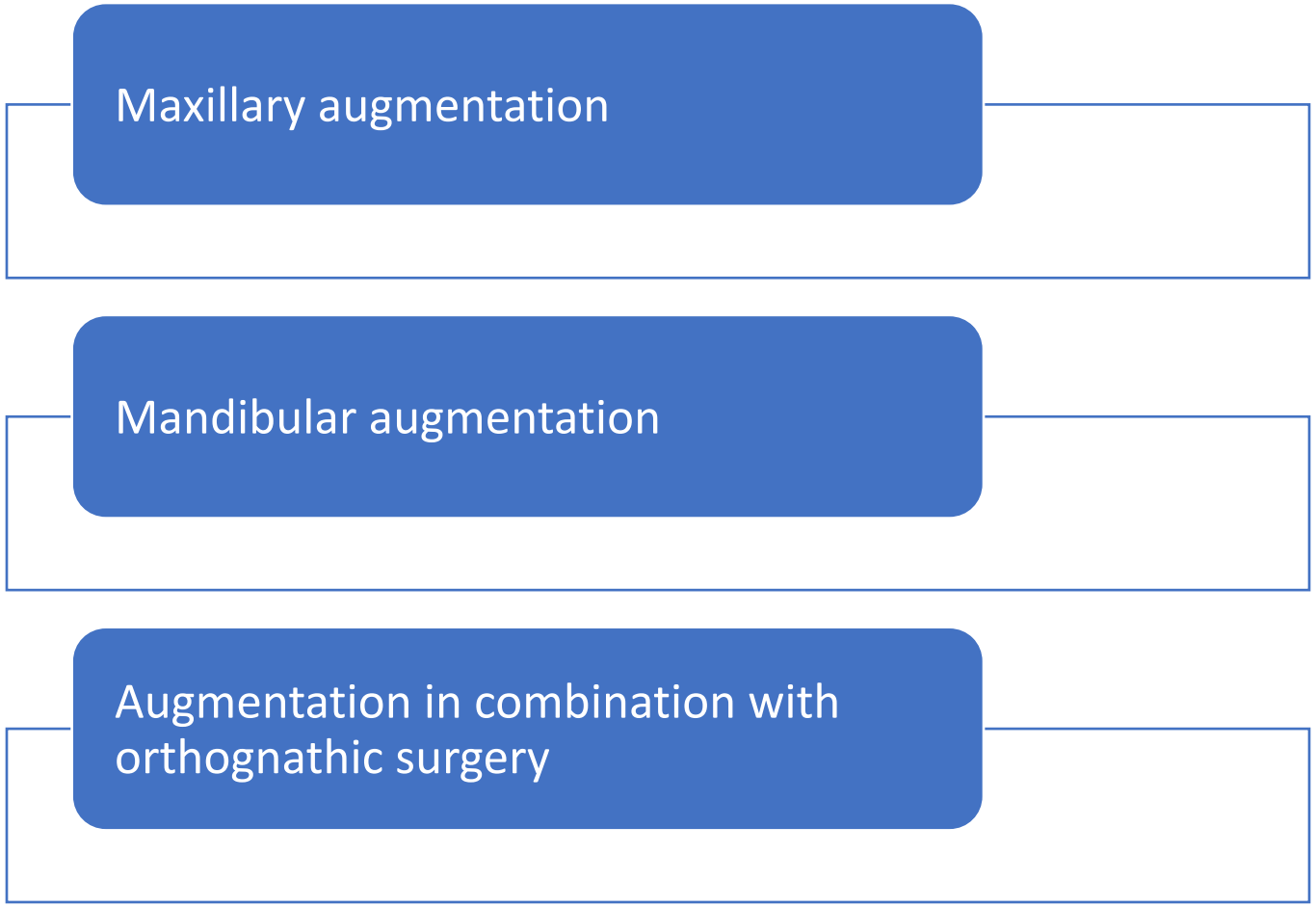
Considerable basal bone resorption in the mandible, resulting in neurosensory disturbances.

Increased susceptibility to fracture of the atrophic jaws.

Replacement of necessary supportive bone.

Altered interact relationship

# Ridge augmentation procedure



# Maxillary augmentation

- Onlay bone grafting- autogenous/allogenic grafts
- Onlay grafting of alloplastic grafts
- Interpositional or sandwich grafts
- Sinus lift procedure

Augmentation in combination with orthognathic surgery

- Mandibular osteotomy procedure
- Maxillary osteotomy procedure
- Combination procedure

# Mandibular augmentation

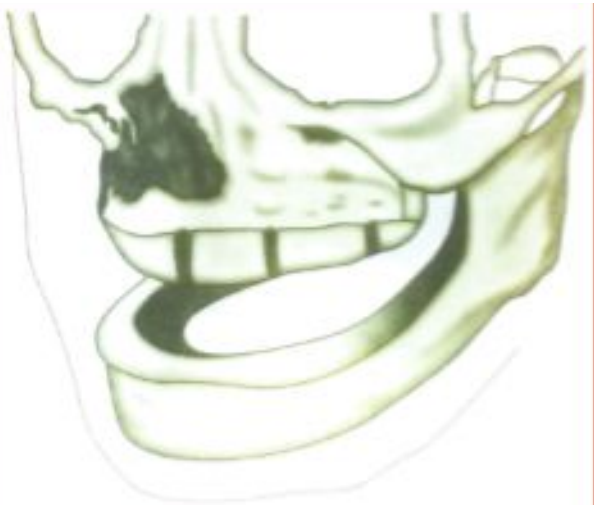
| |
|---|
| 1)Superior border augmentation |
| Bone grafts |
| Cartilage grafts |
| Alloplastic grafts |
| 2)Inferior border augmentation |
| Bone grafts (autogenous/ allogenic) |
| Cartilage grafts |
| 3)Interpositional or sandwich bone grafts |
| Bone grafts |
| Cartilage grafts |
| Hydroxyapatite blocks |
| 4)Visor osteotomy |
| 5)Onlay grafting-autogenous/alloplastic/allogenic material |

# MAXILLARY AUGMENTATION

**ONLAY BONE GRAFTING**

**Indications:**

➢Severe resorption of the maxillary alveolar resulting in the absence of a clinical alveolar ridge and loss of adequate palatal vault form.



**Figs 13.19:** Total maxillary onlay bone grafting

**Advantages:**

➢Development of increased height and form of the alveolar ridge and the palatal vault area.

➢The anteroposterior position of the maxilla can be corrected.

**Disadvantages**

➢Need for a secondary donor site.

➢Extensive post operative resorption.

➢Postoperative secondary soft tissue procedures.

➢Delay in wearing dentures for 6-8 months

# Interpositional bone grafts

**Indications**

➢In a bony deficient maxilla where there is adequate form to the palatal vault but insufficient ridge height, particularly in the zygomatic buttress and posterior tuberosity areas.

**Advantages**

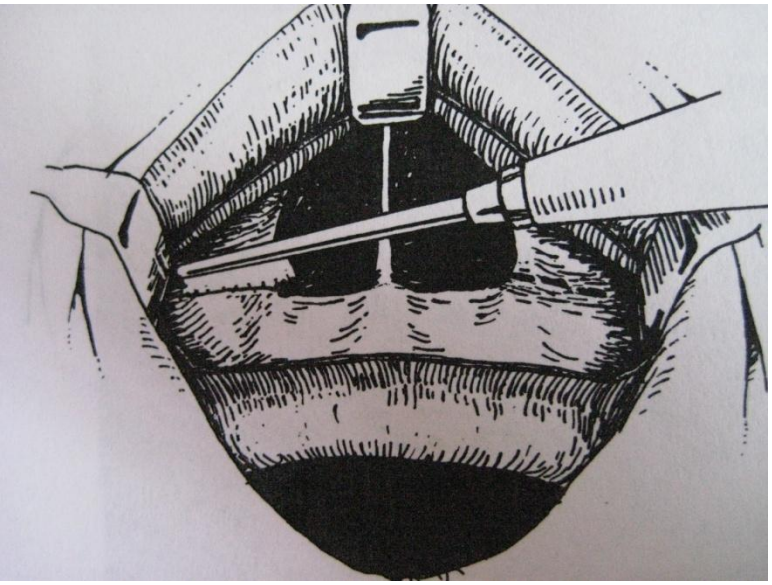
➢Stable and predictable results by changing maxillary position in the vertical, anteroposterior and transverse directions.

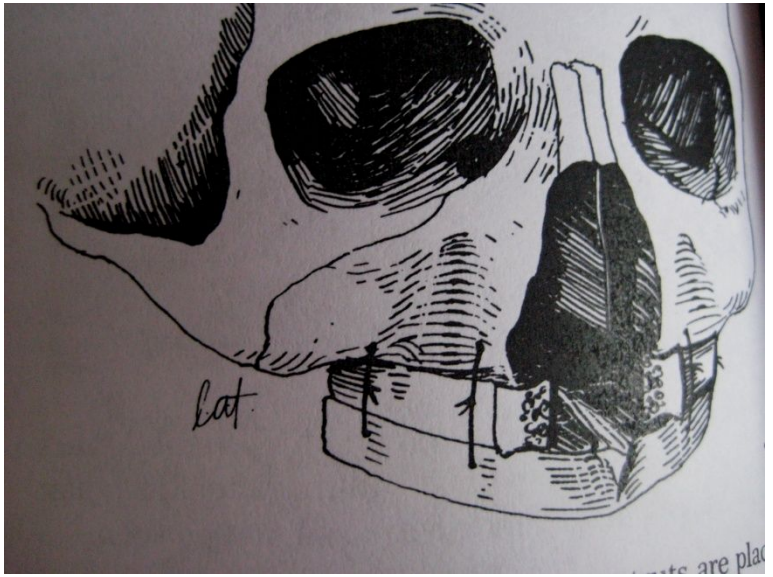
➢May eliminate the need for secondary soft tissue procedures.

**Disadvantages**

➢Need to harvest bone from the iliac bone crest

➢Possible secondary soft tissue surgery






The lateral maxillary and lateral nasal walls and pterygoid maxillary suture area separated using surgical saws and osteotome and the maxilla is down fractured.

Bone grafts obtained from the iliac crest are shaped and wired in place in the lateral maxilllary areas.

This technique effectively increases the ridge height from the lateral maxillary area to the crest of the ridge.

# Total maxillary osteotomy with advancement

- Maxilla has tendency to resorb posteriorly while mandible seems to become prominent with age.

- Max positioned forwards for predetermined distance and stabilized with transosseous graft and interpositional bone graft

Graft should be used if advancement >5mms or if there is anomaly that would increase chances of relapse

Stabilization by placing block of allogenic bone HA/ autologous bone graft in posterior section and wedging posterior aspects of maxilla apart.

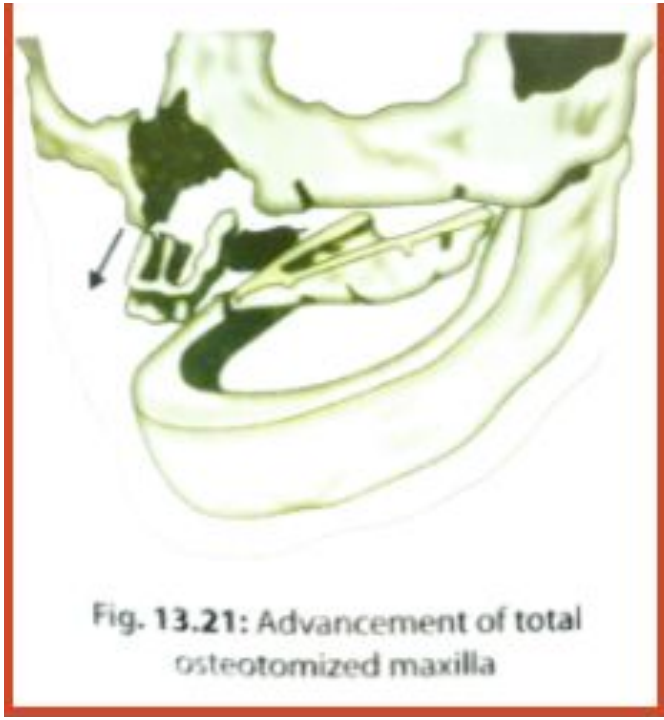


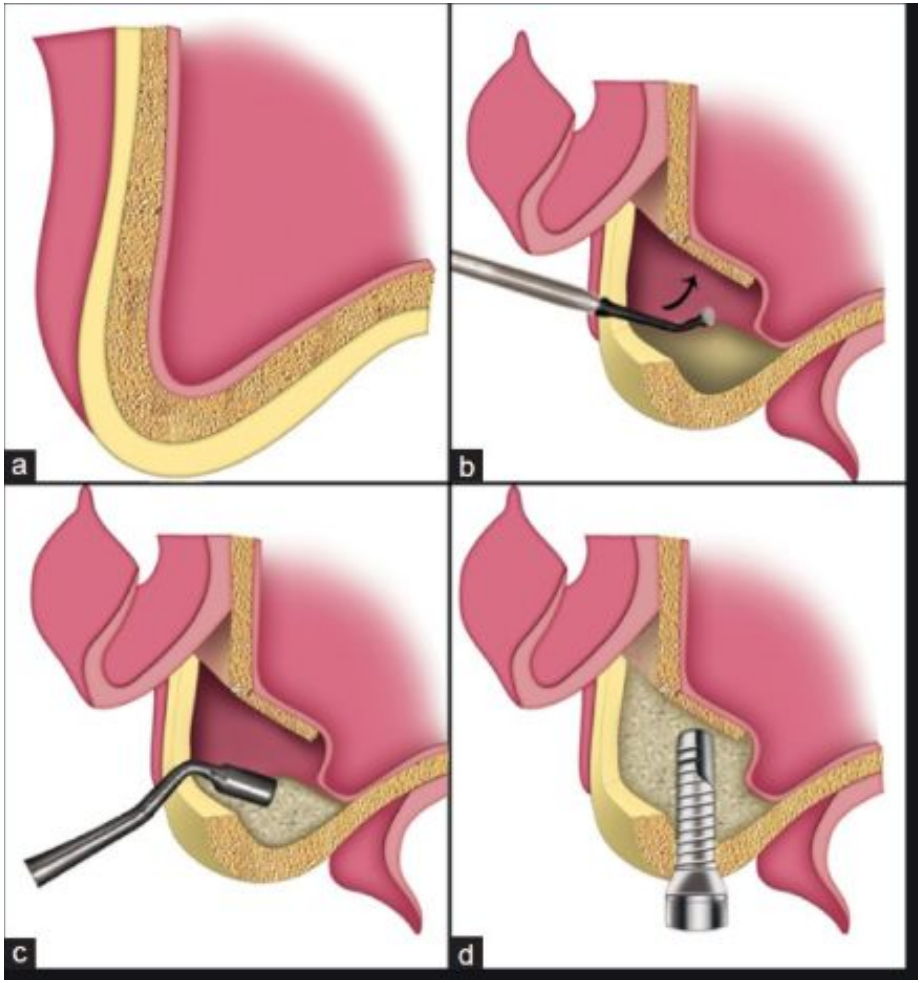
Fig. 13.21: Advancement of total osteotomized maxilla

# Sinus Lift Procedures

- The posterior edentulous maxilla presents special challenges to the implantologist.
- Alveolar bone height  <10 mm
- Direct and indirect sinus lift procedure

# Direct Sinus Lift Procedure

- Tatum 1986---modified caldwell luc approach

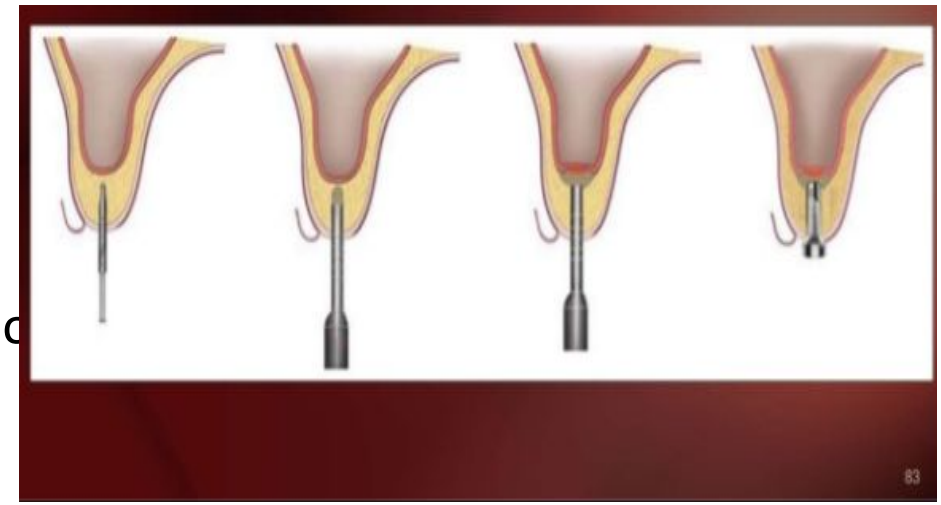


- 4-5 mm of bone present, implant may be placed during the same surgical procedure

Advantage :

- One stage procedure
- Direct view of the implant anchored in the sinus
- Less time required

# Indirect Sinus Lift Procedure-Summer 1994



- less invasive
- shorter healing and waiting peric
- <10mm >7mm
- Increasing vertical height of the bone upto 4mm
- sinus is approached from crest of the alveolar ridge.

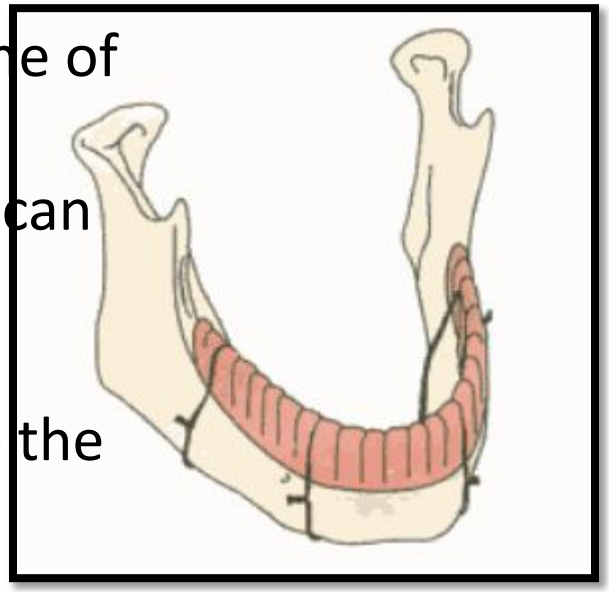
Contraindications:

- Sinus infection
- Tumors or pathologic growth in sinus
- Severe allergic rhinitis
- Chronic topical steroid use
- Radiation therapy
- Excessive tobacco use
- Psychologic / mental impairment

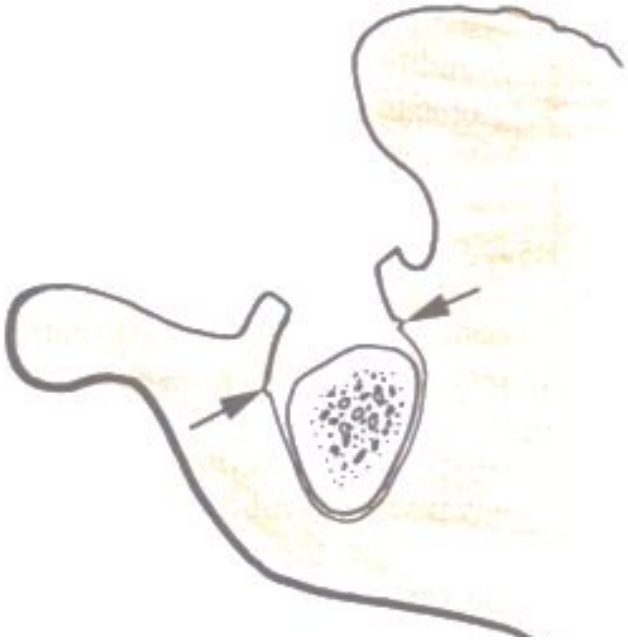
# AUGMENTATION OF SUPERIOR BORDER OF MANDIBLE (Davis, 1970)

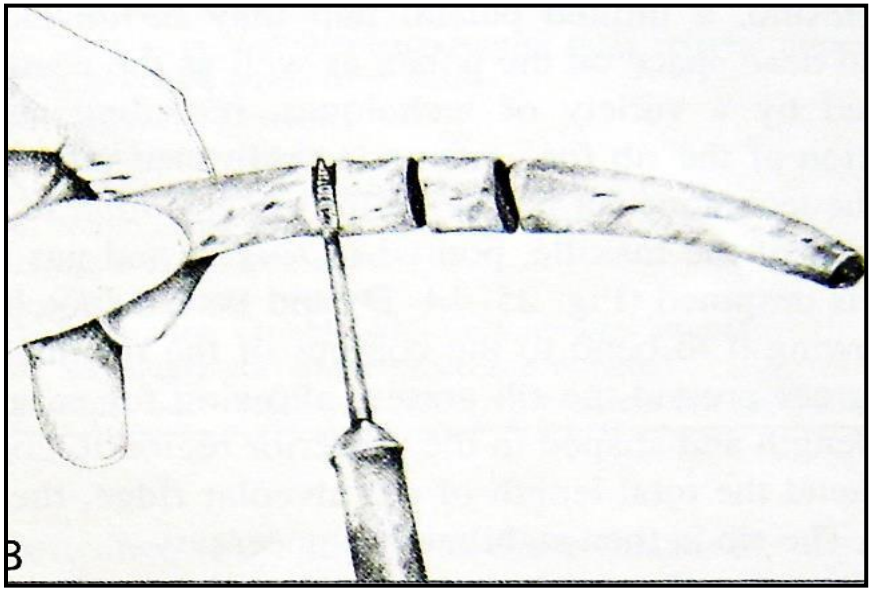
Indications

Extreme loss of bone of the body of mandible(<10mm) can lead to fracture



Patients to tolerate the procedure psychologically & physically

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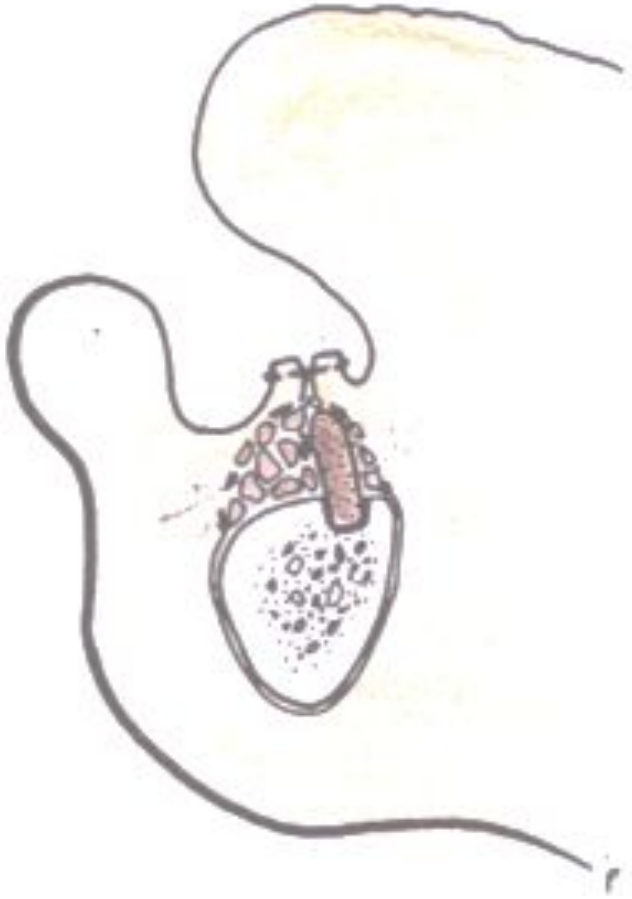


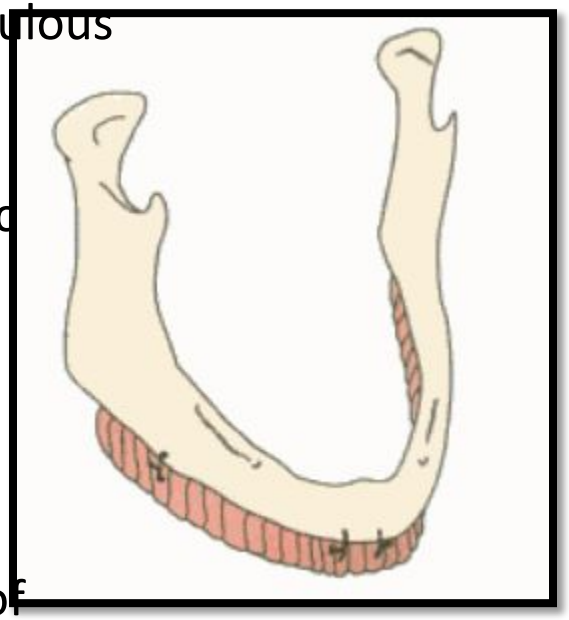
# Augmentation of inferior border of mandible

Indications

Severely atrophic edentulous mandible

Prevention of pathologic fracture of the severely atrophic edentulous mandible

Management of nonunion or malunion of fractures



Advantages:

- Does not obliterate the vestibule
- No mucosal dehiscence
- Little orofacial pain
- Does not alter vertical dimension of occlusion
- Secondary lingual sulcoplasty is not needed, as mylohyoid muscle is lowered by repositioning it below the rib graft during wound closure

- Excellent for fracture stabilization
- No masticatory forces is directly applied to the graft

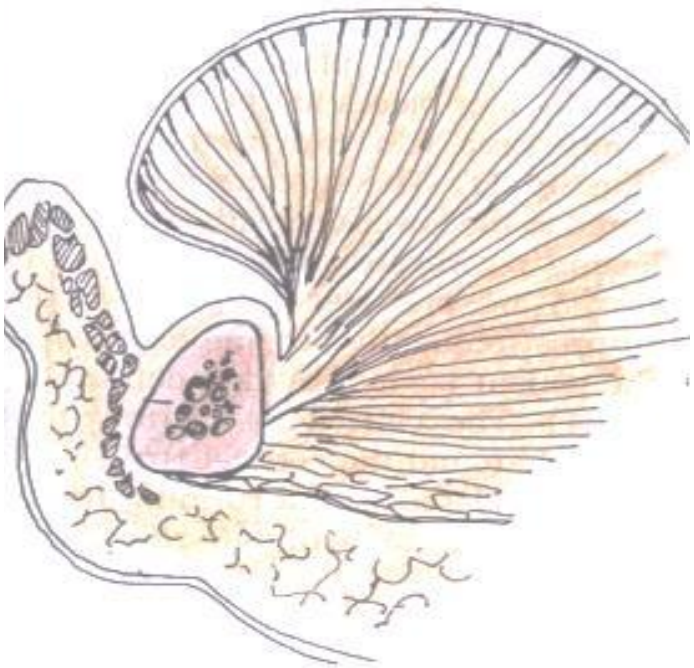
Disadvantages:

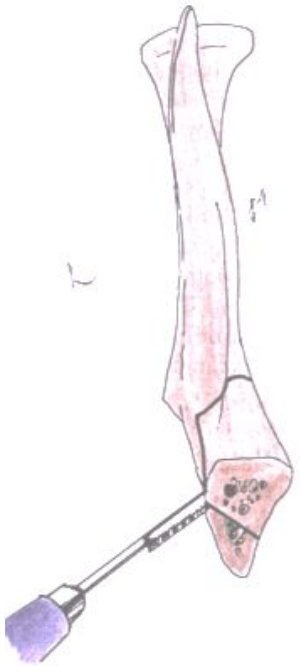
- Large extra oral incision with resultant scarring
- Does not correct any superior border irregularities

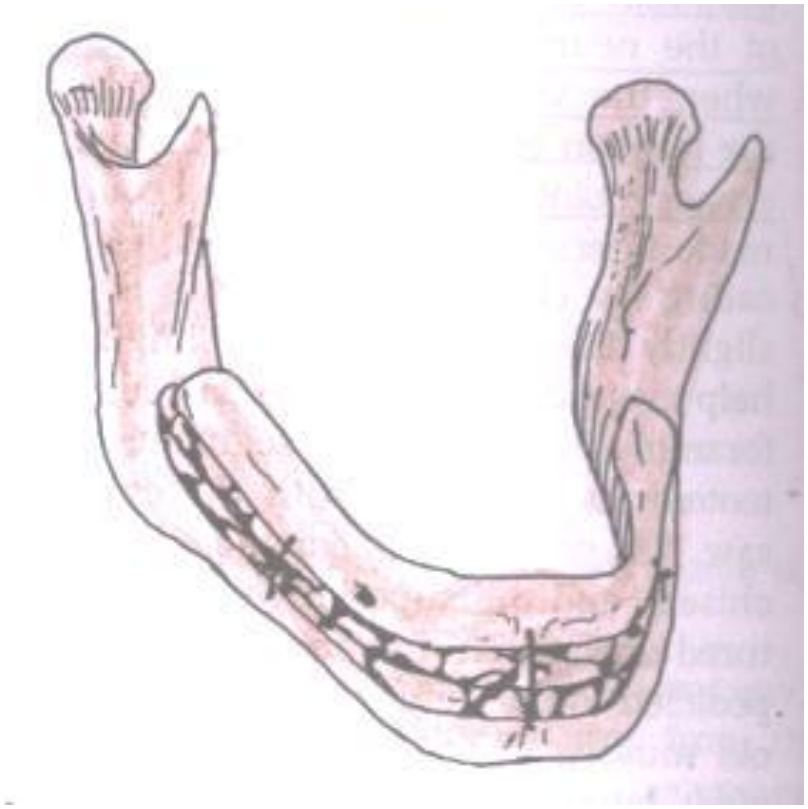
# Augmentation by pedicled bone flap procedures

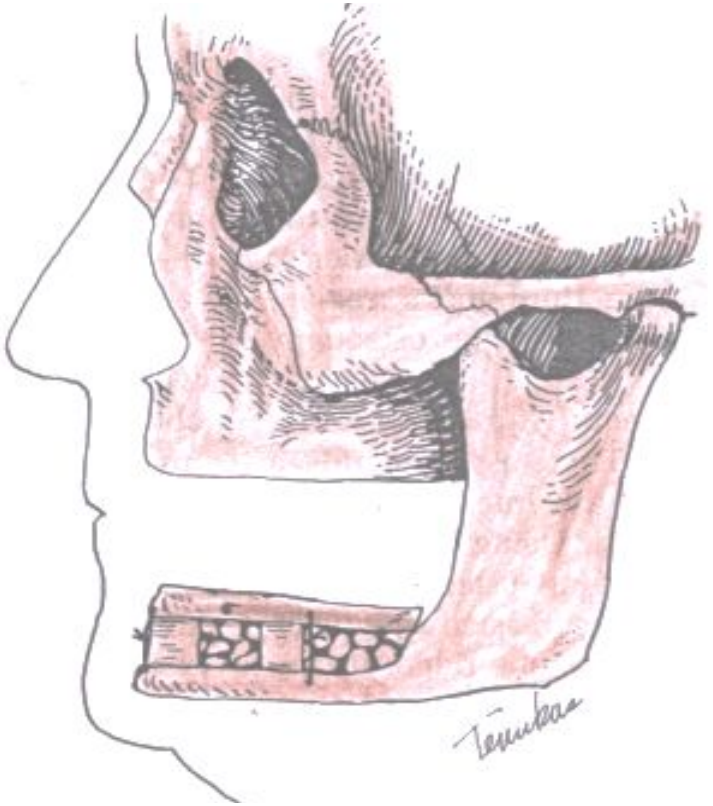
- Major disadvantage of onlay grafting is rapid early resorption of bone during the healing process
- Resorption can be reduced if the bone remains attached to its own uninterrupted blood supply
- Therefore for the mandiblular ridge augmentation, the bone is pedicled onto the lingual aspect
- Two types of osteotomies- horizontal & vertical

# Horizontal Osteotomy







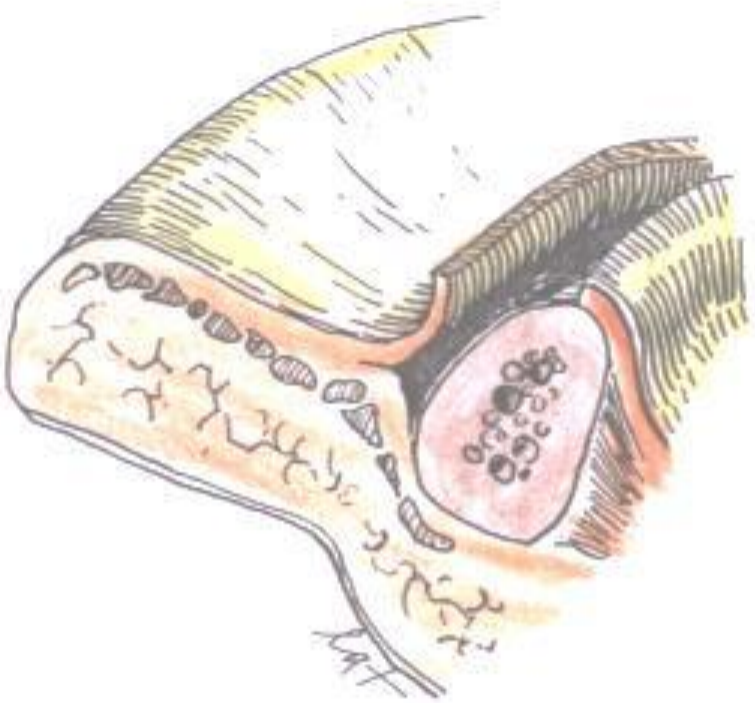


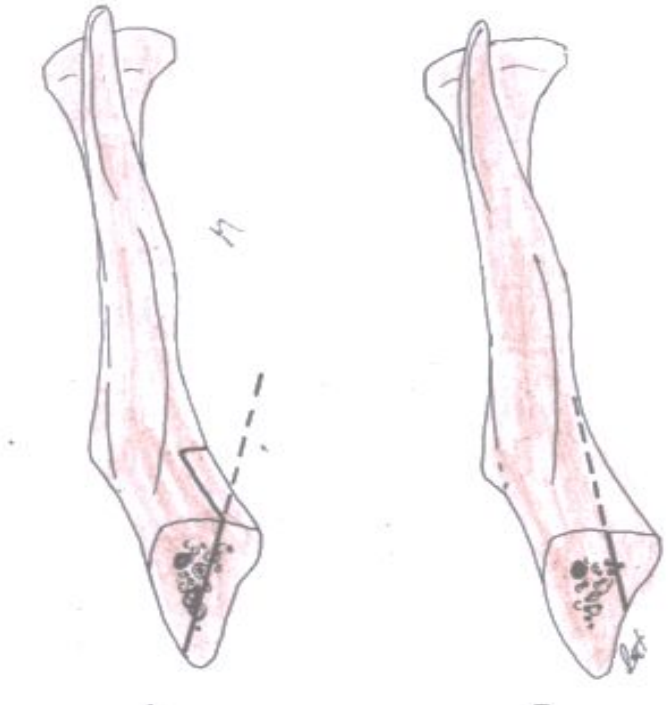
Horizontal osteotomy with interpositional bone grafting

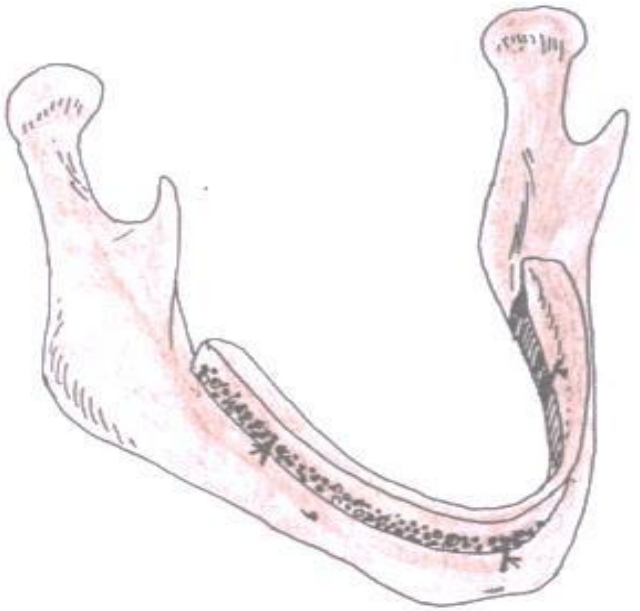
( sandwich augmentation)

# Vertical osteotomy

- Harle(1975)







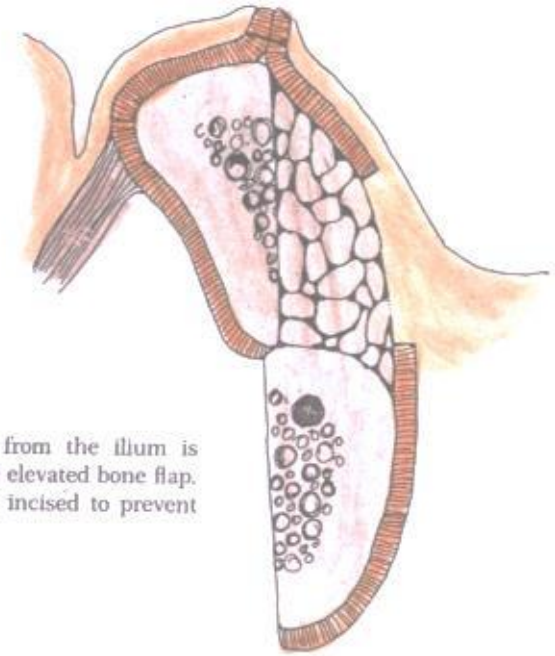


**Fig. 10-28.** Cancellous marrow from the ilium is placed on the lateral aspect of the elevated bone flap. The periosteum may need to be incised to prevent tension during the closure.

# Three-piece osteotomy
## Stoelinga 1983

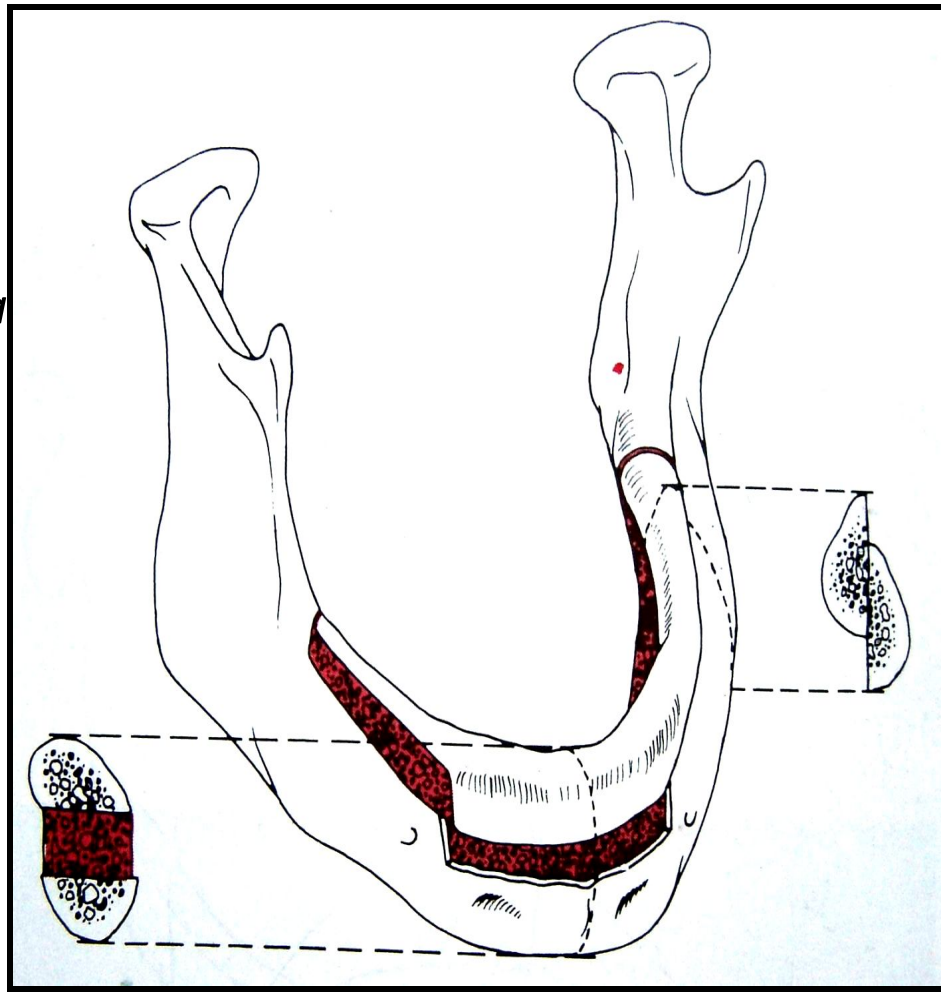
*<u>Advantages:</u>*

- *1.Rate of resorption less.*
- *2. Incidence of nerve paresthesia is less.*

*<u>Disadvantages:</u>*

- *1.Donor site morbidity.*
- *2.Need for hospitalization.*

*Unable to wear denture for 3-5 months*



# References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- Oral & maxillofacial surgery- Laskin
- Oral & maxillofacial surgery- Fonseca
- Current therapy in oral & maxillofacial surgery- Bagheri