

GOOD
MORNING
YOUNG MINDS



MAJOR SURGICAL ORTHODONTICS

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□ ORTHOGNATHIC SURGERY

- 1. CONVENTIONAL ORTHOGNATHIC SURGERY**
- 2. SFOA**

□ DISTRACTION OSTEOGENESIS

□ CLEFT LIP/PALATE

Introduction

- Subjects with severe malocclusion i.e ***dentofacial deformity which is defined as a deviation from normal facial proportions and dental relations that are severe enough to be handicapping (Proffit)*** cannot be treated with orthodontics **ALONE.**

- *Surgical orthodontics*, as the name denotes, includes the surgical procedures that are carried out before, during or after active orthodontic treatment.

- ***Surgical procedures*** which are undertaken to improve the facial profile and aesthetics, are primarily focused on the correction of these disproportions of underlying jaws and their alignment.
- These are collectively grouped as ***orthognathic surgery***.
- The surgical procedures may be undertaken on either of the jaws (one jaw) or both the jaws (bimaxillary) independently or in addition to surgery of the craniofacial structures that may include the orbits, zygoma and the cranium.

NOT A SUBSTITUTE

Historical perspective

- 1849 - Hüllihen 1st performed osteotomy on the lower jaw to treat deformity caused by a burn.
- 1887- Vilray Blair performed an osteotomy of the mandibular body for the correction of prognathism.
- 1906 and 1907 - Blair reported mandibular body osteotomy and horizontal osteotomy of the ramus.
- **1942 - Obwegeser** who introduced intraoral bilateral sagittal split osteotomy modified by Dal pont.
- 1864 – Cheever, down--fractured maxilla to resect a nasopharyngeal mass in two -patients.
- 1927 - Wassmund reported his initial attempt to perform a maxillary osteotomy where he employed orthopaedic traction postoperatively to position the maxilla and did not surgically mobilise.
- Obwegeser who fully mobilised the maxilla in a single step and brought it into the predicted position.
- 1970 - He also reported simultaneous repositioning of the maxilla and the mandible .

Motivational factors involved in seeking orthognathic surgery

Aesthetics

- The aesthetic impairments with perceptions of negative self-image and social well-being.
- Many psychosocial studies have shown cosmetic motivation as the primary reason for seeking orthognathic surgery.
- It has been reported that **patients with class III deformity rated themselves less attractive than class II patients**. After the surgery they felt significantly more improvement in attractiveness/ self-confidence compared to class II patients.

Gerzanic L, Jagsch R, Watzke IM. Psychologic implications of orthognathic surgery in patients with skeletal class II or class II malocclusion. *Int J Adult Orthodon Orthognath Surg.* 2002

Functional problems

1. Problems of articulation of **speech** especially with anterior open bite and severe deep bite.
2. **TMJ** problems especially in class III patients.
3. Periodontal and gingival health such as in traumatic deep bite.
4. Obstructive sleep apnoea (**OSA**).
5. Compromised masticatory efficiency due to a decreased number of functional occlusal contacts.
6. **Tumour** resection of the jaws.

Indications

- Severe class II skeletal discrepancy
- Severe class III skeletal discrepancy
- Very severe dentoalveolar problems that cannot be corrected by orthodontics alone.
- Correction of vertical discrepancies—long face and short face
- Transverse discrepancies
- Congenital craniofacial syndromes like cleft lip and palate, synostosis, hemifacial microsomia
- Patients with facial asymmetry

Contraindications

- Mandibular prognathism due to tumours of the endocrine glands and endocrine disorders.
- Adults with complex behavioural problems and known **psychological disorders** may have to be carefully evaluated for their mental fitness to undergo surgery.
- **Patients with medical conditions are not an absolute contraindication.**

Diabetes mellitus	Susceptible to periodontal breakdown, delayed wound healing
Hyperthyroidism	Tendency to osteoporosis
Adrenal insufficiency	Decreased stress tolerance, delayed healing
Pregnancy	Hormonal changes and periodontal breakdown
Heart diseases	Prone for endocarditis
Bleeding disorder	Bleeding tendency
Behavioural disorder	Bizarre reactions to surgery, slow orthodontic tooth movement due to drugs
Rheumatic arthritis	Manipulation of temporomandibular joint may increase problem

Clinical evaluation

1. Medical and dental history
2. Extraoral examination
3. Intraoral examination
4. Diagnostic records
5. Possible VTOs and predictions/mock surgery
6. Reassessment in joint sessions, with an oral surgeon.

Evaluation of the face. It constitutes an assessment of the following parameters:

- Vertical proportions
- Sagittal problems
- Transverse problems
- Symmetry of the face/midline deviations
- Nose and its impact on the overall facial profile.

ASSESSMENT OF FACIAL SYMMETRY

- Gross facial asymmetry can occur as a result of:
 - A. Congenital defects like cleft lip & palatae
 - B. Hemi-facial atrophy/hypertrophy
 - C. Unilateral condylar ankylosis and hyperplasia
 - D. Facial palsy etc.



Hemi facial
hypertrophy



Hemi facial atrophy



Facial palsy

HORIZONTAL FACIAL SYMMETRY

Rule of fifth :

An ideally proportional face can be divided into central, medial & lateral equal fifths. The separation of the eyes, which should be equal, determine the central & medial fifths.

The nose & chin should be centered within the central 5th & the width of the nose should be the same as or slightly wider than the central 5th

Interpupillary distance equal to the width of the mouth.



VERTICAL FACIAL PROPORTION

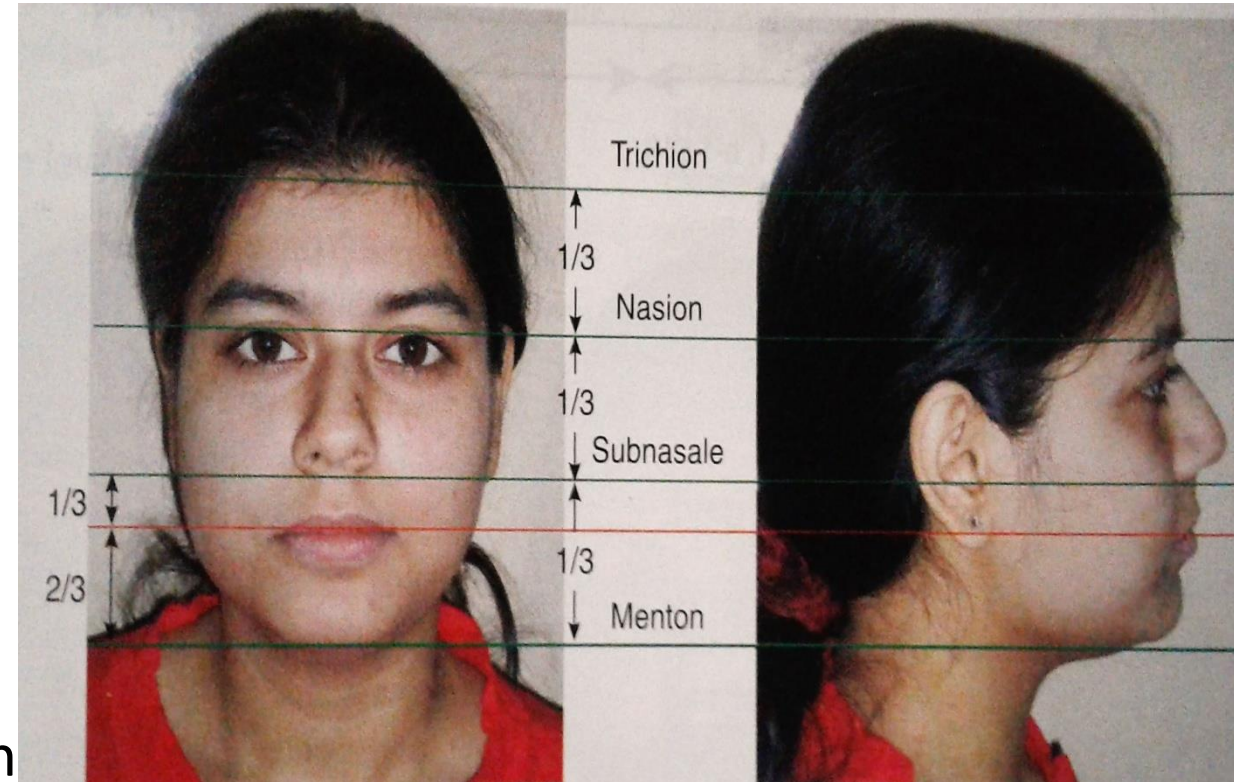
In vertical plane the face is divided into 3 equal parts

Trichion- Nasion ,Nasion- subnasale,
Subnasale – menton

Common aberration in facial height is an increased or decrease in lower $1/3^{\text{rd}}$ of face

Eg: Increase in lower anterior facial height often seen in openbite cases

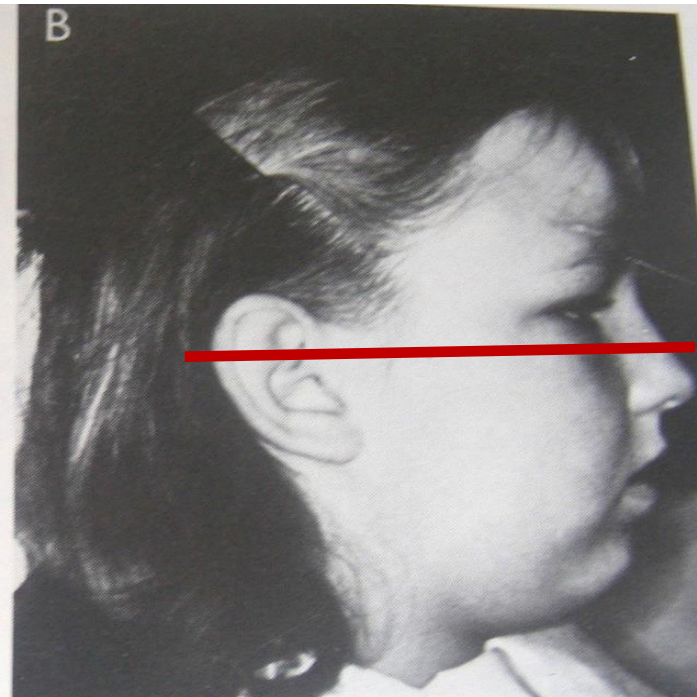
Decreased lower facial height seen in deepbite cases.



PROFILE ANALYSIS

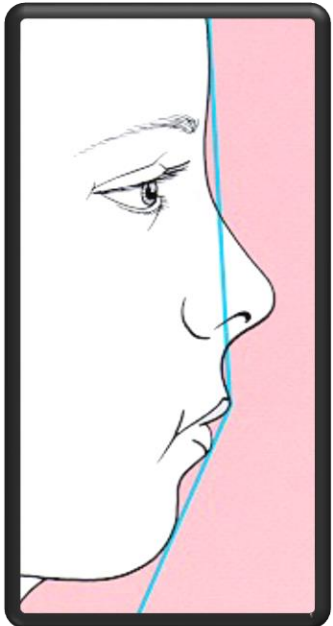
- Called as **Poorman's Cephalometric Analysis.**
- Patient is placed in physiologic natural head position

INCORRECT

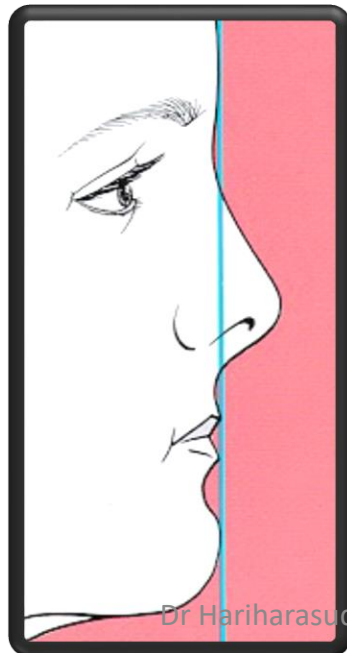


CORRECT

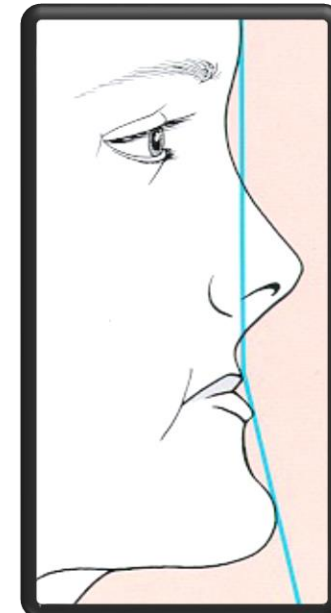
- **Convex – recessive chin, prominent upper lip (skeletal class II)**
- **Straight**
- **Concave – mandibular protrusion, retrognathic maxilla or both (skeletal class II)**



**CONVEX
PROFILE**



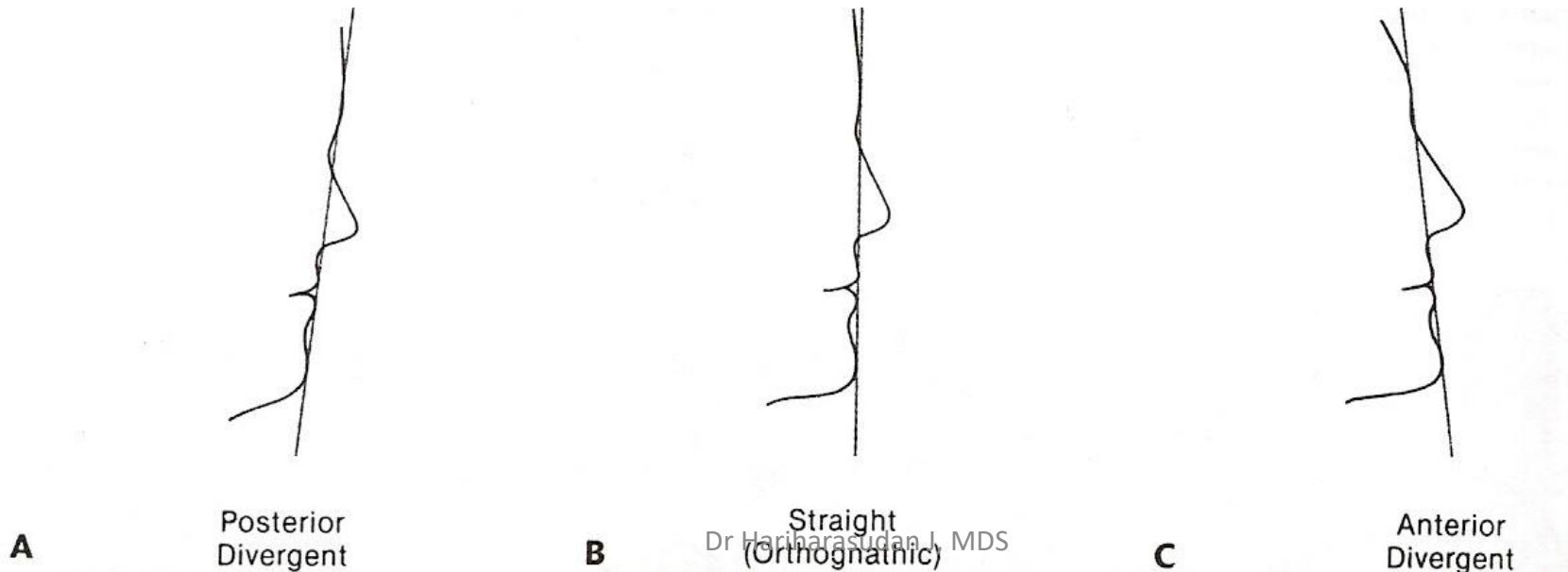
**Straight
profile**



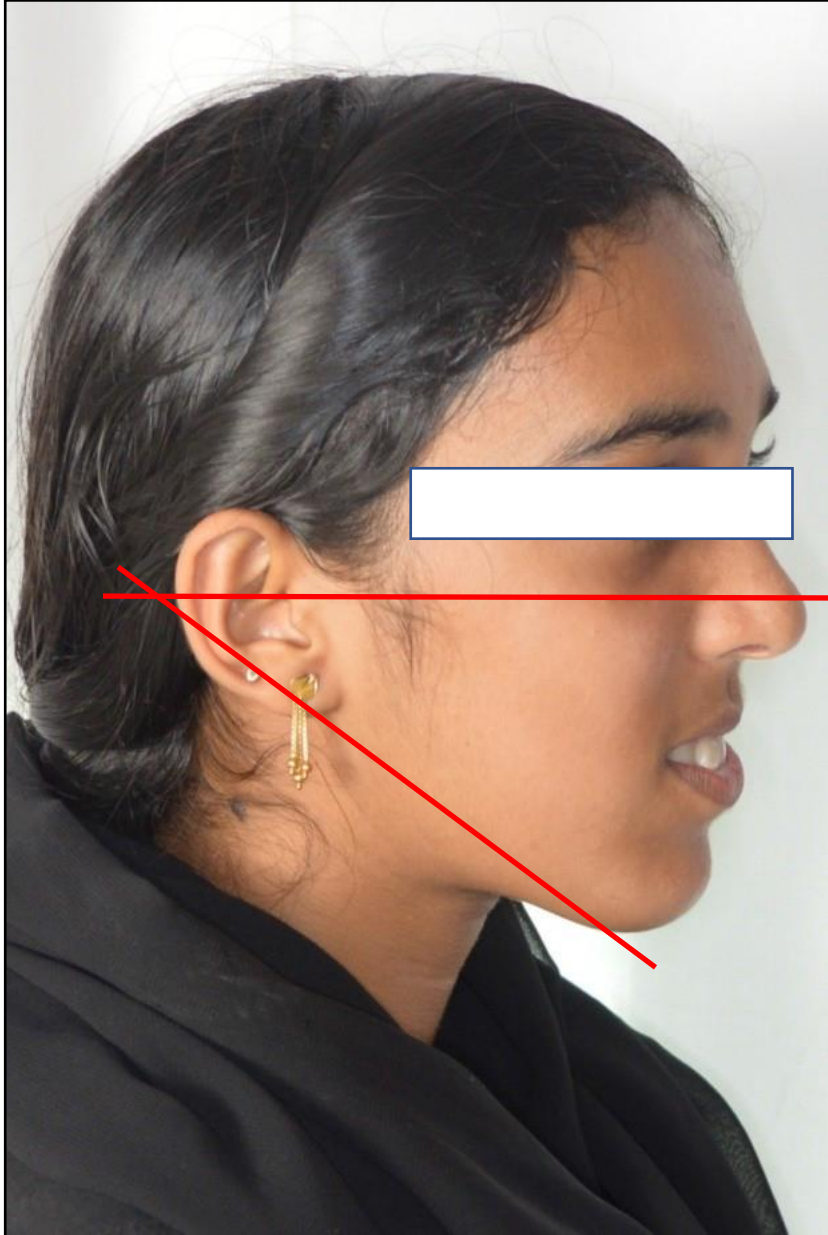
**CONCAVE
PROFILE**

DIVERGENCE

- Term coined by **Milo Hellman**.
- Defined as an anterior or posterior inclination of lower face relative to forehead.
- If it slopes anteriorly- Anterior Divergence
- If it slopes posteriorly- Posterior Divergence



CLINICAL FMA



FACIAL SYMMETRY-

□ Midline structures :

1. Glabella
2. Nasal bridge
3. Nasal tip (Pronasale)
4. Mid point of philtrum of upper lip
5. Dental midlines
6. Midpoint of chin (Pog')



Intraoral examination

The following parameters need to be assessed:

- Amount of overjet and overbite
- Sagittal relations of the molar, canine and occlusal contacts
- Posterior cross-bite and width of the maxilla
- The width of the mandible
- Inclinations of the anterior teeth
- Inclinations of the posterior teeth
- Crowding/spacing
- Curve of Spee.

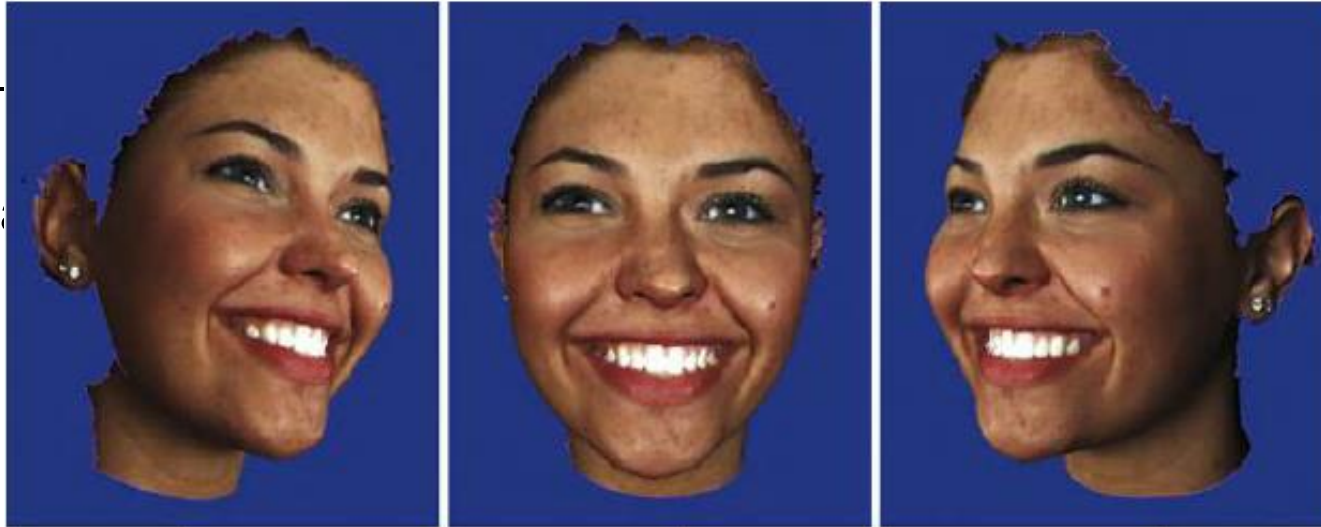
Evaluation of the oral hygiene status, periodontal health, missing or extracted teeth and need for maintenance of -general dental health are also assessed. Possible need for the restorative work and optimization of oral health is a -pre-requisite before considering a case for orthognathic surgery.

□ Functional examination

- Evaluation of speech
- Examination of the oral cavity volume and size of the tongue.
- Evaluation of the size of the tongue is of particular significance in skeletal class III patients.
- A setback surgery can pose volume constraints in accommodating a large size tongue. Tongue size reduction procedure may need to be included in the plan in such clinical situations.

Diagnostic records and investigations

1. Facial photographs—
 2. Study models with w
 3. Lateral cephalogram
 4. Orthopantomograph
- bone available for maki
5. Additional records inc
 6. 3D facial photos su
- prediction of post treatn



assess the interseptal



virtual planning and

Diagnostic features of a dentofacial deformity

MAXILLA







	Clinical Features	Skeletal Assessment	Dental Assessment
Sagittal deficiency	<ul style="list-style-type: none">• Concave facial profile• Retrusive upper lip• Alar base narrow• Lack of dental display	<ul style="list-style-type: none">• SNA decreased• SNB normal• ANB decreased	<ul style="list-style-type: none">• Class III• Maxillary dental crowding• Maxillary incisors proclined• Mandibular incisors normal or proclined
Sagittal excess	<ul style="list-style-type: none">• Convex facial profile• Acute nasolabial angle	<ul style="list-style-type: none">• SNA increased• SNB normal• ANB increased	

	Clinical Features	Skeletal Assessment	Dental Assessment
Vertical excess (long face syndrome)	<ul style="list-style-type: none"> • Convex profile • Lower facial height increased • Alar base constricted • Acute nasolabial angle • Excessive incisor show • Excessive gingival show • Lip incompetence • Mentalis strain with lip closure • Chin vertically long and retruded 	<ul style="list-style-type: none"> • Lower facial height increased • SNA increased • SNB decreased • ANB increased • Steep mandibular plane angle • Increased palatal occlusal plane 	<ul style="list-style-type: none"> • Class II, Class I • Anterior open bite • Constricted maxillary arch • Flat or accentuated curve of Spee • Dental crowding
Vertical deficiency (short face syndrome)	<ul style="list-style-type: none"> • Concave facial profile • Lower facial height increased • Nasolabial angle varies • Alar base widened • Lack of incisor show • Edentulous appearance • Protruded chin 	<ul style="list-style-type: none"> • Lower facial height decreased • SNB increased • ANB negative • Decreased palate–occlusal plane • Acute mandibular plane angle 	<ul style="list-style-type: none"> • Class II, Class I • Deep bite • Crowding in mandibular dentition • Reverse curve of Spee







MANDIBLE

	Clinical Features	Skeletal Assessment	Dental Assessment
Deficiency	<ul style="list-style-type: none"> • Convex profile • Retruded chin • Everted lower lip • Deep mentolabial crease • Mentalis strain with lip closure 	<ul style="list-style-type: none"> • SNA normal • SNB decreased • ANB increased • Ar-Gn decreased 	<ul style="list-style-type: none"> • Class II • Proclined mandibular incisors • Retroclined maxillary incisors • Accentuated curve of Spee
Excess	<ul style="list-style-type: none"> • Concave profile • Deficient appearance of midface • Broad lower third • Thin lower lip 	<ul style="list-style-type: none"> • SNA normal • SNB increased • ANB decreased 	<ul style="list-style-type: none"> • Class III • Proclined maxillary incisors • Retroclined mandibular incisors

Table 67.1 Features of skeletal Class III malocclusion

	 <p data-bbox="828 328 1172 496">Skeletal class III vertical type<ul style="list-style-type: none">• Large SNB• Large gonial angle• Anterior openbite• Increased lower facial height (LFH)</p>
	 <p data-bbox="828 752 1172 921">Skeletal class III showing maxillary deficiency and mandibular excess<ul style="list-style-type: none">• Smaller SNA• Large SNB• Increased mandibular corpus length</p>
	 <p data-bbox="828 1176 1172 1332">Skeletal class III transverse maxillo-mandibular discrepancy<ul style="list-style-type: none">• Posterior crossbite• Large SNB• Open gonial angle• Increased lower facial height</p>

Features of skeletal Class II malocclusion

	 <p data-bbox="1528 328 1893 496">Skeletal class II vertical type<ul style="list-style-type: none">• Large SNA• Small SNB• Decreased mandibular corpus length and ramus height</p>
	 <p data-bbox="1528 752 1893 921">Skeletal class II horizontal type<ul style="list-style-type: none">• Flat mandibular and palatal plane• Small SNB• Decreased mandibular corpus length and ramus height• Decreased LAFH</p>
	 <p data-bbox="1528 1176 1893 1332">Vertical maxillary excess<ul style="list-style-type: none">• Increased anterior facial height• Excessive gingival display• Large mandibular plane angle• Open gonial angle</p>

Epker's envelope of discrepancies

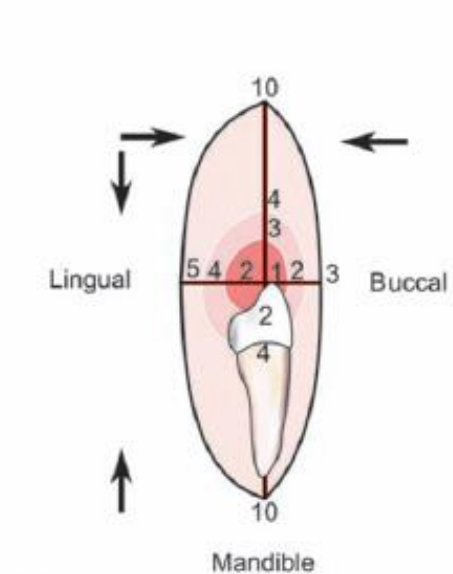
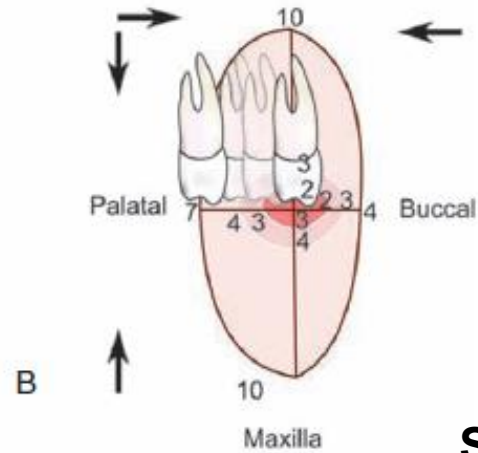
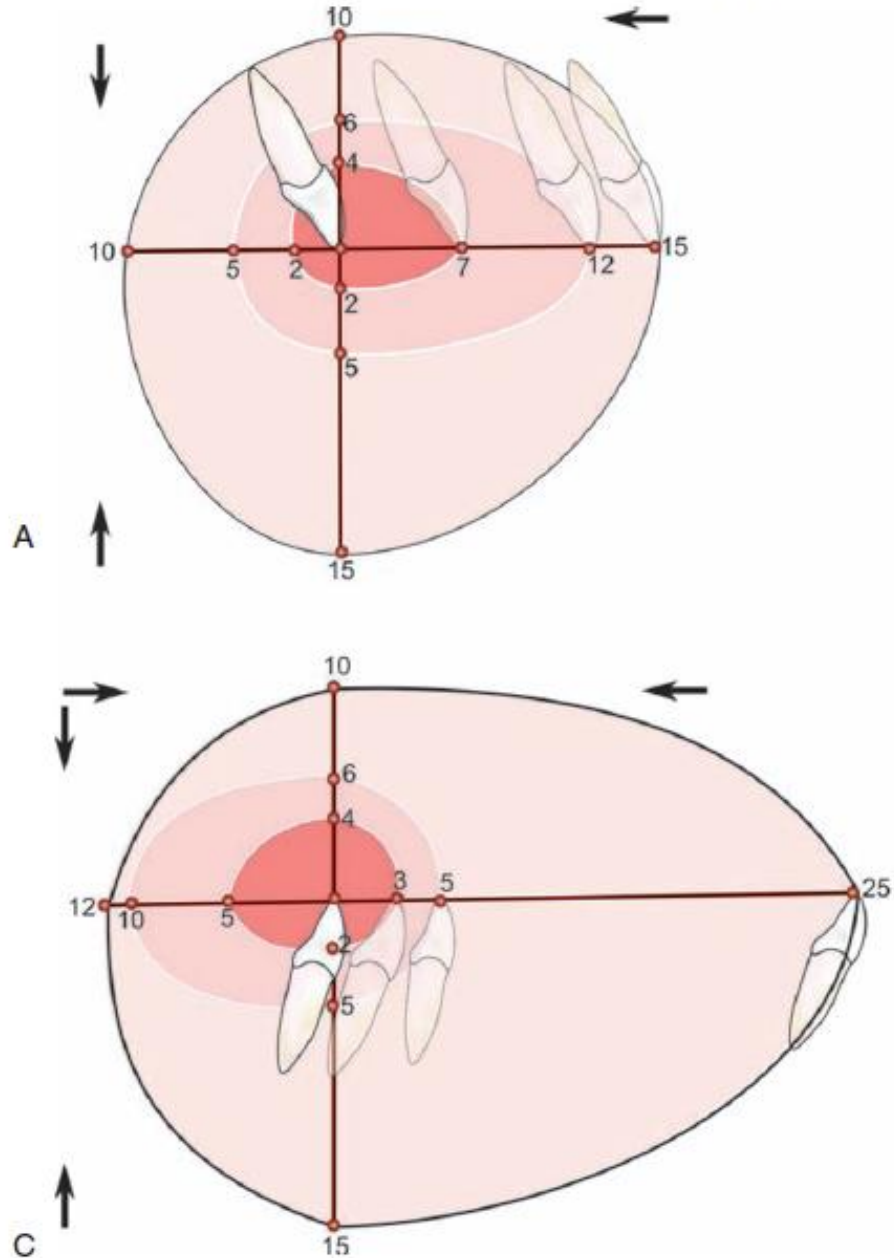


Diagram D: Mandibular arch view showing Epker's envelope of discrepancies. It features three concentric circles: an inner red circle, a middle pink circle, and an outer light pink circle. The arch is divided into segments labeled 1 through 10. Labels 'Lingual' and 'Buccal' are present. Arrows indicate directions of movement.

WHO GAVE????

Surgery vs Temporary skeletal anchorage ??

1. The inner circle indicates the limits to orthodontic treatment.
2. The middle circle indicates the limits to tooth movement combined with growth modification.
3. The outer circle indicates surgical correction.

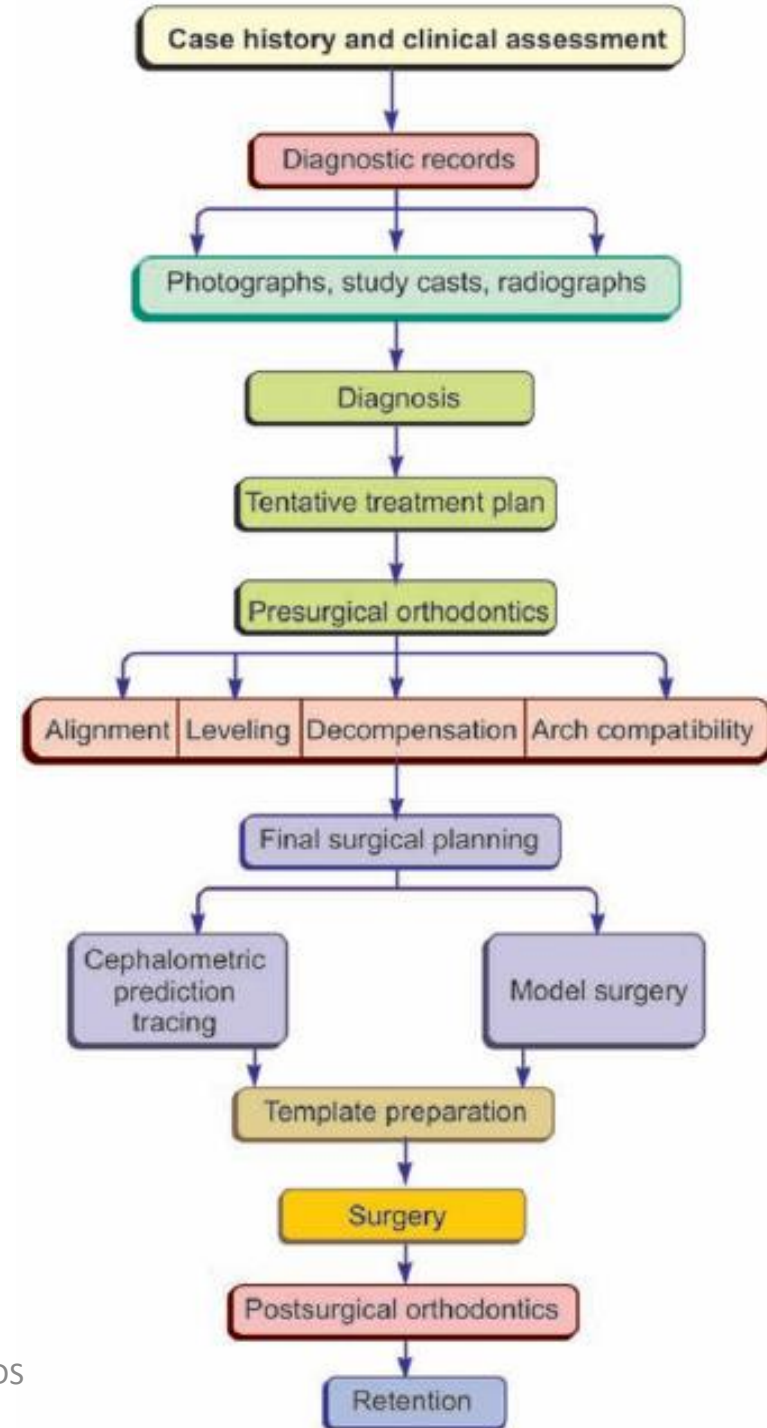
Importance of age in orthognathic surgery

- **Delayed till adulthood** so that the skeletal growth is completed and the deformity is fully expressed.
- The age at which surgery is to be performed is influenced by the sexual dimorphism ,type of deformity to be corrected.
- The **mandible grows till late in adulthood**, more so in subjects with true mandibular prognathism .So surgical intervention in skeletal **class III patients may have to be delayed** until completion of the mandibular growth which may be as late as 22-24 years in males while much early in females.
- Mandibular deficiency patients , maxillary vertical excess may need to undergo surgery early before the growth is complete.

Nature of Problem	Recommended Time of Treatment
Mandibular excess	<ul style="list-style-type: none"> • Treated best when growth is complete • Assessed by hand-wrist radiograph or serial cephalometric tracing
Mandibular deficiency	<ul style="list-style-type: none"> • Girls: 14–16 years; • Boys: Approximately 18 years
Maxillary deficiency	<ul style="list-style-type: none"> • Maxillary advancement may be delayed till adolescent growth spurt
Maxillary excess	<ul style="list-style-type: none"> • After growth completion
Short face	<ul style="list-style-type: none"> • Mandibular ramus surgery is preferred to increase facial height and downward movement of the posterior maxilla. Treated time similar to mandibular deficiency problem
Long face	<ul style="list-style-type: none"> • Le Fort I osteotomy to move maxilla up. This leads to mandibular autorotation. Early surgery not recommended
Asymmetry	<ul style="list-style-type: none"> • Early surgical intervention recommended only when abnormal growth worsens the existing situation, e.g. craniofacial synostosis

TIMING FOR ORTHOGNATHIC SURGERY

Steps in treatment planning in surgical orthodontics



□ STEPS INVOLVED IN AN ORTHOGNATHIC SURGERY PROCEDURE

1. Preorthodontic preparatory phase



2. Presurgical orthodontic treatment phase



3. Surgical phase



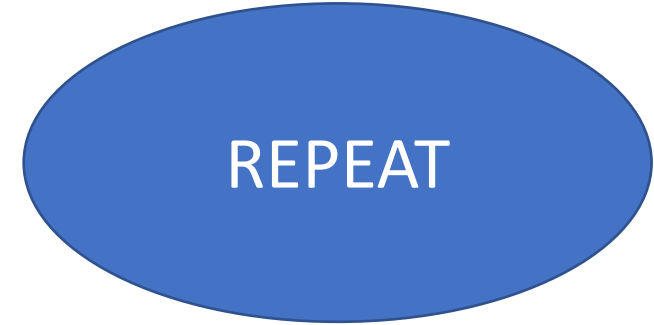
4. Postsurgical orthodontic phase



5. Prosthodontic treatment phase, rehabilitation of occlusion and aesthetic dentistry

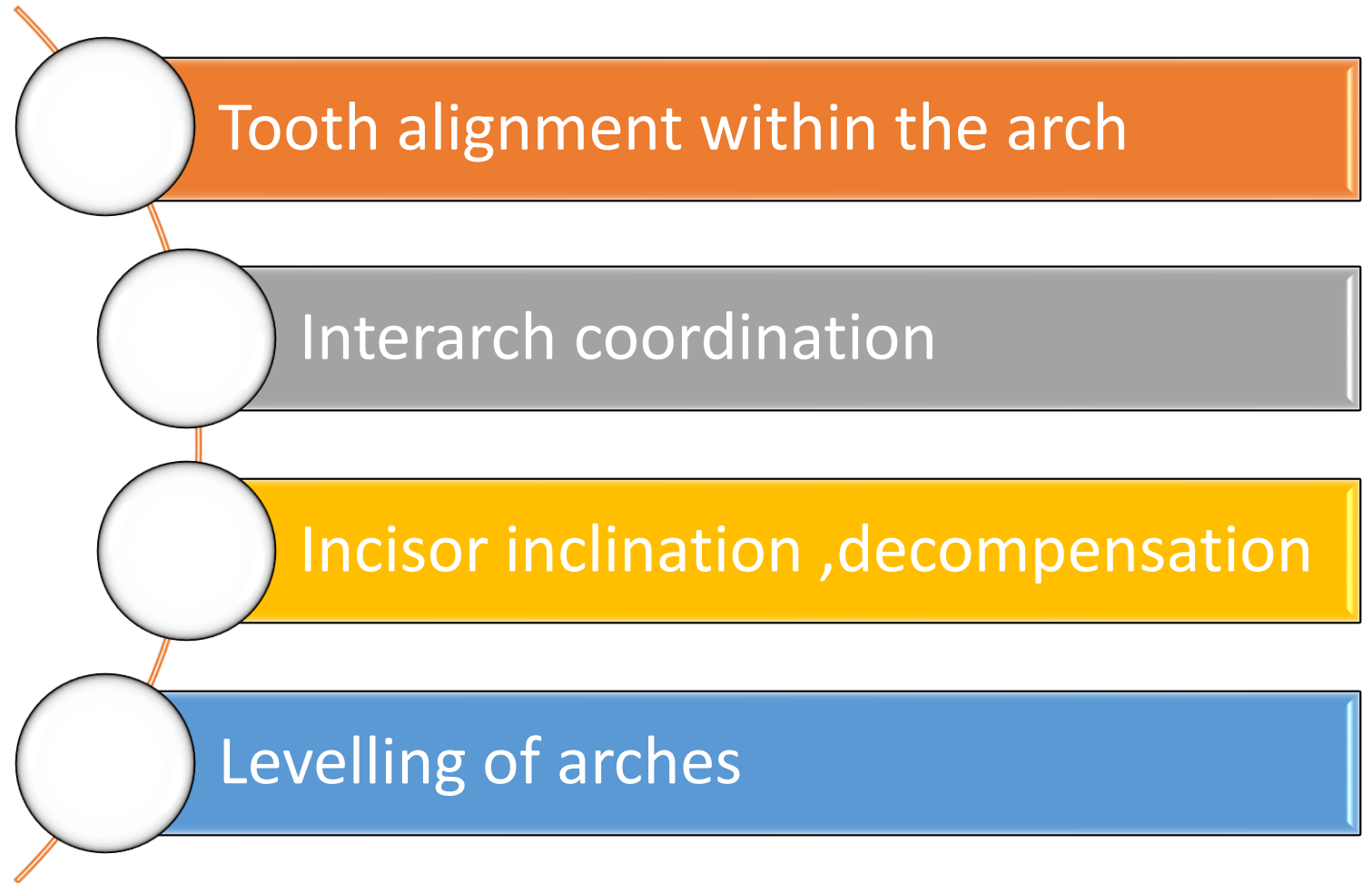


6. Follow-up and retention.

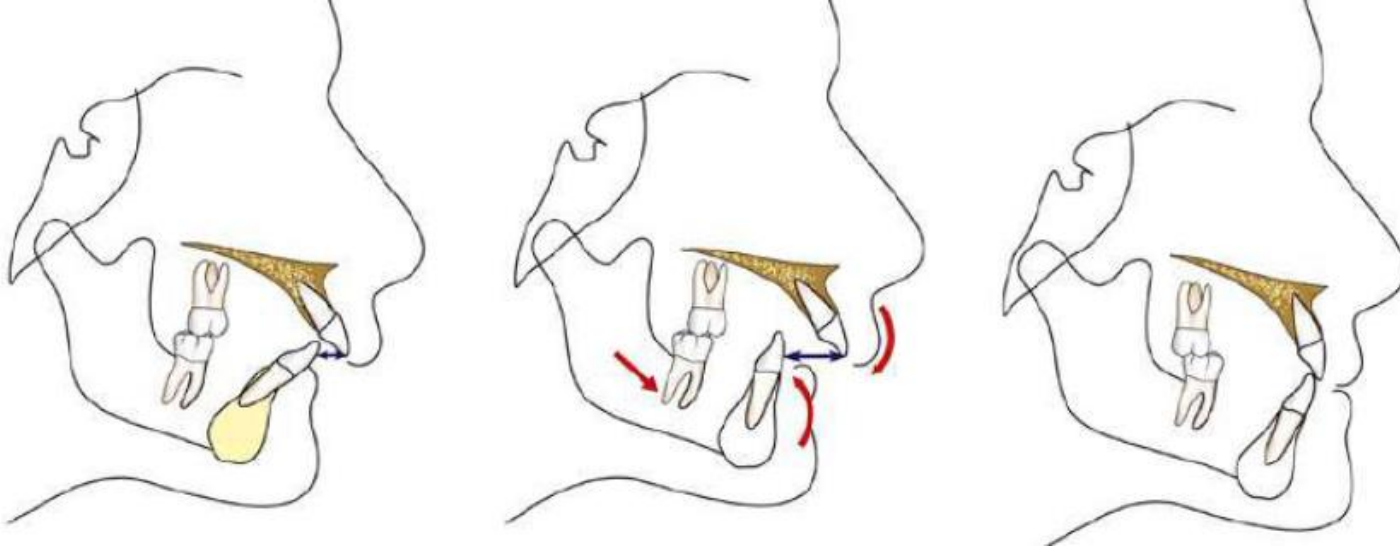


Places teeth to the most acceptable position over the basal alveolar bone in preparation for planned surgery

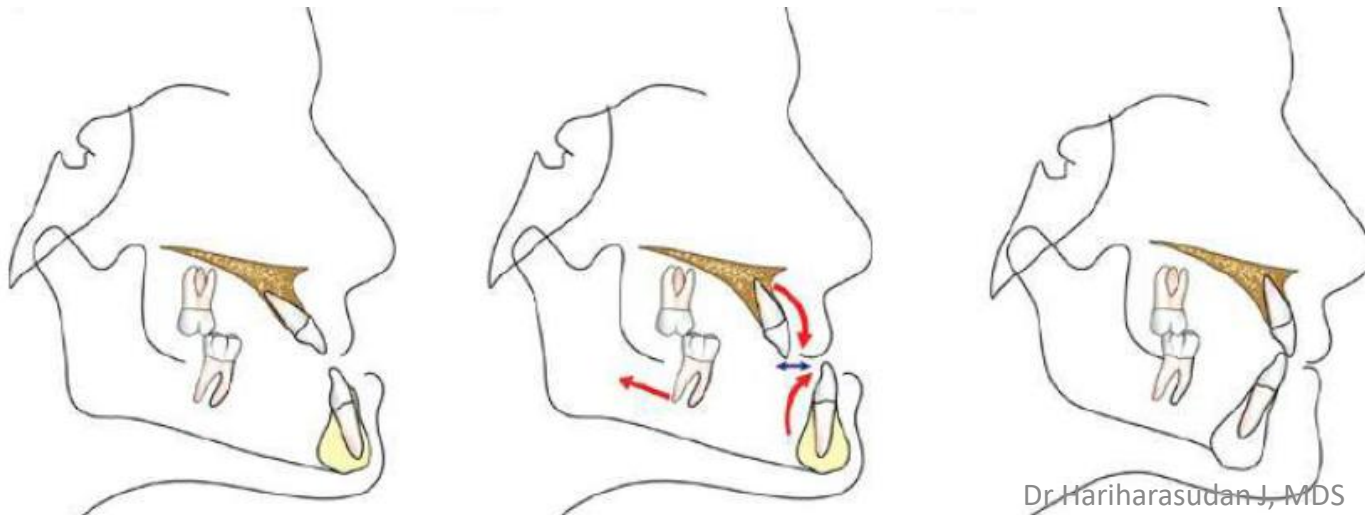
PRE SURGICAL ORTHODONTICS



Pre surgical DECOMPENSATION (Reverse orthodontics)



Skeletal class II Malocclusion



Skeletal class III Malocclusion



- Assessment of the dental compensations in the malocclusion and how the deformity would express when dental decompensations are completed and the teeth would have attained their normal positions on their respective skeletal bases.

- ***Extraction patterns for decompensation (class II)***

- Dental compensation present prior to treatment - Lower incisors are proclined- attempt by the dentoalveolar apparatus to adapt to the underlying skeletal discrepancy.
- Lower first bicuspid can be removed to retract and upright the lower anteriors and allow for greater skeletal movement (finishing class III molar),
- Lower first and upper second bicuspid can be extracted to finish class I molar.
- This decompensation extraction pattern is the opposite to that which would be used in a skeletal II camouflage case.

- ***Extraction patterns for decompensation (class III)***

- Extraction of lower second and upper first bicuspid to finish class I molar

The Surgical Treatment Objective (STO)

- The postsurgical profile of the patient can be predicted with some degree of accuracy by cephalometric means. This is called 'surgical treatment objective (STO)' or **'PREDICTION TRACING'**.
- It is a two-dimensional visual projection of the changes in osseous, dental, and soft tissues as a result of orthodontics and orthognathic surgical correction of the dentofacial and occlusal deformity.

- The three purposes of STO are:
 1. Establishment of goals in presurgical orthodontics
 2. Development of an accurate surgical objective to achieve the best functional and esthetic outcome
 3. Creation of facial profile objective that can be used as a visual tool for consultation with the patient and their family.

- PREDICTION TRACING is done **TWICE**—once before the start of the treatment to determine the orthodontic and surgical goals and again after the completion of presurgical orthodontics, but before surgery, to allow the surgeon to accurately measure the amount of skeletal movements to be achieved during surgery.
- After locating and assessing the severity of deformity, the osteotomy and the extent of movement of the osteotomized segment is determined.
- The osteotomized segment is cut out and moved as determined on the acetate tracing of the cephalogram. The soft tissue follows bone movement in a ratio determined by the type and technique of the movement.
- These soft tissue changes are marked on the traced cephalogram to obtain the postoperative profile and acts as a guide for prediction tracings.



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MOCK SURGERY

REPEAT

- The surgical plan is formulated by using the prediction tracings as a guide and then surgery is simulated on the articulated working models.
- Model surgery is done on mounted articulators. Two types of articulators are used.
 1. *Arbitrary articulator*: Indicated in conditions where the condylar position is not altered in surgery.
 2. *Semiadjustable articulator*: Indicated in cases where the condylar position is altered during surgery.
- After the models are articulated, cuts are made in the planned area of the model. They are then repositioned in the desired planned position and the segments secured in their new position with sticky wax.

- **Model surgery has got important purposes:**

1. To verify whether the planned movements are possible.

2. To process the occlusal wafer splints.

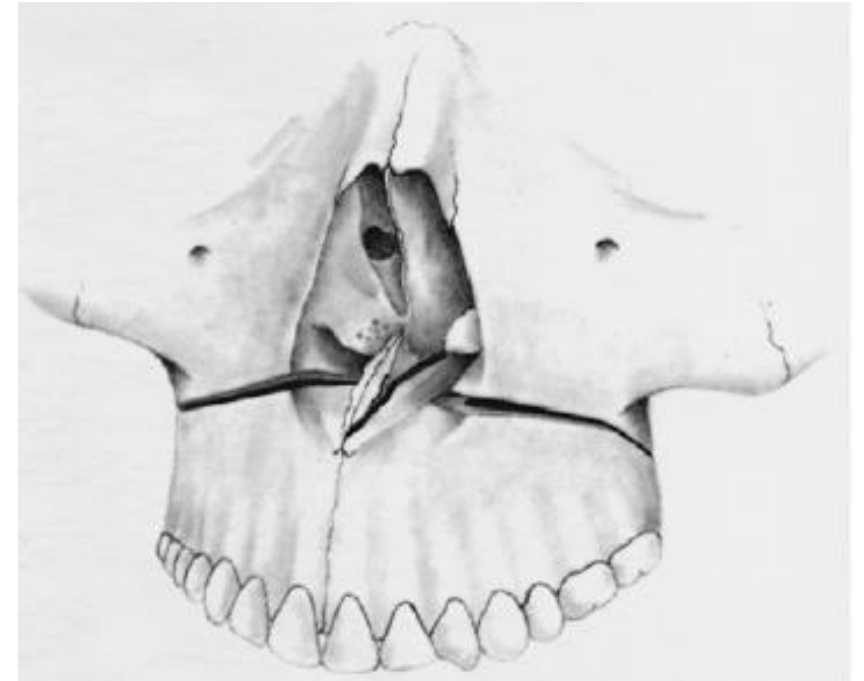
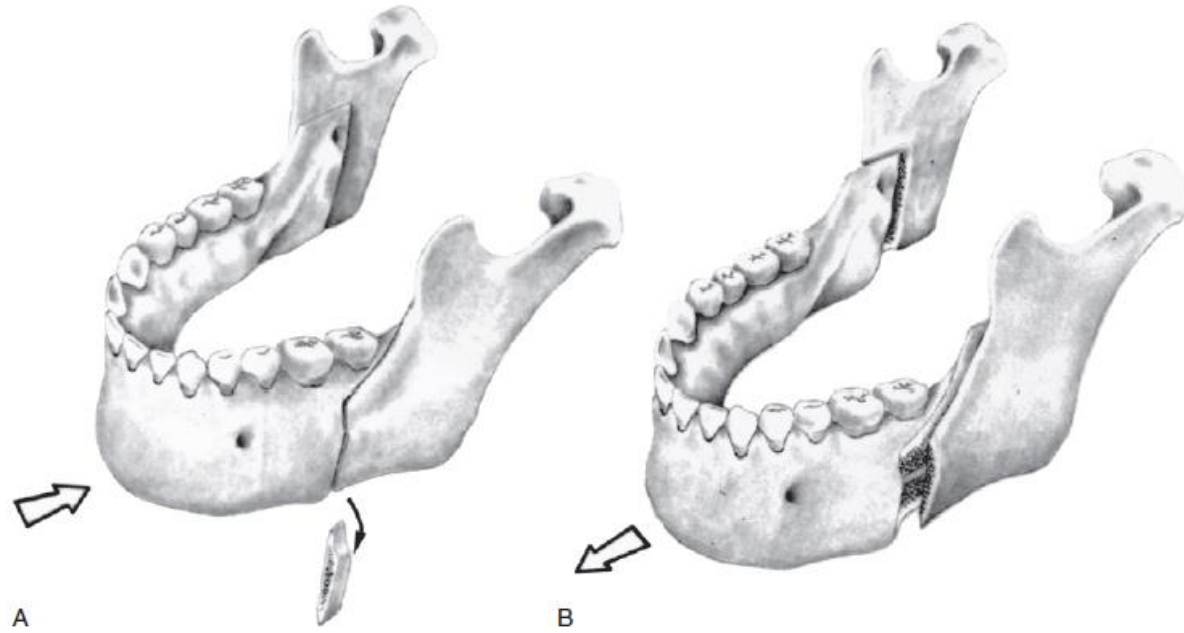
3. Aids in evaluation of treatment outcome and any possible modifications needed for surgical treatment are noted.

- The acrylic occlusal splints are fabricated in new occlusal positions that will be of great help during surgery.

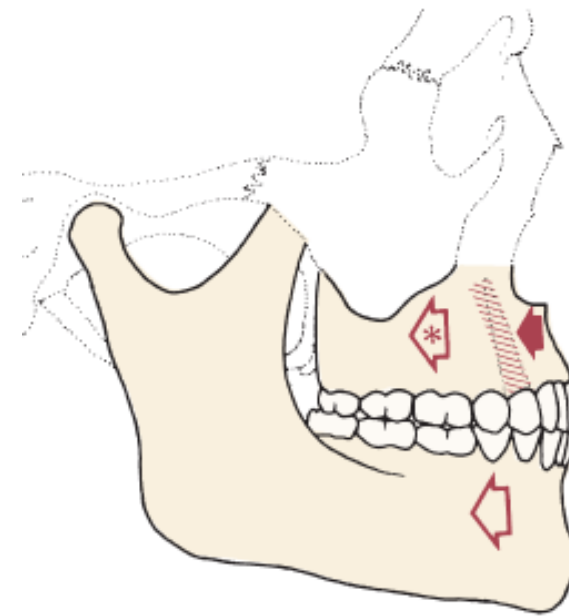
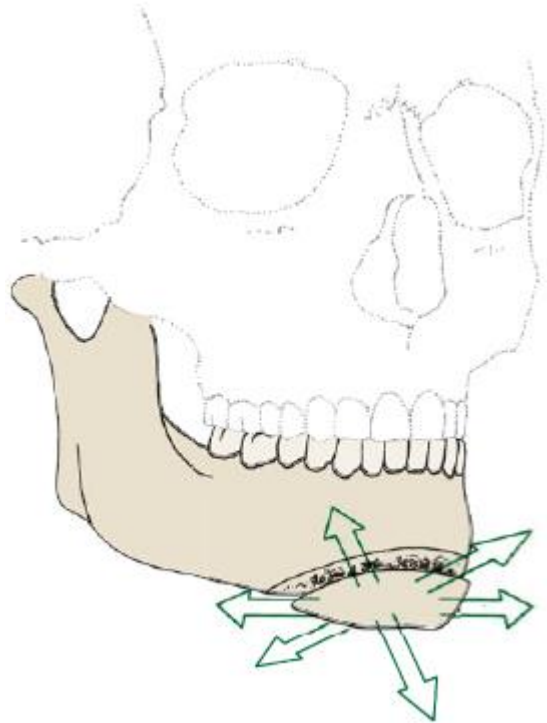
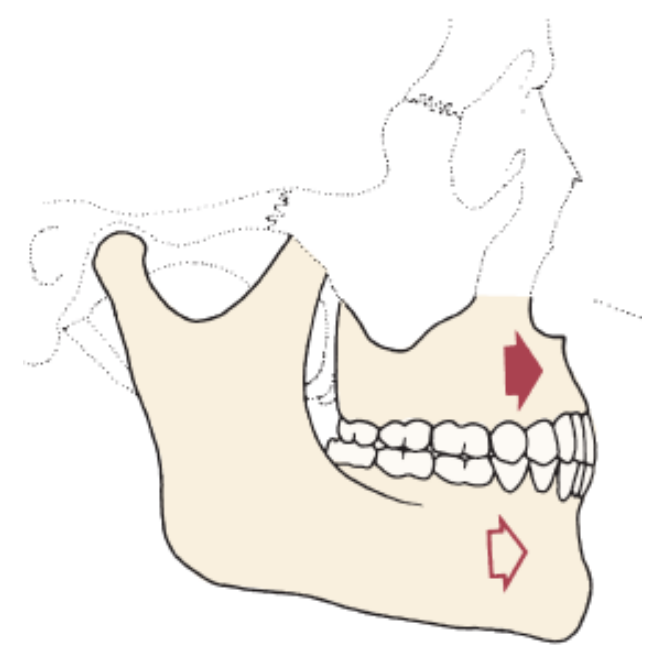
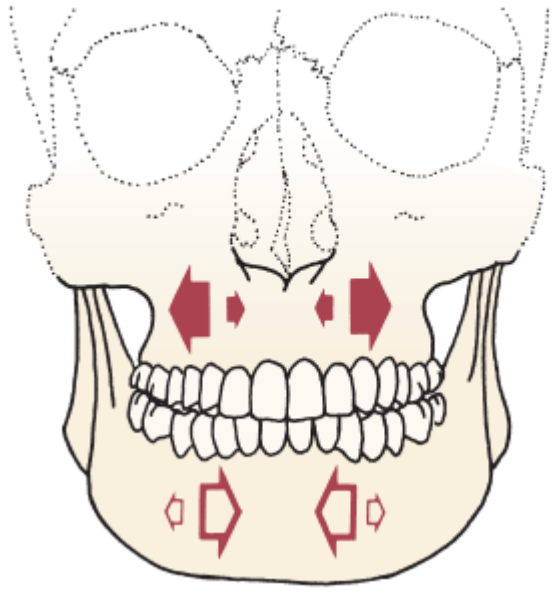
- If surgery is planned in both the jaws, maxillary cast is moved first and fixed on the articulator. Occlusal splint is made in this position for the first stage. Then the mandibular cast is repositioned to occlude with the maxillary cast. The second stage occlusal splint is prepared.



SURGICAL PHASE







Surgical treatment options for skeletal jaw discrepancy

Problem	Affected side	Procedure(s)
Mandibular deficiency	Bilateral	Sagittal split osteotomy with advancement
Mandibular excess	Bilateral	Sagittal split osteotomy with a setback
Horizontal chin deficiency		Advancement genioplasty
Bimaxillary protrusion		Pre-maxillary osteotomy such as Wassmund operation in the maxilla Segmental osteotomy of the anterior mandible
Maxillary protrusion		Pre-maxillary osteotomy such as Wassmund operation in the maxilla
Excess vertical growth of the maxilla		Le Fort I procedure with maxillary impaction
Maxillary horizontal deficiency		Le Fort I procedure with maxillary advancement
Class III with vertical maxillary deficiency and mandibular excess	Bilateral	Le Fort I procedure with maxillary advancement, inferior positioning with bone grafting Sagittal split osteotomy with a setback
Class III with vertical maxillary excess and mandibular excess	Bilateral	Le Fort I procedure with maxillary impaction Sagittal split osteotomy with a setback
Mandibular deficiency with high mandibular plane angle	Bilateral	Le Fort I procedure with maxillary impaction Sagittal split osteotomy, mandibular advancement
Asymmetry of the face		Differential Le Fort procedure of the maxilla Sagittal split osteotomy and rotation/genioplasty with rotation

➤ Mandibular prognathism

The various procedures employed for sagittal mandibular correction or setback:

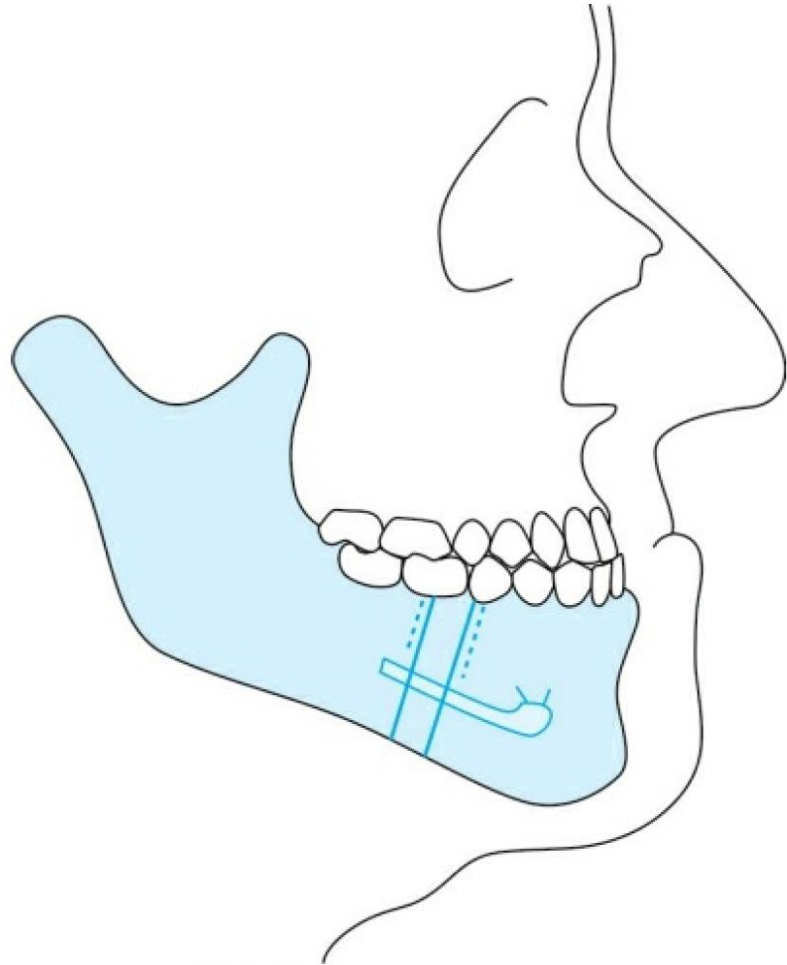


FIG. 27.7. Body osteotomy.

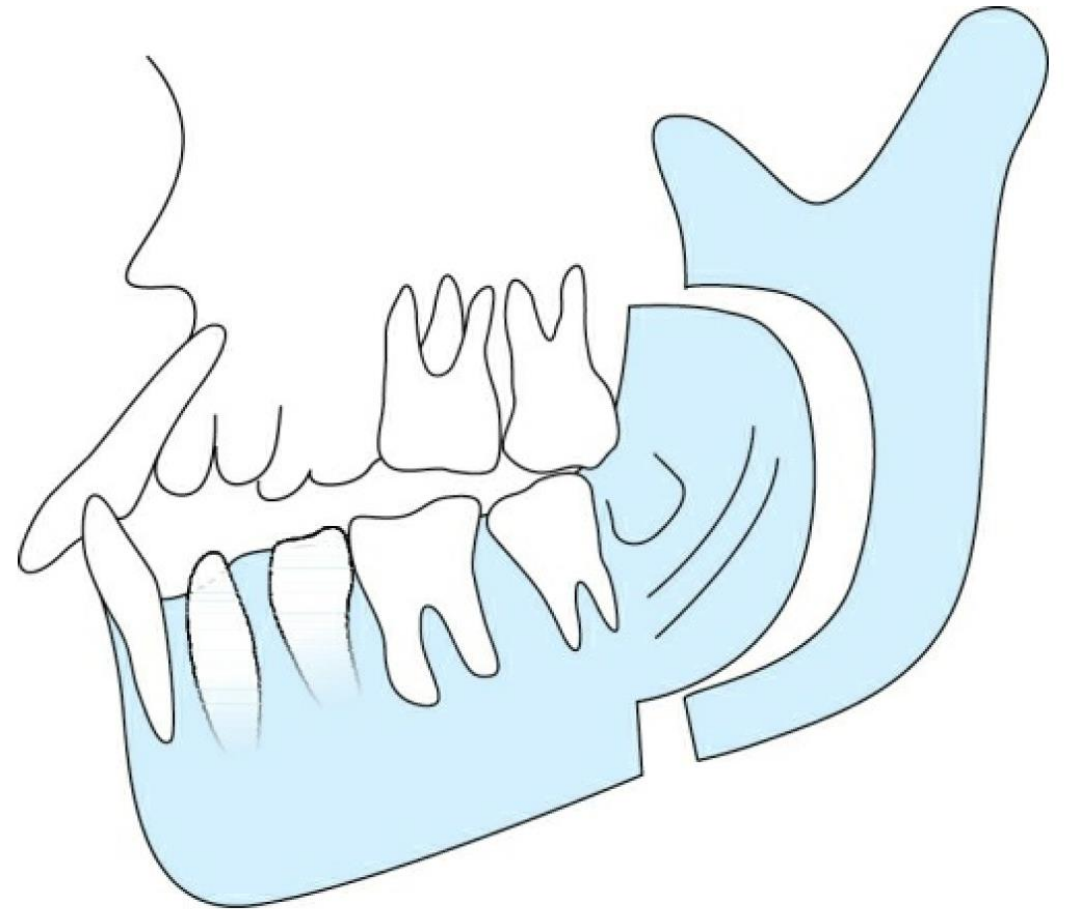


FIG. 27.8. C osteotomy.

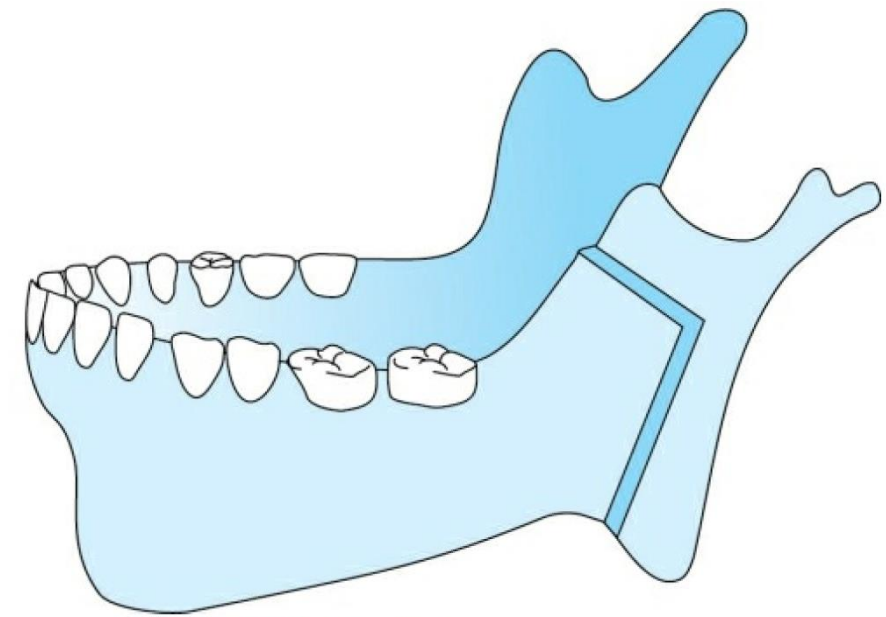


FIG. 27.9. Mandibular ramus osteotomy.

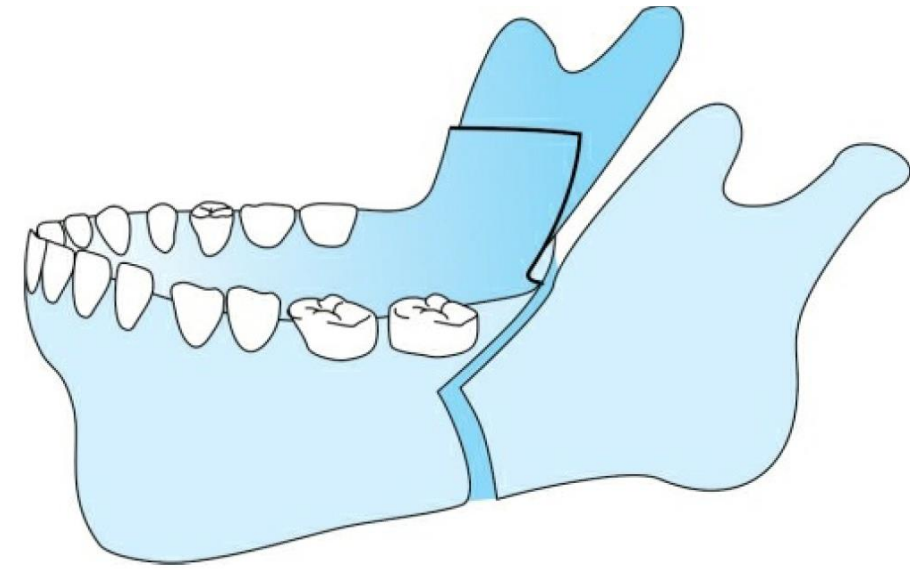


FIG. 27.10. Sagittal split technique.

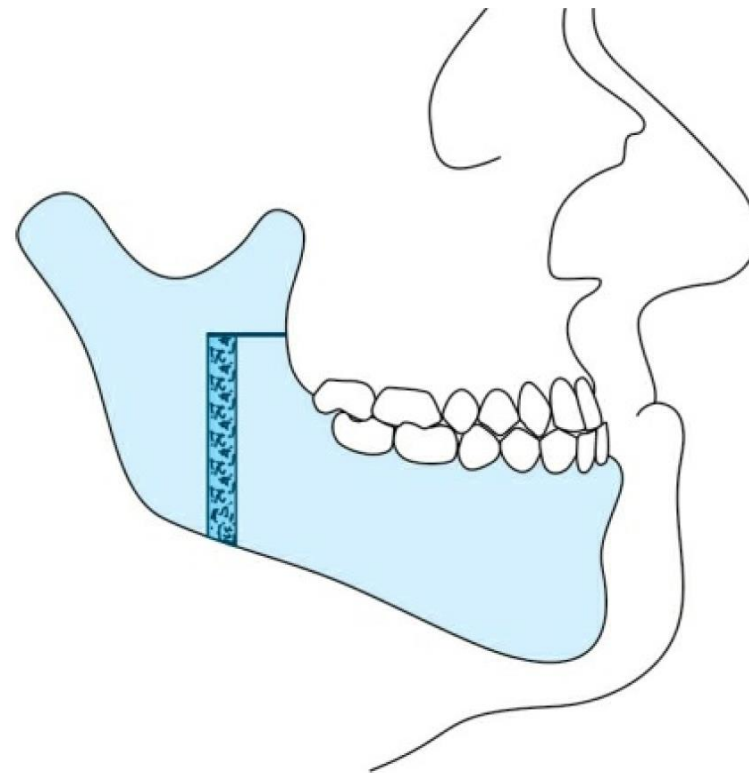


FIG. 27.11. Vertical subsigmoid osteotomy.

➤ Maxillary retrusion

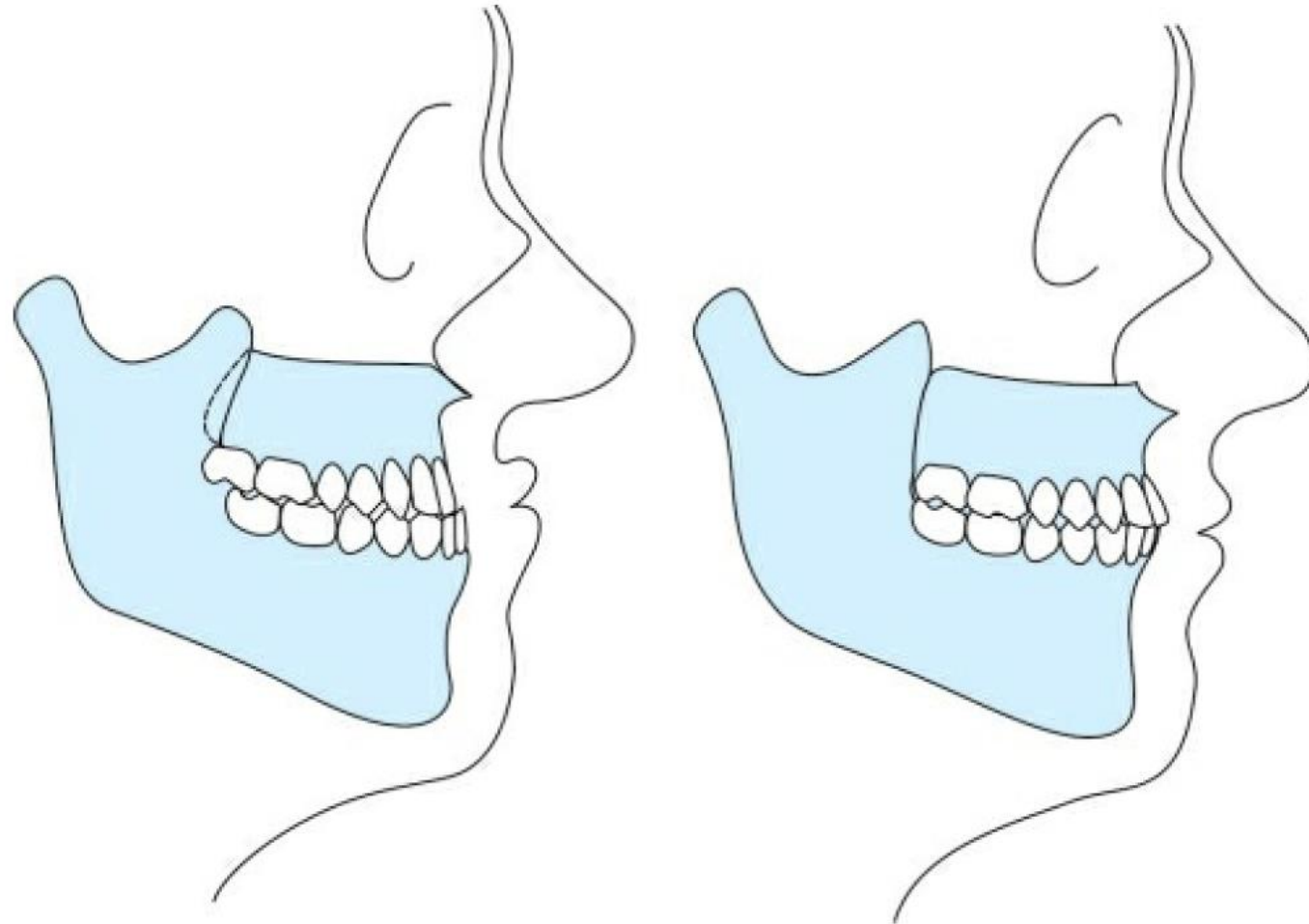


FIG. 27.12. Maxillary osteotomy.

➤ Surgical correction of receding chin/deficient chin

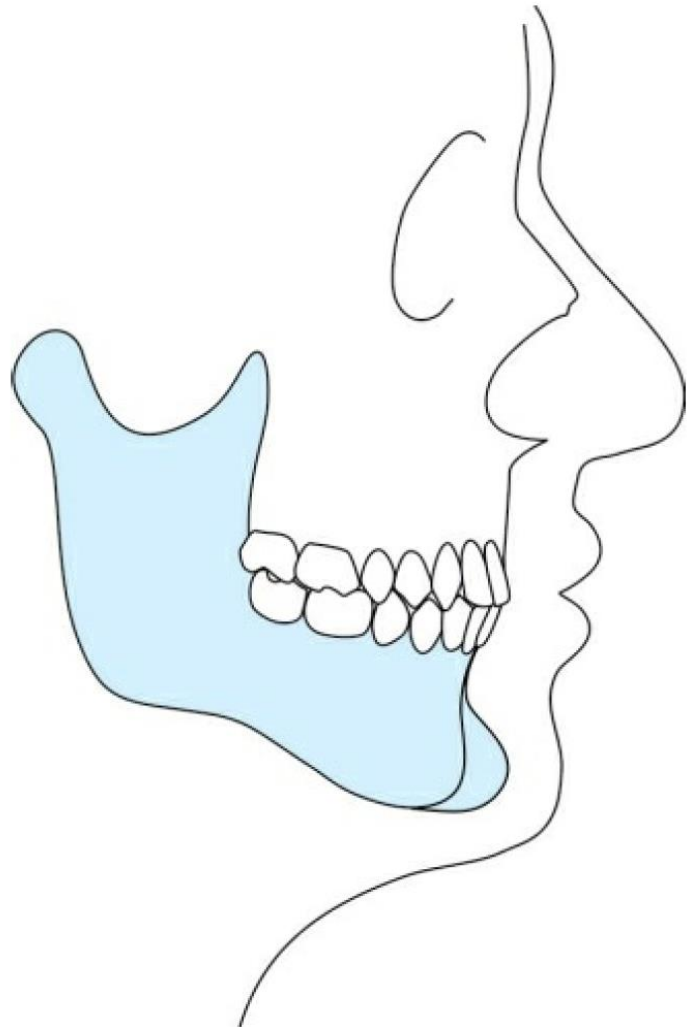


FIG. 27.13. Chin onlay.

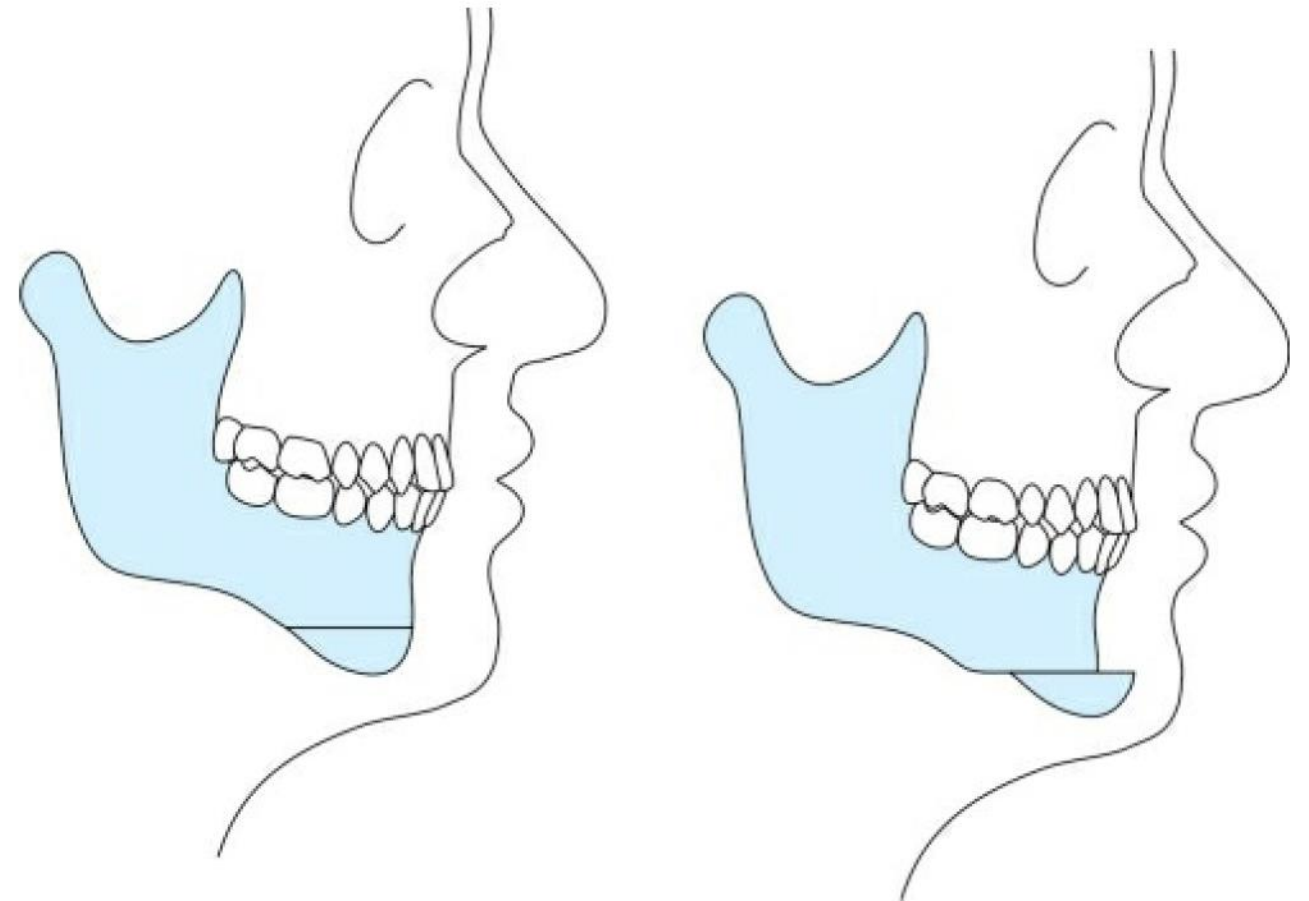


FIG. 27.14. Sliding genioplasty.

➤ Surgical correction of class II malocclusion

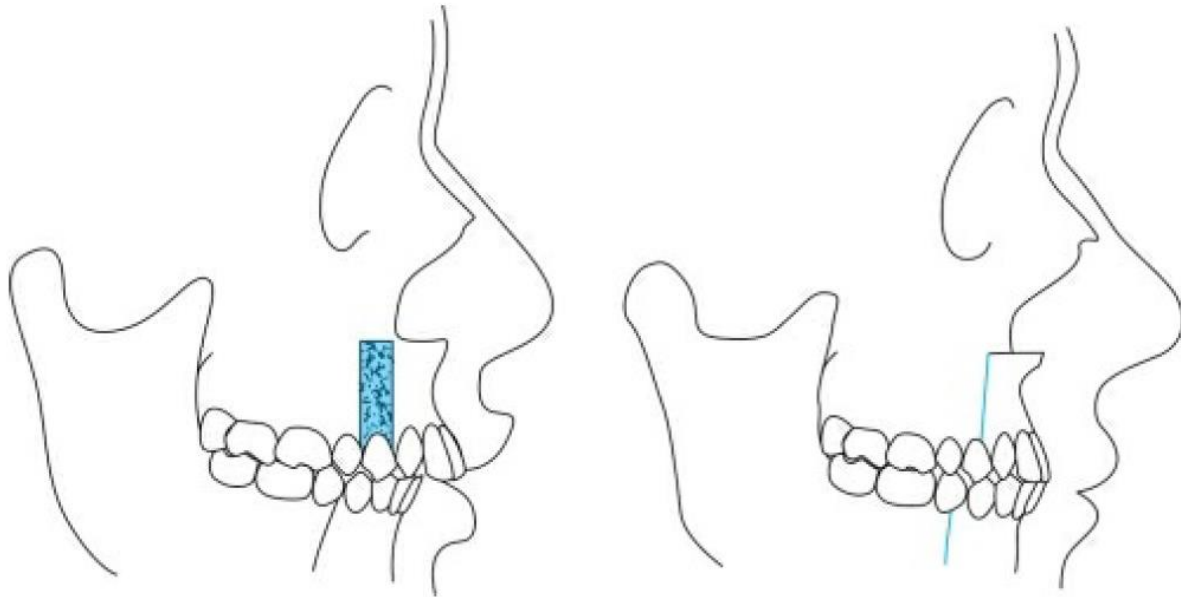


FIG. 27.16. Prognathic maxilla with normal chin: Wassmund procedure.

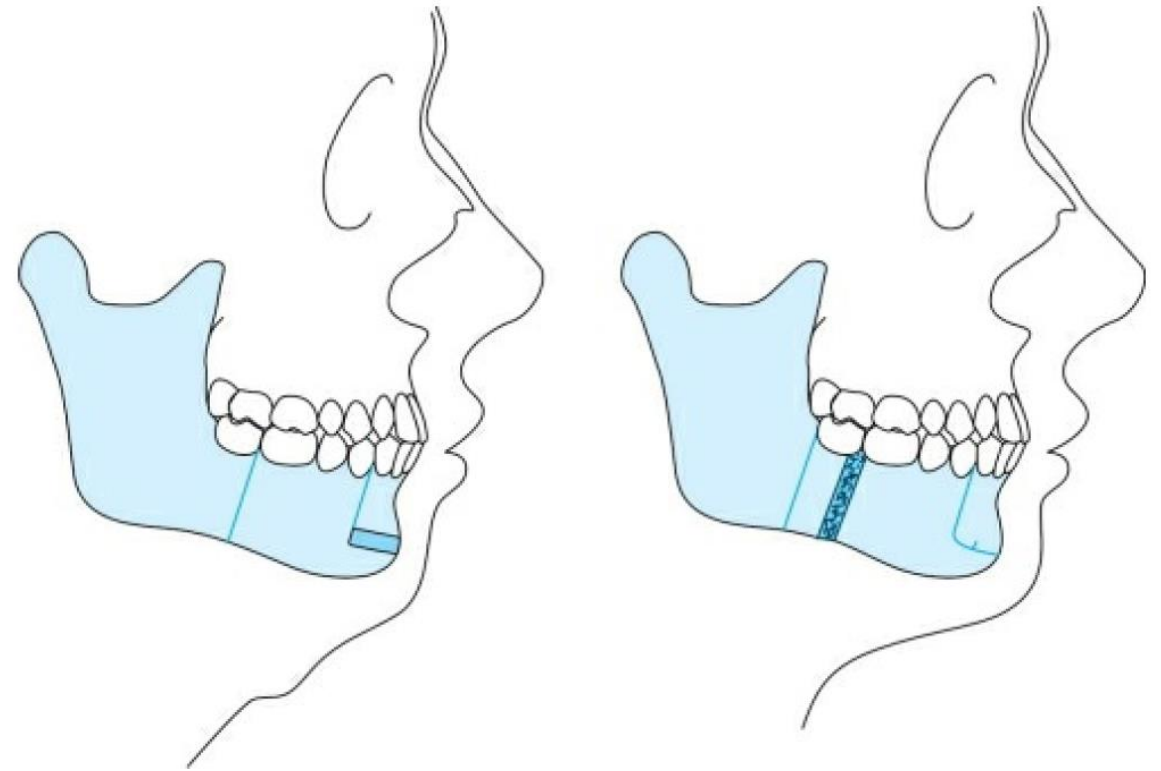
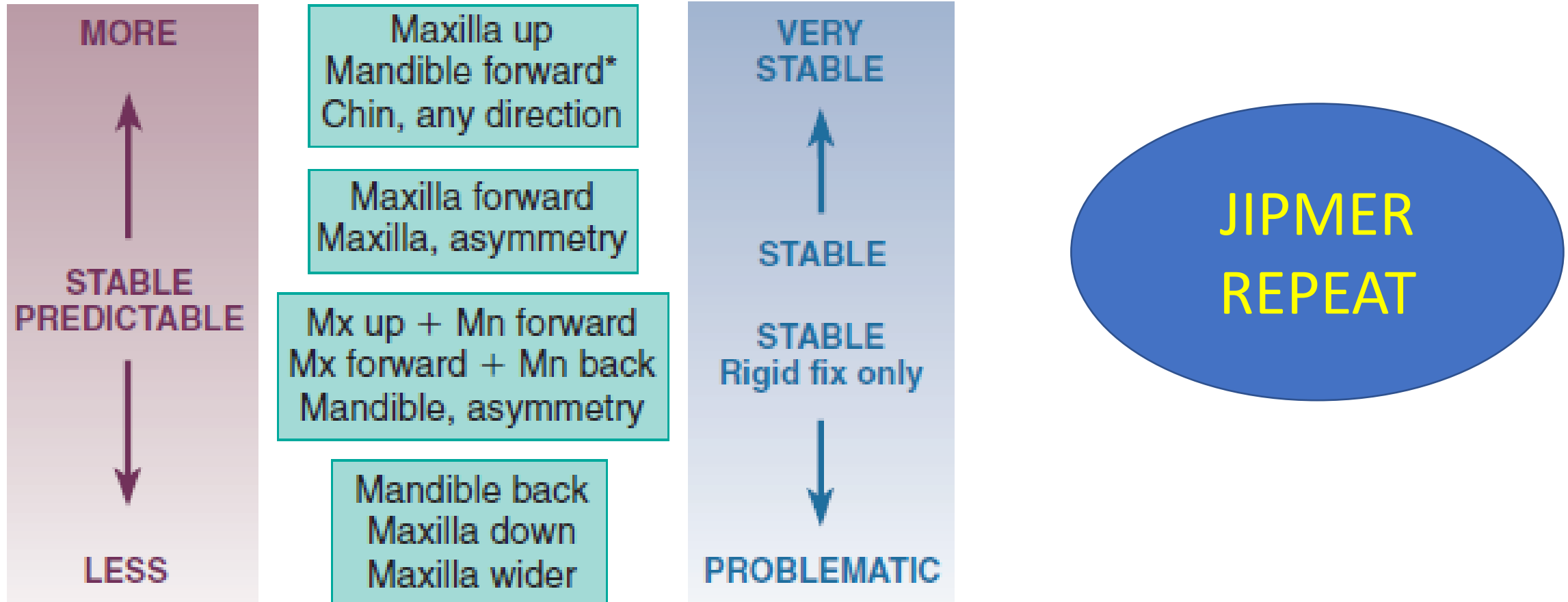


FIG. 27.17. Retrognathic mandible: BSSO with Kole procedure.

Post surgical stability and clinical success

Surgical-Orthodontic Treatment: A Hierarchy of Stability



Postsurgical Orthodontics

- The orthodontist removes the splint and the stabilizing archwire and places the working archwires.
- The occlusal splint together with the stabilizing archwire provides the maximum intercuspation at the surgical position established, which is at centric relation or close to it.
- This can be maintained for 4–5 weeks following which the splint is removed on the same day as the stabilizing archwire is removed and replaced with working archwires.

- If the splint is removed, but the stabilizing archwire remains, then teeth are held rigidly not allowing them to move. But the number of tooth contacts is very less when the condyles are seated. So the mandible searches for a new occlusion with greater intercuspatation producing less-than-ideal, convenience bite.
- But if the stabilizing archwire was removed along with the splint, then the working archwire would have allowed the teeth to move and settle into good intercuspatation instead of moving the mandible.
- Light elastics are placed to settle the teeth into occlusion. The elastics also help to position the mandible into maximum intercuspatation.
- Postsurgical orthodontics is usually completed in 3–6 months.

CLINICAL SIGNIFICANCE

Time Estimate for Combined Orthodontic and Surgical Treatment (Based on Proffit and White)

- Presurgical orthodontics: 2–12 months
- Surgery/hospitalization: 1–5 days
- Patient under surgeon's care: 3–8 weeks
- Postsurgical orthodontics: 3–6 months

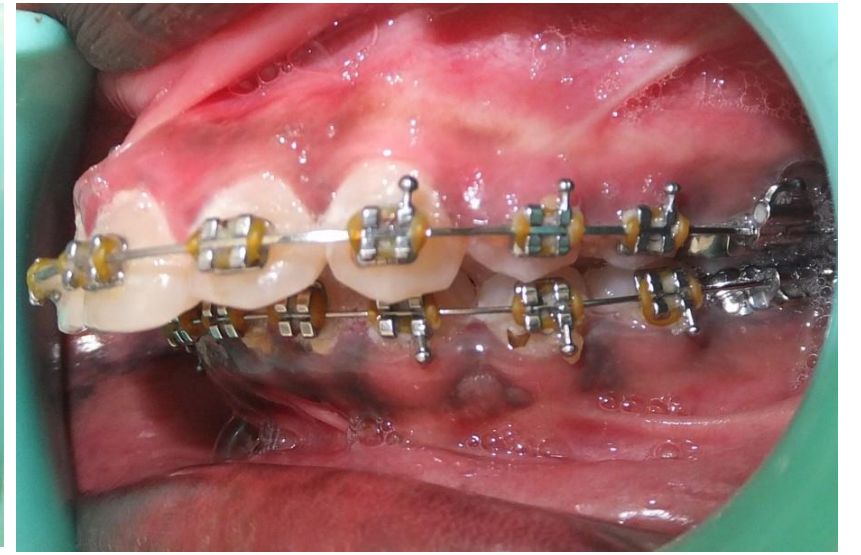
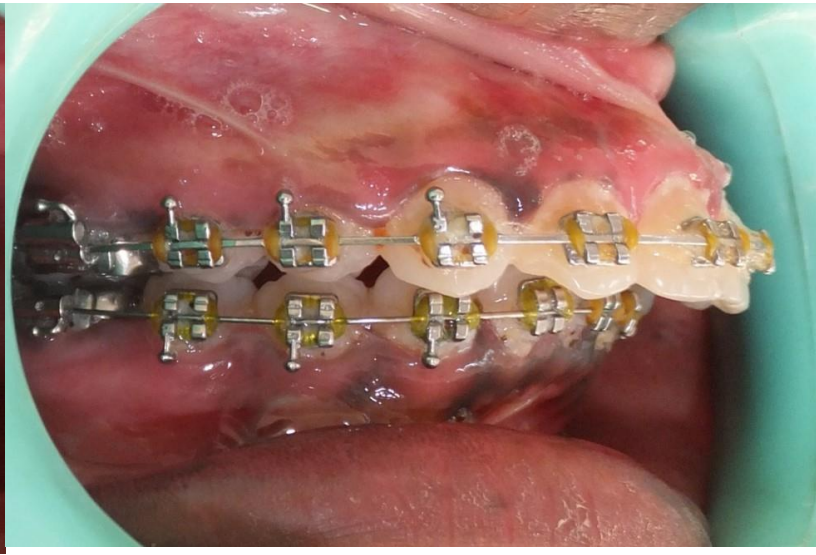
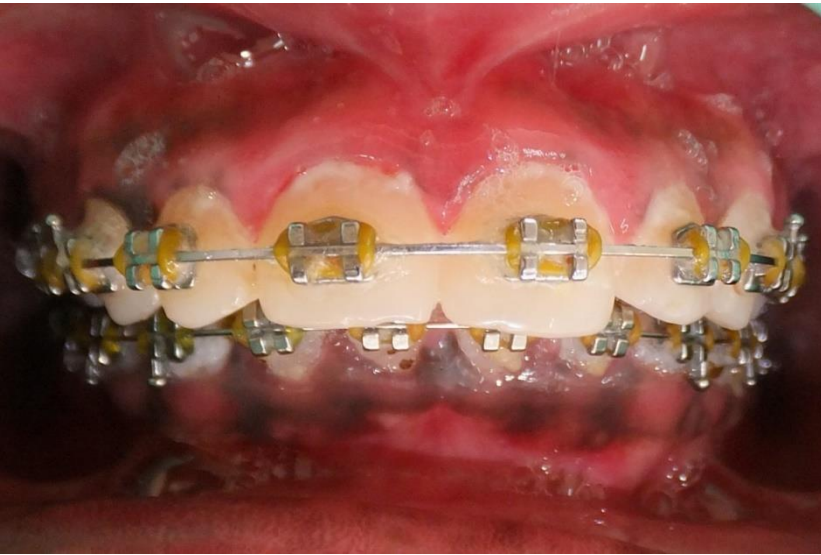
PRE PHOTOGRAPHS



A CASE OF CONVENTIONAL ORTHOGNATHIC SURGERY







PRE CEPH



MID CEPH



PREDICTION TRACING

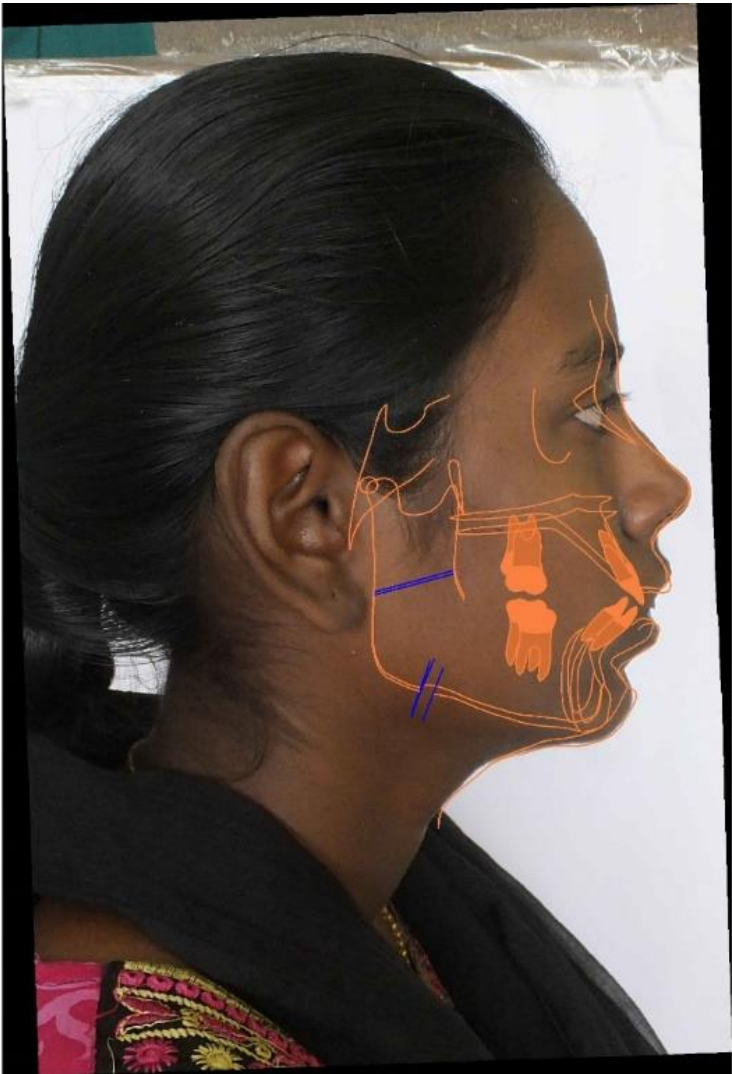
MANDIBLE

4 mm SAGITTAL ADVANCE

MAXILLA

5 mm VERTICAL
IMPACTION

2 mm SETBACK







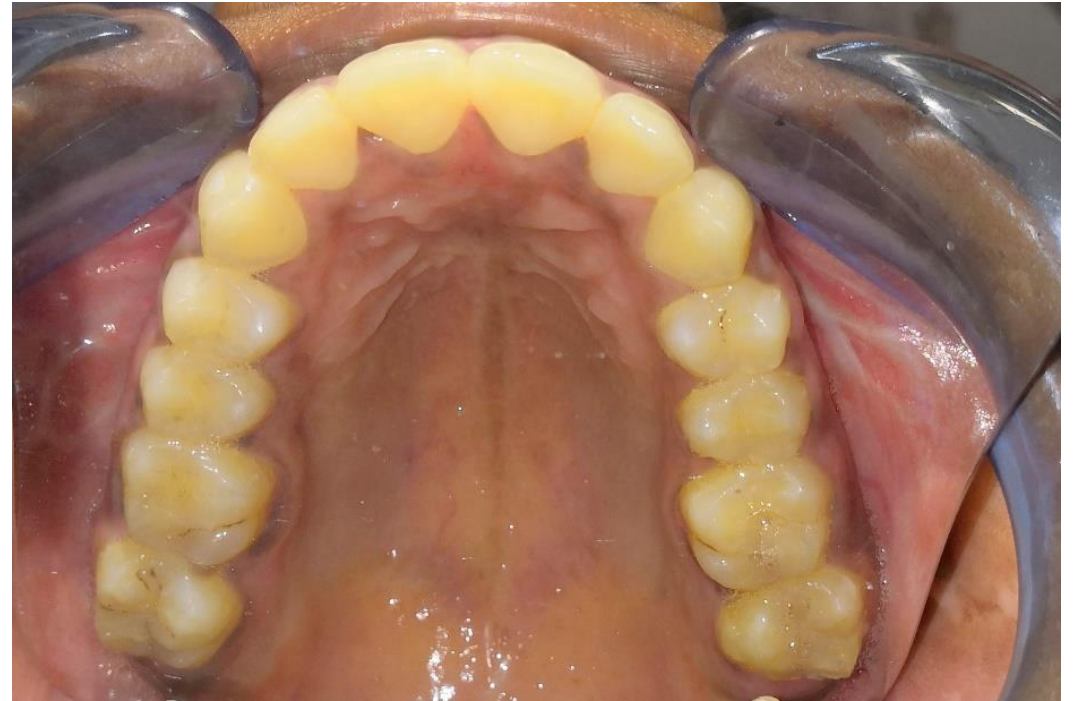


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Surgery first orthognathic approach (SFOA)

RECENT TRENDS

Surgery first orthognathic approach (SFOA)

- Orthognathic surgery precedes the orthodontic treatment
- Orthodontics-first approach (**CONVENTIONAL**) indicates that the orthodontic treatment precedes the orthognathic surgery which encompasses a prolonged treatment duration and temporary worsening of facial appearance.
- The surgery first approach (SFA) technique or first-orthognathic-approach or SFOA involves rigid fixation followed by rapid orthodontic treatment to take advantage of the regional acceleratory phenomenon (RAP).

- Treatment time is as short as 7 months have been reported in the literature and bypassing pre-surgical orthodontics results in an overall shortened treatment time up to 1- 1.5 years.
- Indications:
 1. The SFA can be used in those non-growing individuals who have well-aligned arches and a flat to mild curve of Spee.
 2. Normal to mild proclination/retroclination of incisors
 3. Minimal transverse discrepancy.

- **Steps in surgery first approach**

1. Following complete records and discussion on the plan of the surgery both the arches are bonded and banded, but ***no archwires are placed.***
2. The ***model surgery is performed*** as per the determined end objectives of the occlusion or class I molar relations.
3. Following surgery the ***orthodontic treatment is initiated 1 week to one month after surgery*** to take advantage of the regional acceleratory phenomenon (RAP).
4. Orthodontic treatment involves ***de-compensation and flattening of the curve of Spee.***

Advantages of surgery first approach, according to Liou et al

1. Patient's chief complaint, dental function, and facial aesthetics are achieved and improved in the beginning of the treatment;
2. The entire treatment period is shortened to 1-1.5 years or less
3. The phenomenon of postoperative accelerated orthodontic tooth movement reduces the difficulty and treatment time of orthodontic management in the SFA.

Disadvantages :

- Predicting the final occlusion is the hardest challenge with SFA due to multiple dental interferences.
- Cases requiring extractions are extraordinarily complicated to plan while performing surgery-first approach.
- Any minor surgical error can compromise the final occlusion .
- The planning process highly time consuming.
- The increase in the number and complexity of osteotomy procedures poses a greater risk to the patient.

SOFT-TISSUE CHANGES FOLLOWING ORTHOGNATHIC SURGERY

- When **mandibular setback** is done, the volume of the oral cavity is reduced, so the tongue could block the airway unless physiologic adaptation occurs.
- The tongue does adapt by repositioning itself downward rather than backward. The result is patency of airway, but fullness in the submandibular area is seen, leading to **'double chin' or 'turkey gobbler effect'**. Submental lipectomy can be effective, but a part of the bulge is due to muscle and not fat.
- **Superior repositioning of the maxilla** may contribute to **widening of the alar nasal base**. An alar cinch procedure is widely used to correct this problem.

- Sometimes, a superior repositioning done to correct an anterior open bite can be accompanied by simultaneous ***V-Y cheiloplasty to improve a short philtrum common in long face patients***. This causes an increase in philtrum height to equal the commissural height.
- If **maxillary advancement** is performed, the ***tip of the nose is more projected*** than it was preoperatively. A previously prominent dorsum may now look as an insufficient dorsum.
- If the ***maxilla is moved posteriorly***, the ***tip of the nose may be inadequately projected*** and the dorsum looks more projected, requiring its reduction or more support for the columella.

SFOA





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DIAGNOSIS

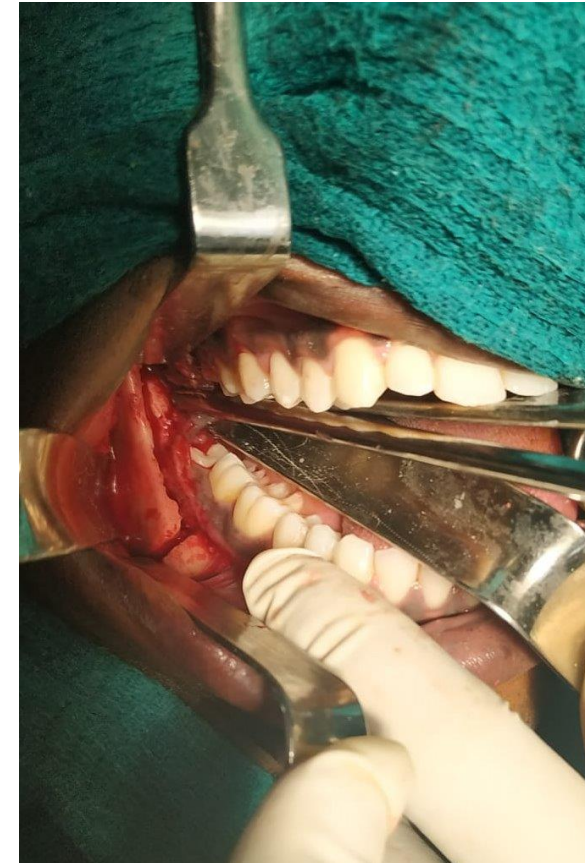
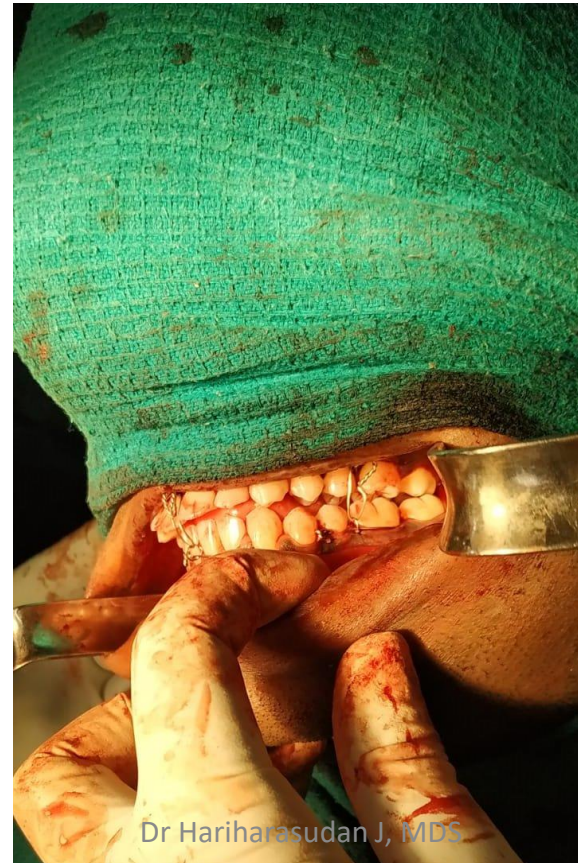
Angle's class III-sub division malocclusion on a class III skeletal base attributed to Orthognathic maxilla, Prognathic mandible , Horizontal growth pattern , with proclined upper and lower incisors, Infra eruption of upper incisors and posteriors in mandible, with class III canine relation on both sides, Class III incisor relationship , negative overjet Of -3mm, with anterior crossbite of 11,21,22,23 with missing 28,38, Spacing irt lower anteriors, Crowding irt upper anteriors, Rotated 12,34, with concave profile and competent lips.

LATERAL CEPHALOGRAM



TREATMENT PLAN

- ORTHOGNATHIC SURGERY : **SURGERY FIRST APPROACH (SFOA).**
- Phase I :
Bilateral sagittal split osteotomy (BSSO)
- Phase II:
Post surgical orthodontics with fixed mechanotherapy using MBT 022'' prescription .



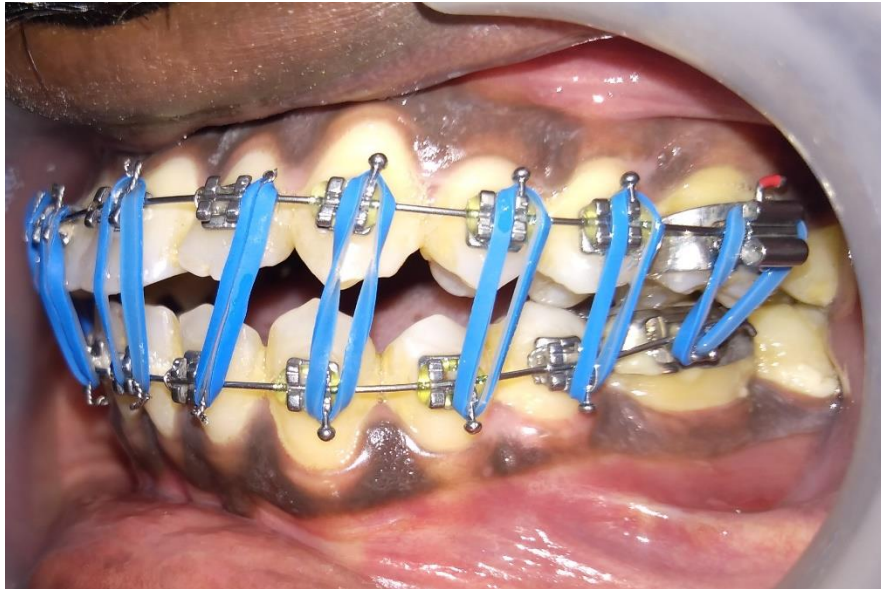
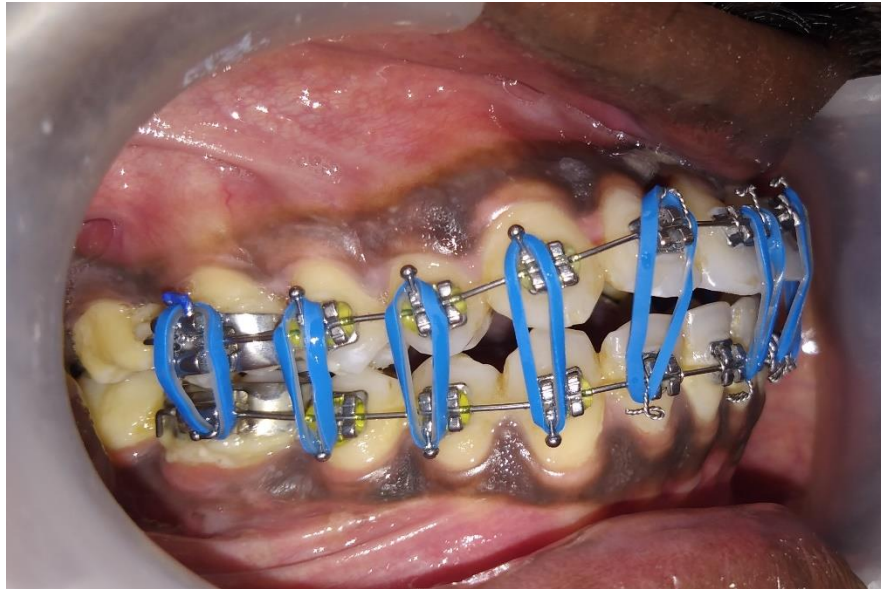
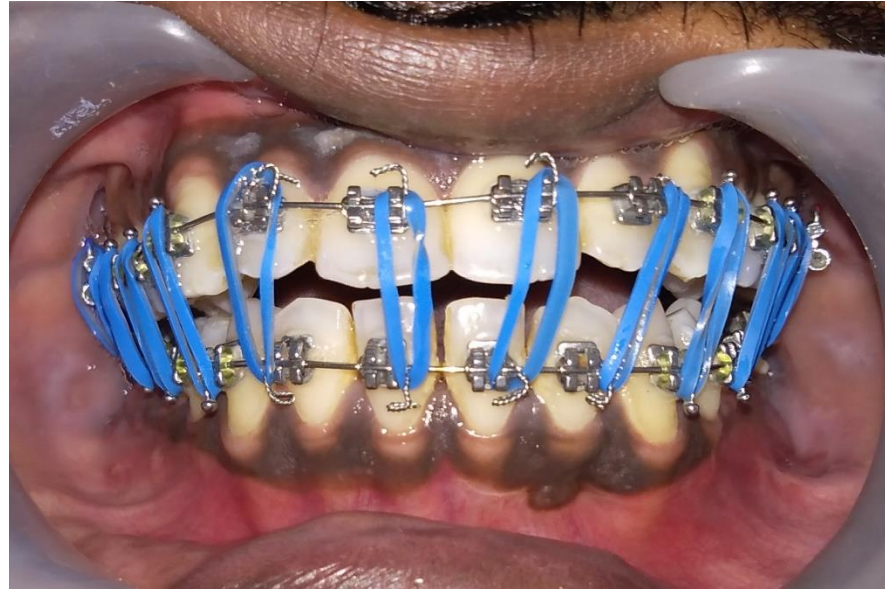
POST SURGICAL- 4 WEEKS

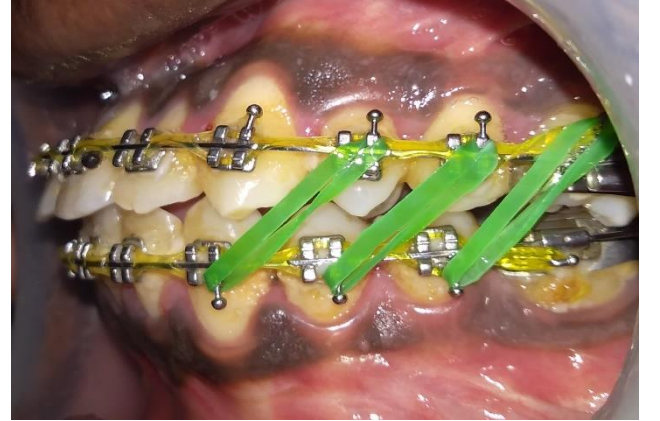
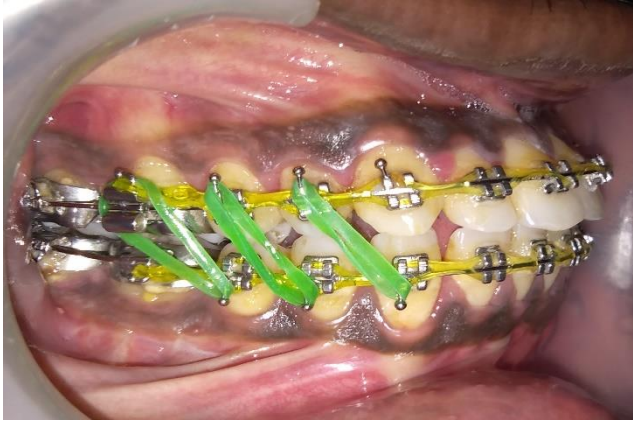


POST SURGICAL- 4 WEEKS



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STANLEE DIGITAL DENTAL X-RAYS
MR.ELUMALAI 26M TNGDC
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Dr Hariharasuda 2511 MDS 00
MR.ELUMALAI 26/M ID 20696 23/11/2020 11:13 AM
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PRE TREATMENT



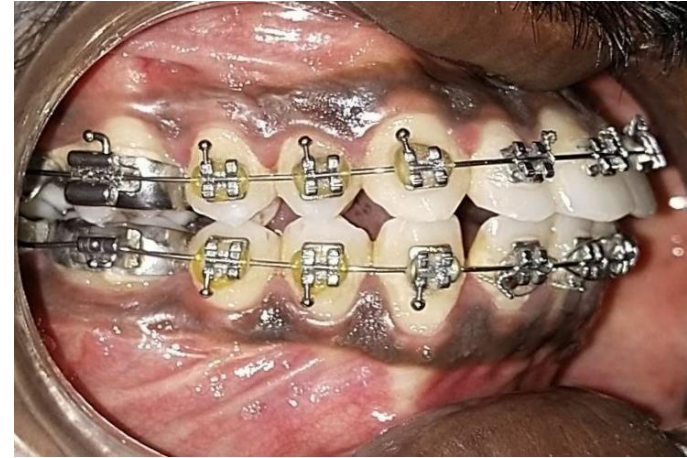
PRESENT – ON GOING



PRE TREATMENT



PRESENT – ON GOING



PRE TREATMENT



PRESENT – ON GOING



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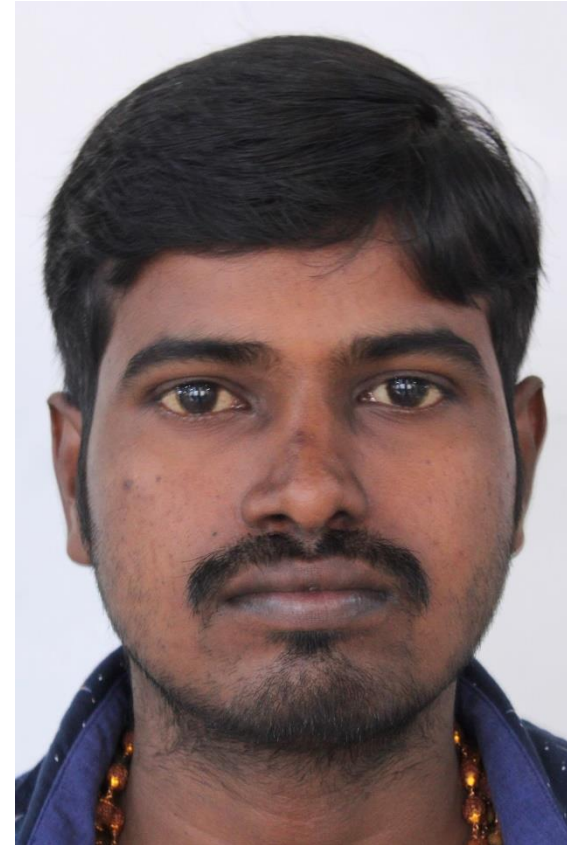
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PRESENT – ON GOING



PRE TREATMENT



PRESENT – ON GOING



Complications following orthognathic procedures

Dissatisfaction with outcome :

1. Patient-related factors : Unrealistic expectations, external motivating factors, unknown psychological problems.
2. Team-dependent factors: Lack of proper understanding of the patients' expectations, needs and psychology.
3. Poor doctor-patient inter-action or personality conflict.

Complications and risks associated with orthognathic surgical procedures :

1. Postoperative infection
2. Bleeding
3. Malunion and nonunion
4. Soft tissue injuries
5. Unanticipated fractures
5. Malocclusion
7. Devitalisation of teeth
8. Relapse
9. Gingival recession and periodontal complications.

Complications unique to Le Fort surgery of maxilla :

1. Infraorbital nerve traction injury
2. Unanticipated fractures (pterygoid plate, sphenoid bone, middle cranial fossa)
3. Damage to the internal maxillary artery and its branches
4. Avascular necrosis of the maxilla or a segment
5. Velopharyngeal insufficiency
5. Injury to nasolacrimal or Stenson's duct
7. Maxillary sinusitis
8. Nasal septal deviation and buckling, widening of the nasal alar base.
9. Arteriovenous fistulas

Bilateral sagittal split osteotomy of the mandible :

1. Injury to inferior alveolar nerve
2. Bleeding from the inferior alveolar artery or masseteric artery
3. Unanticipated fractures and unfavourable split
4. Avascular necrosis
5. Acute/progressive condylar resorption
6. Aggravation of asymptomatic TMJ disorders
7. Malpositioned proximal segment
8. Malocclusion and Relapse during correction of class II problems.

Osseous genioplasty :

1. Injury to the mental nerve
2. Inferior mandibular border contour irregularity
3. Gingival recession
4. Relapse.



Distraction osteogenesis

- **Gabriel Ilizarov**, a Russian orthopaedic surgeon.
 - A surgical process for **reconstruction** of skeletal deformation.
- It involves *gradual, controlled displacement of surgically created fractures and results in simultaneous expansion of soft tissue and bone volume.*
- Ability to reconstruct deficiency in both bone and soft tissue makes this a unique process.
- The technique of bone formation under the influence of tensional stress is called *distraction osteogenesis.*

Procedure

□ Three steps:

1. Mobilization of the bone

2. Transport by means of devices

3. Fixation of a healthy segment

- ✓ After surgically created fracture, the mechanical device namely the distraction device is used to produce gradual, controlled movement of the mobilized bone segment.
- ✓ Once the desired repositioning of the bone segment is achieved, the distraction device is left without activation. Now it acts as a fixation device.
- ✓ Regeneration takes place which heals by filling with bone.
- ✓ Simultaneous to bony expansion, soft tissue expansion also takes place.

❑ Primary indications

- Combined deficiencies in bone and soft tissues.
- Compromised wound healing.

❑ Secondary indications

- Expand alveolus for orthodontic tooth movement.
- Create site for dental implant.
- Create site for dental implant placement by alveolar distraction.

❑ Limitations

- Requires minimum quantity of bone.
- Expansion is unidirectional.
- Patient cooperation is required for activation.
- Both the anchorage and transport segments must have adequate strength to withstand forces of mobilization.

❑ Biological Basis of Distraction

1. Osteotomy
2. Latency
3. Distraction
4. Consolidation
5. Remodeling.



OLD-CR



NEET REPEATS

1. Osteotomy

- *Division of bone into two segments.*
- Ilizarov actually recommended only a green stick fracture after corticotomy for distraction of limbs.
- The greater blood supply in the facial skeleton - osteotomies generally are recommended.
- A complete osteotomy is more reliable for distraction of the jaws.

2. Latency Stage

- Period from bone division to the onset of traction is called *latency period*.
- Latency represents the time allowed for reparative callus formation.
- The latency phase is important for **adequate maturation of the callus**.
- If distraction is **started too early**, - decreased bone formation - cartilaginous elements - decreased mechanical strength of the newly created bone.
- If the latency period is too long (i.e. if hard callus formation has begun), the distraction device may be unable to further separate the bony segments.
- Ideal latency period is selected as **5–7 days after the surgical injury**.

3. *Distraction*

- Distraction or traction force applied by the devices.
- Gradual traction separates the bone tissue and stimulates regeneration.
- (1) **Rate** or the amount of distraction per day; (**1 mm per day**).
- (2) **Rhythm** or how frequently the device is activated. - Ilizarov recommended **0.25 mm four times** a day activation.
 - Most common protocol for maxillofacial patients is **0.5 mm increments twice daily**.

4. Consolidation Phase

- Period from stoppage of traction forces and removal of distraction devices.
- 6–8 weeks.

5. Remodeling Phase

- The period from removal of distraction device to the application of full functional loading to the distracted bone segment.
- 1 year

CONCLUSION

- Orthognathic surgery can be a rewarding experience for the patient, the treating team of oral surgeon and the -orthodontist in carefully and well-planned cases.
- The key to success is to be able to meet the outcome expected by the patient following treatment which is governed by a number of variables such as the psychological needs of the patient and understanding, assessment of the deformity in the perspectives of soft tissue, skeletal deformity and malocclusion.
- Since most orthognathic surgery patients are otherwise healthy only careful case selection, flawless planning and seamless execution can avoid complications and bring desired happiness both for the patient and orthognathic surgery team.

DISCUSSION

1. DIFFERENCE BETWEEN COS AND SFOA ?
2. STEPS IN COS ?
3. PRE SURGICAL AND POST SURGICAL ORTHODONTICS ?
4. MOCK SURGERY ?
5. CEPHALOMETRICS FOR SURGICAL CASE?
6. DISTRACTION OSTEOGENESIS ?

MCQs

1. Which is the most stable orthognathic procedure?

- a) Maxillary width expansion
- b) Mandibular advancement
- c) Maxillary impaction
- d) Maxillary forward movement

2. Which is the least stable orthognathic procedure ?

- a) Maxillary forward
- b) Mandibular setback
- c) Maxillary expansion
- d) Mandibular advancement

3. Extraction patterns for decompensation of skeletal class II ?

- a) Extn of upper and lower first premolars
- b) Extn of lower first premolars and upper second premolars
- c) Extn of upper second premolars only
- d) Extn of lower second premolars only

THANK U GUYS

