

UNIVERSITY
OF MIAMI



Surgery-First Versus Traditional Pre-Surgical Orthodontics Approach to Orthognathic Surgery

**Miller School of Medicine Academic
Day 2019**

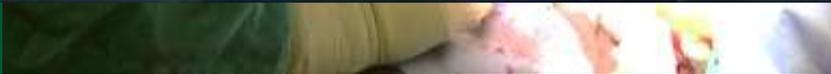
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Resident Surgeon**

Disclosure

The following for profit relationships in the past twelve months, by presenter or spouse/partner are related to this presentation:

Equipment: None
Speakers Bureau: None
Stock Shareholder: None
Grant/Research Support: None
Consultant: None

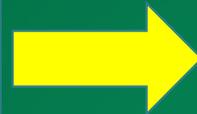




Presentation Objective

Understanding Surgery First

Key Terminology
Benefits/Risks
Physiological
Mechanism



Patient Analysis – Surgical
Candidate Selection

Dental Features
Facial Features
Movements –
Predictable/Safe



Decisive Surgical Execution

Case Presentation
Surgical Principals
and Nuances

Why is Surgery First Important?

1. Time – Patient's Don't Like to Wait



Table 2. Demographic characteristics of the study patients.

	<u>Orthodontics-first group</u>	<u>Surgery-first group</u>	<i>P</i> -value
Sex, <i>n</i> (%)	<i>n</i> = 52	<i>n</i> = 45	
Male	10 (19.2%)	10 (22.2%)	
Female	42 (80.8%)	35 (77.8%)	
Age (years), mean	29.7	23.7	
Diagnosis	Class III dentofacial deformity	Class III dentofacial deformity	
Treatment time (months), mean	22.0	14.6	0.001

2. Psychological Considerations

Patient anxiety and concerns

Typically an adolescent –
typically their first surgery

- 1st Recovery
- 2nd Braces
- 3rd Swollen
- 4th Eating difficulty
- 5th Liquid diet
- 6th Pain
- Watts et al AJODO 2018

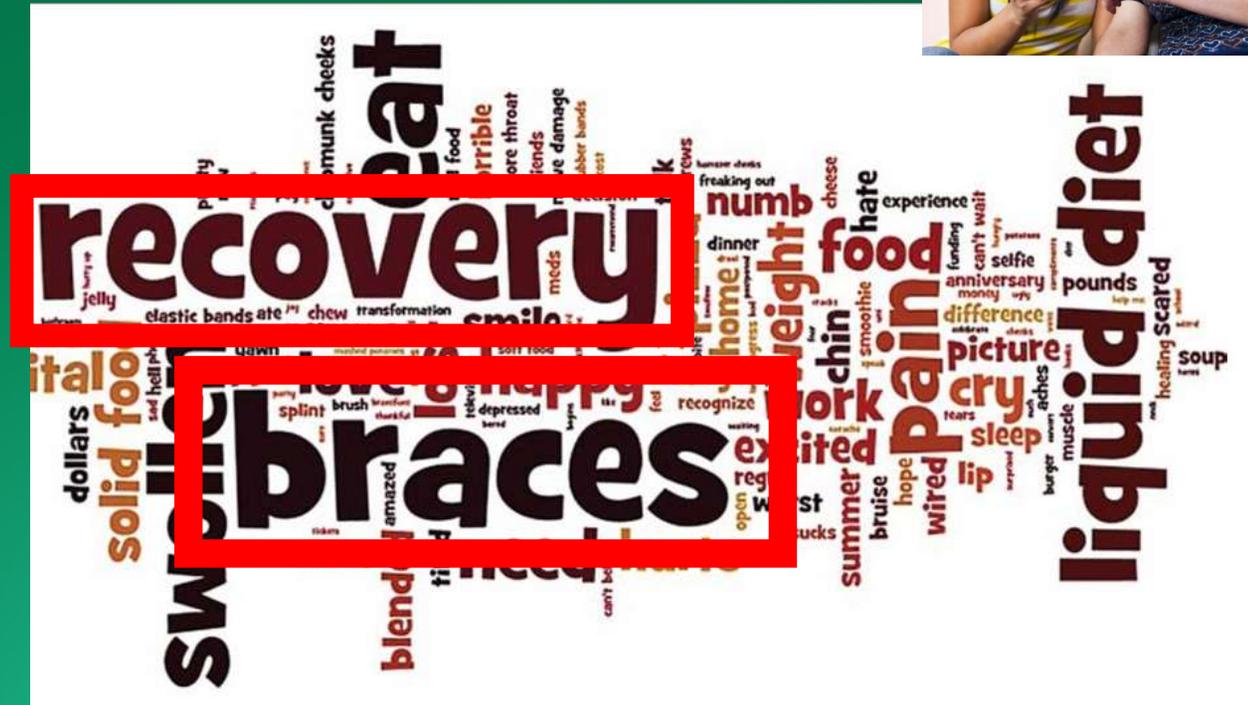
Significant **Delay in Resolution**
of Patients' **Chief Complaint**

Further Deterioration in
- Facial profile/aesthetics
- Occlusion/Mastication

**Reduced Quality of Life and
Confidence**



689



3. Dental Considerations Associated With Pre-surgical Orthodontics

Discomfort and Pain

Gingival Recession

Gingival Hyperplasia

Root Resorption

Dental Caries

Deterioration in Occlusal Function
(decompensation)

Masticatory and speech discomfort

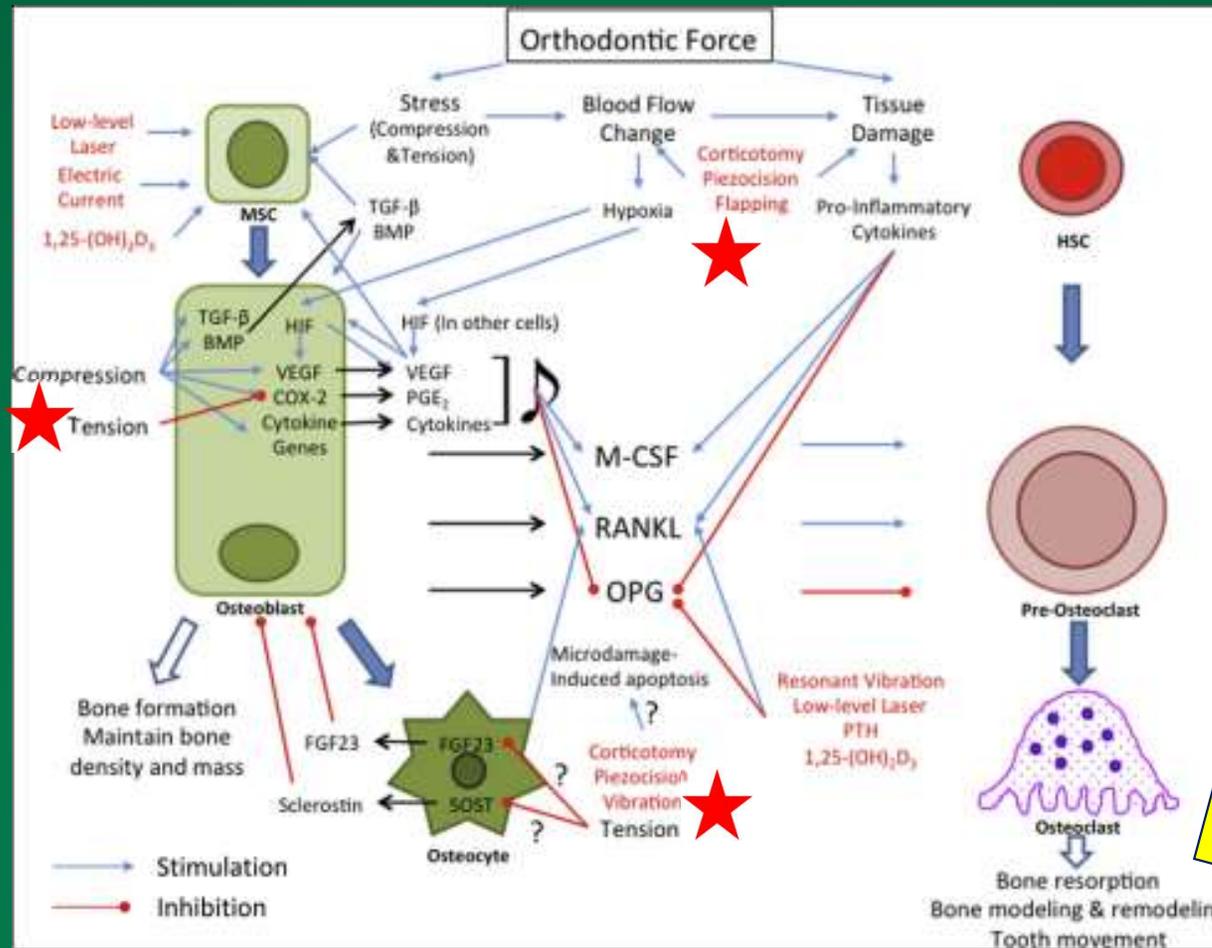


Surgery First Benefits

1. Patient's **Chief Complaint, Dental Function,** and **Facial Esthetics** – achieved/improved **Beginning of Treatment**
2. Entire Treatment Period Shortened by **1 – 1.5 Years or Less**
3. Post-operatively accelerated orthodontic tooth movement phenomenon



Post-Op Accelerated Orthodontic Tooth Movement Phenomenon



Precise Definitions

Precise Terminology -> Understanding -> Diagnoses -> Treatment

Conventional Orthognathic Surgery:

Pre-surgical orthodontics to:

- Alleviate the dental crowding,
- Level the curve of Spee
- Decompensate the dental inclinations
- Remove any occlusal interferences
- Coordinate the upper and lower arches

Post-op orthodontic: Final detailing
Settling of the occlusion

Surgery Early:

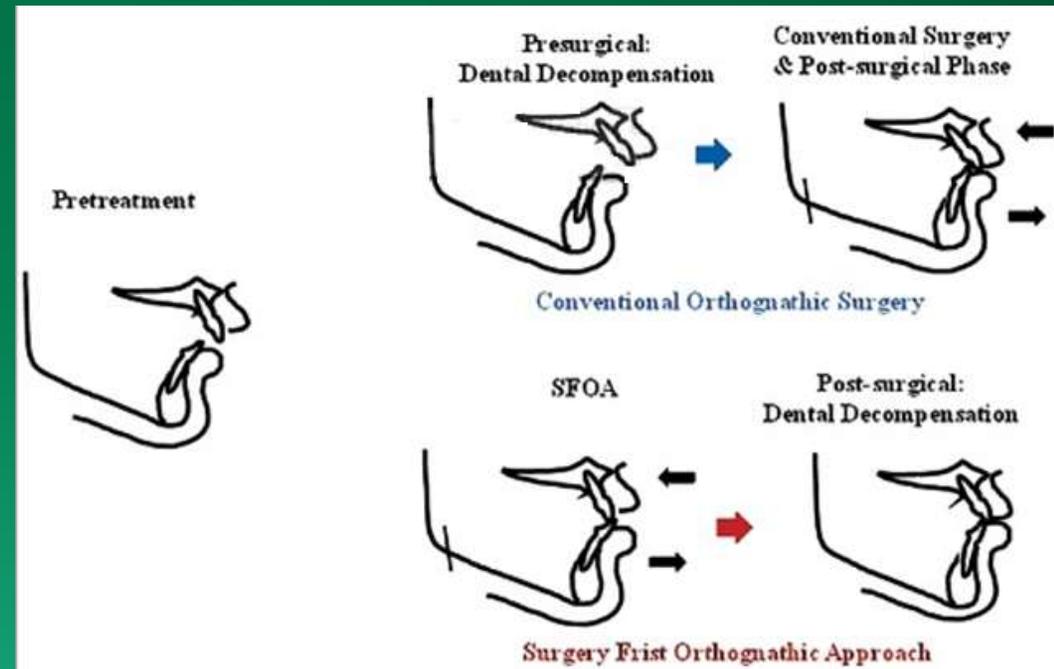
Pre-op Orthodontic treatment < 6 months prior to operation

Surgery First of Face First Approach:

No presurgical Orthodontic phase; surgery is performed first

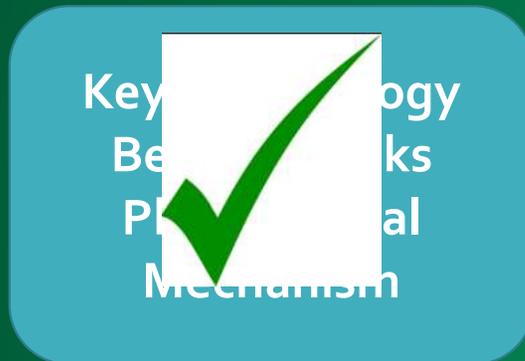
Transitional occlusion is set post-op

Comprehensive orthodontic treatment to achieve the desired occlusion



Presentation Objective

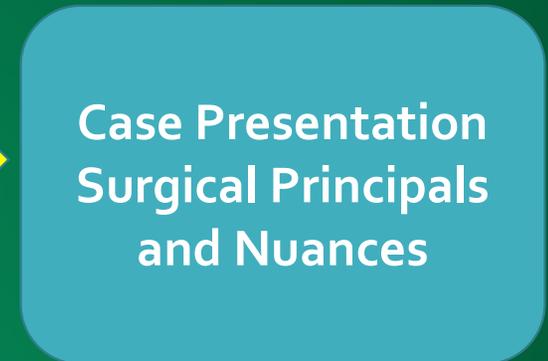
Understanding Surgery First



Patient Analysis – Surgical
Candidate Selection



Decisive Surgical Execution



Patient Analysis & Selection: Dental Findings

Three Key General Features For Success:

- 1) Well-aligned to mildly crowded anterior teeth
- 2) Flat to Mild curve of Spee
- 3) Normal to mildly proclined/retroclined incisor inclination

Ideal Cases that do not need too much pre-surgical orthodontic alignment and decompensation

- Dental midline at or close to middle of Jaws
- Limited to No Transverse Discrepancy Mx/Mn

Molar Relationship:

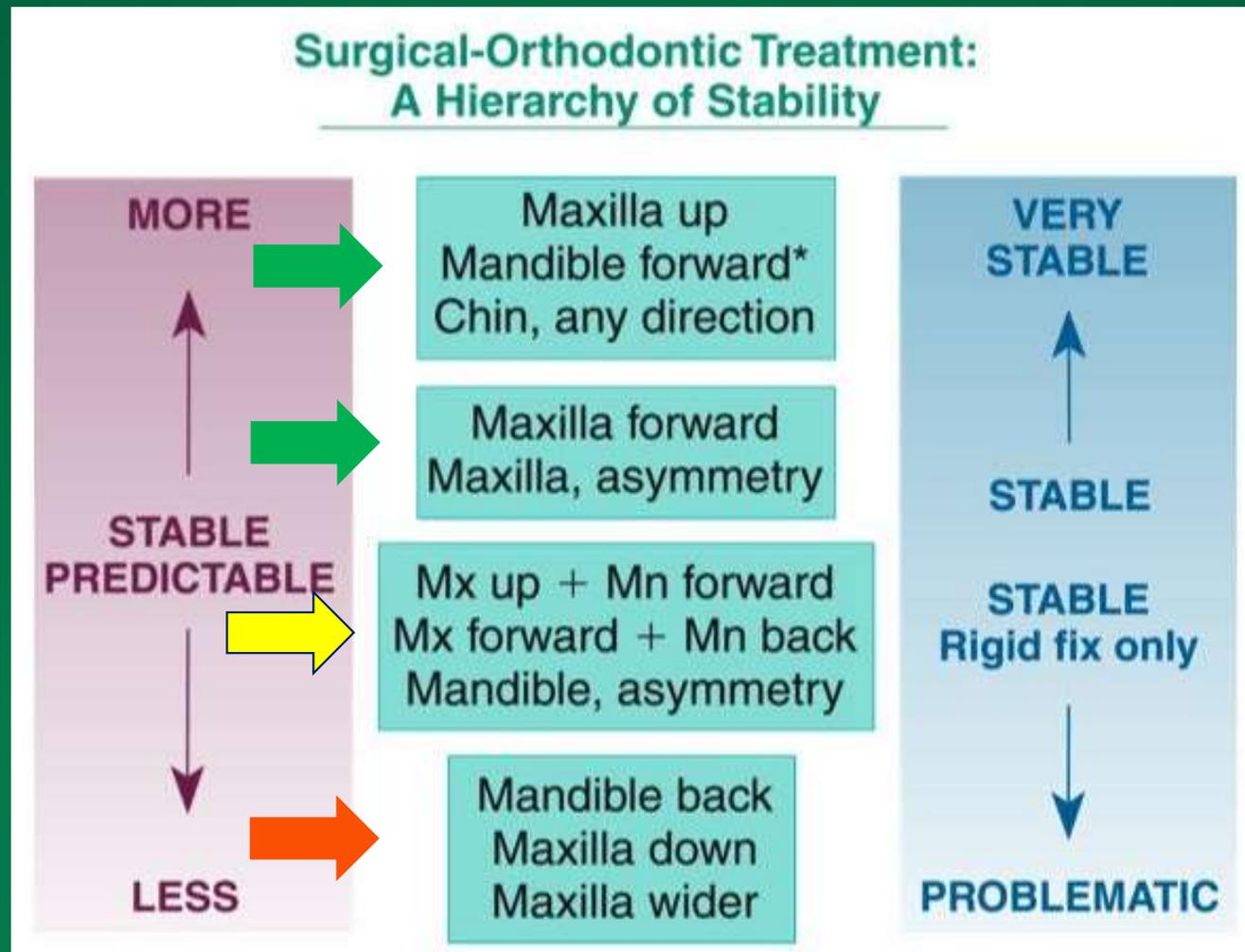
Class I – Non-extraction cases (no anterior crowding) or BiMax first PM Ext

Class III – Mandible First PM Extracted

Class II – Maxillary First PM Extracted



Patient Analysis & Selection: Facial Findings



Patient Analysis & Selection: Facial Findings

ORAL SURGERY ORAL MEDICINE
ORAL PATHOLOGY ORAL RADIOLOGY

Surgery-first/early-orthognathic approach may yield poorer postoperative stability than conventional orthodontics-first approach: a systematic review and meta-analysis

Liu, et al. Vol 126. No2.
Aug 2018

12 studies (total of 498 participants).

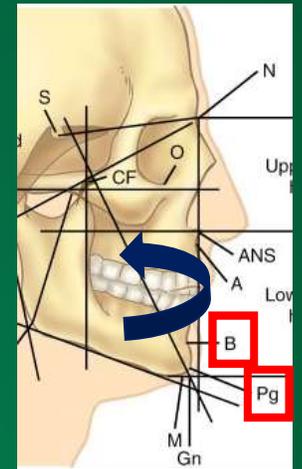
Surgery First group - significantly lower postoperative stability vs Control for:

- **Pogonion** (horizontally)
- **Point B** (both horizontally and vertically)
- **SNB** – Postoperative changes
- Significant and Clinically Detectable

The **mandible** tends to **rotate counterclockwise** more in the SFEA group, which indicate a **poorer postoperative stability** than in the COA group

The maxilla was found to have no significant difference between the SFEA group and COA group

1. **Unstable occlusion** - compressive force of **masseter muscle** applied to bone segment → Main cause of relapse
 - Stable occlusion contributes to bone stability and decreases the possibility of mandibular relapse
2. Mandibular **autorotation** after the **removal of surgical splints or postoperative orthodontic** correction of occlusal interference
3. **High degree of tooth movement in the postoperative orthodontic** → **Regionally accelerated phenomenon**
 - May Cause immediate rotational relapse as well
4. Mandibular **protrusive relapse** may happen in the initial stage of postoperative orthodontic treatment



Presentation Objective

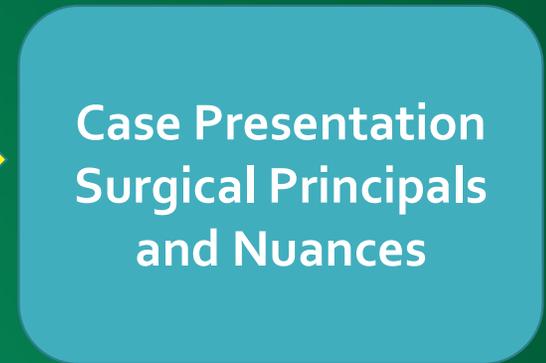
Understanding Surgery First



Patient Analysis – Surgical Candidate Selection



Decisive Surgical Execution





CASE PRESENTATIONS

INITIAL PRE-OPERATIVE FACIAL PHOTOS



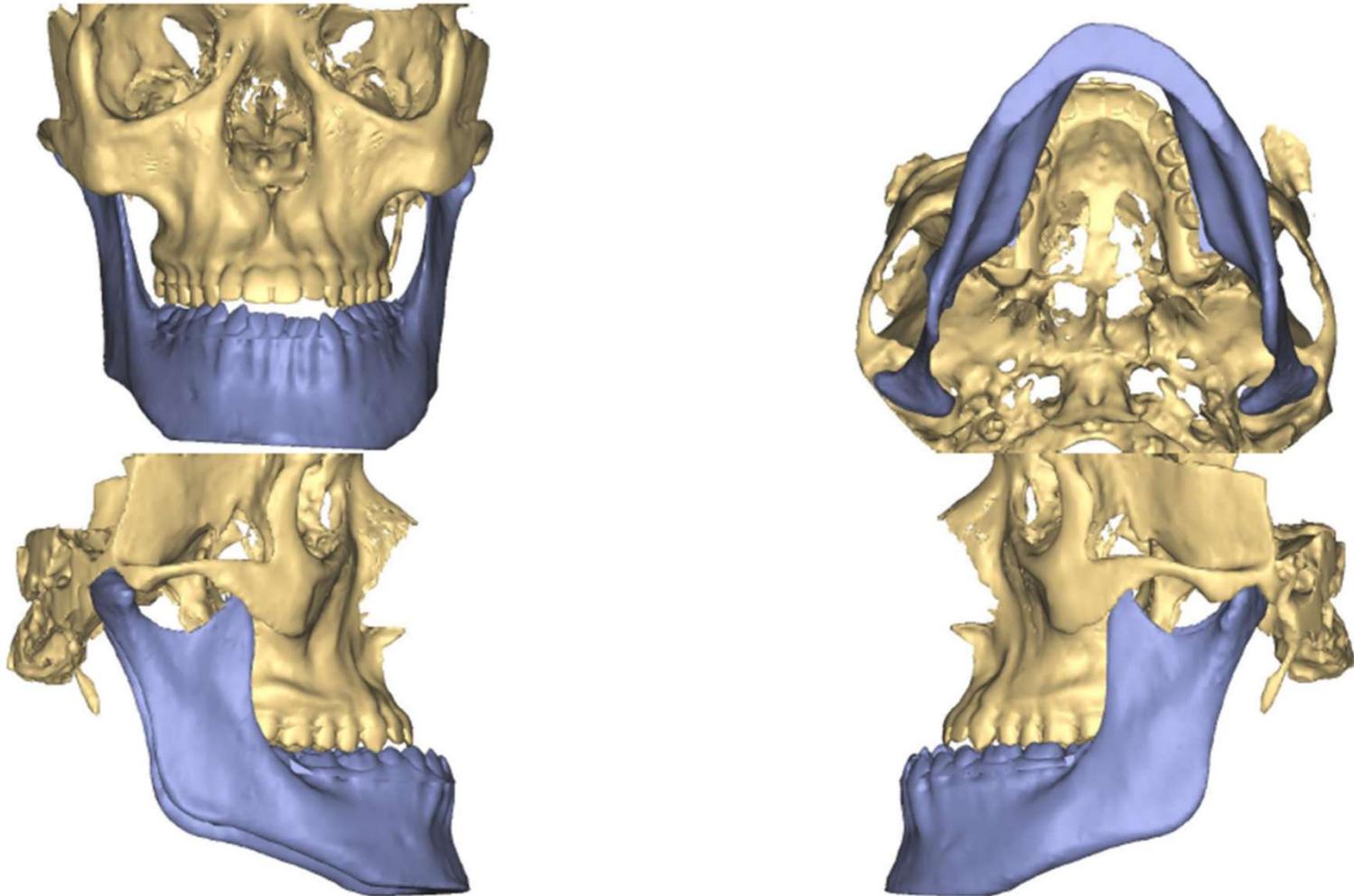
21 y.o. Man

CC: "I cannot incise my food"

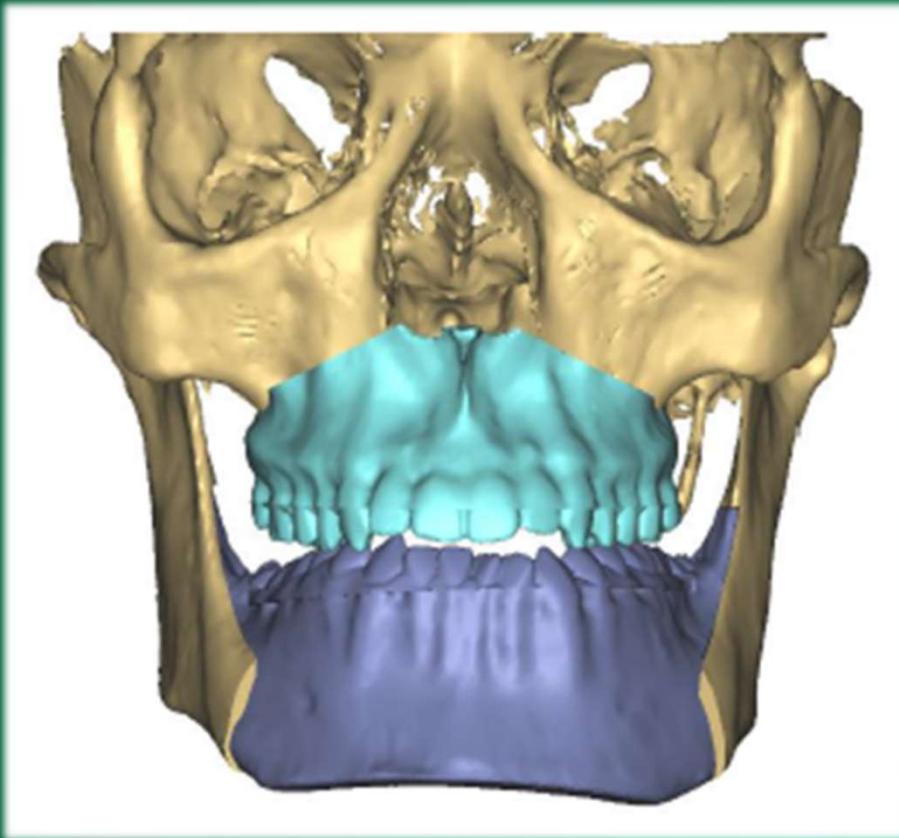
Dx: B/L Absolute Maxillary Transverse Discrepancy
Angle Class III Malocclusion, Facial Asymmetry, Apertognathia



Surgical Plan: Preoperative situation



Surgical Plan Overview

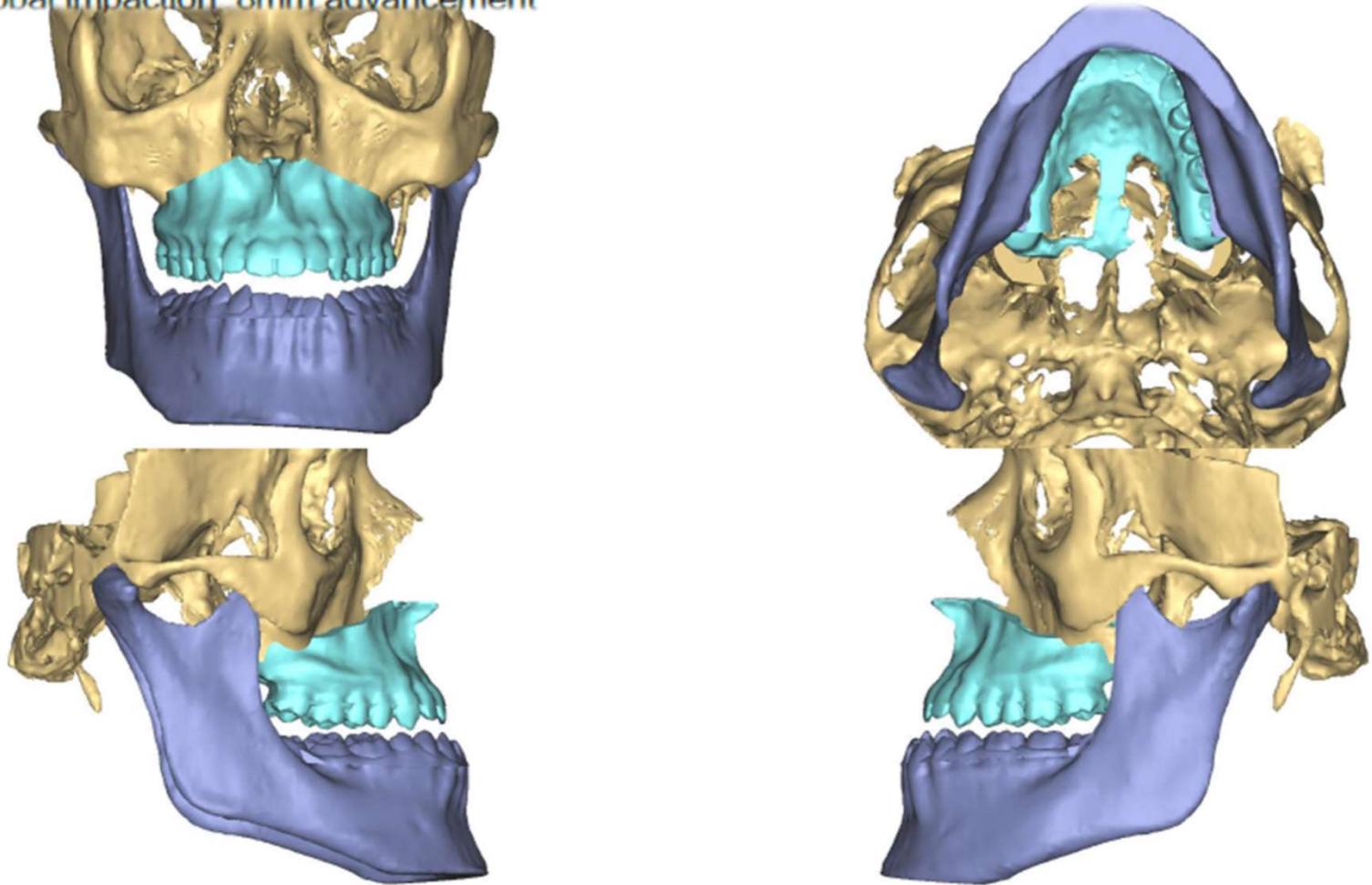


Orthognathic Bimaxillary Surgery

- Maxilla surgery first: LeFort-I → Intermediate splint
- Mandible surgery: BSSO → Final splint
- Occlusion is based on plaster casts

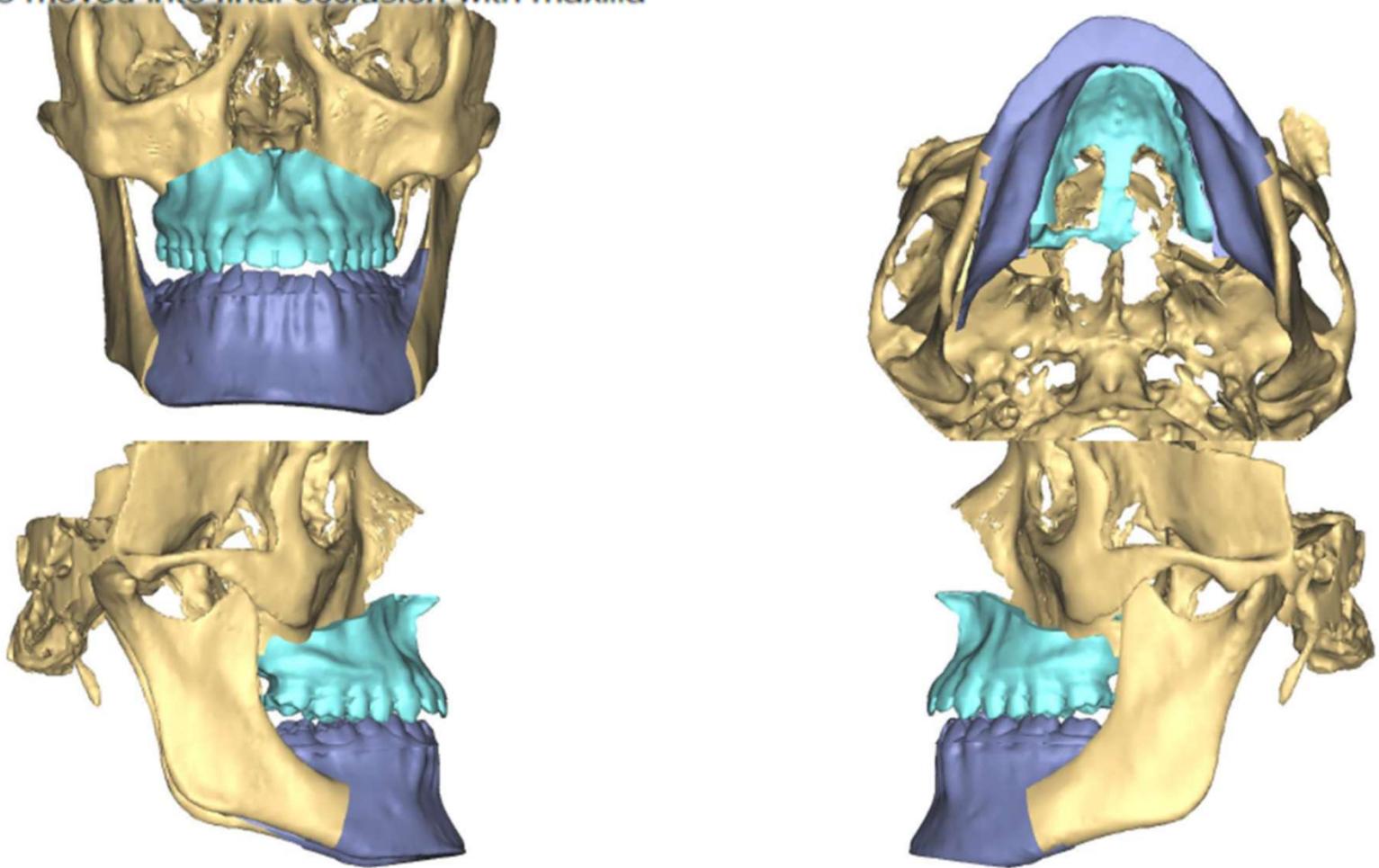
Surgical Plan: Intermediate position (Maxilla movement first)

6mm global impaction 8mm advancement

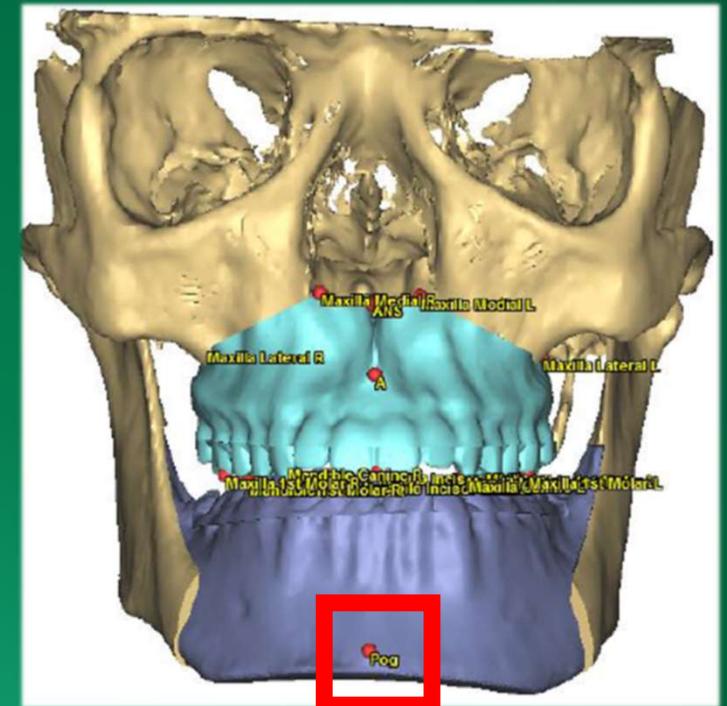


Surgical Plan: Final position

Mandible moved into final occlusion with maxilla



Point	Left/Right (mm)	Ant/Post (mm)	Up/Down (mm)
A	0.0	8.0 Ant	6.0 Up
ANS	0.0	8.0 Ant	6.0 Up
Maxilla 1st Molar L	0.0	8.0 Ant	6.0 Up
Maxilla 1st Molar R	0.0	8.0 Ant	6.0 Up
Maxilla Canine L	0.0	8.0 Ant	6.0 Up
Maxilla Canine R	0.0	8.0 Ant	6.0 Up
Maxilla Incisor Midline	0.0	8.0 Ant	6.0 Up
Maxilla Lateral L	0.0	8.0 Ant	6.0 Up
Maxilla Lateral R	0.0	8.0 Ant	6.0 Up
Maxilla Medial L	0.0	8.0 Ant	6.0 Up
Maxilla Medial R	0.0	8.0 Ant	6.0 Up
Mandible 1st Molar L	2.0 R	6.5 Post	5.9 Up
Mandible 1st Molar R	2.0 R	7.9 Post	5.5 Up
Mandible Canine L	2.4 R	6.6 Post	7.3 Up
Mandible Canine R	2.4 R	7.9 Post	7.0 Up
Mandible Incisor Midline	2.6 R	7.1 Post	7.9 Up
Pog	2.6 R	3.5 Post	8.9 Up

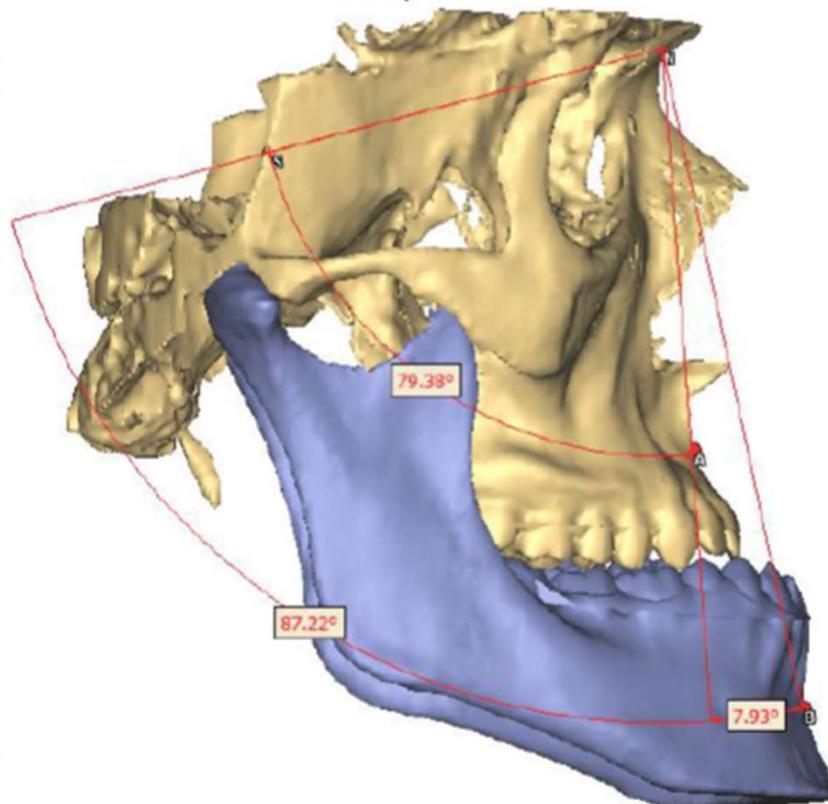


Surgical Plan: Basic Lateral Cephalometry

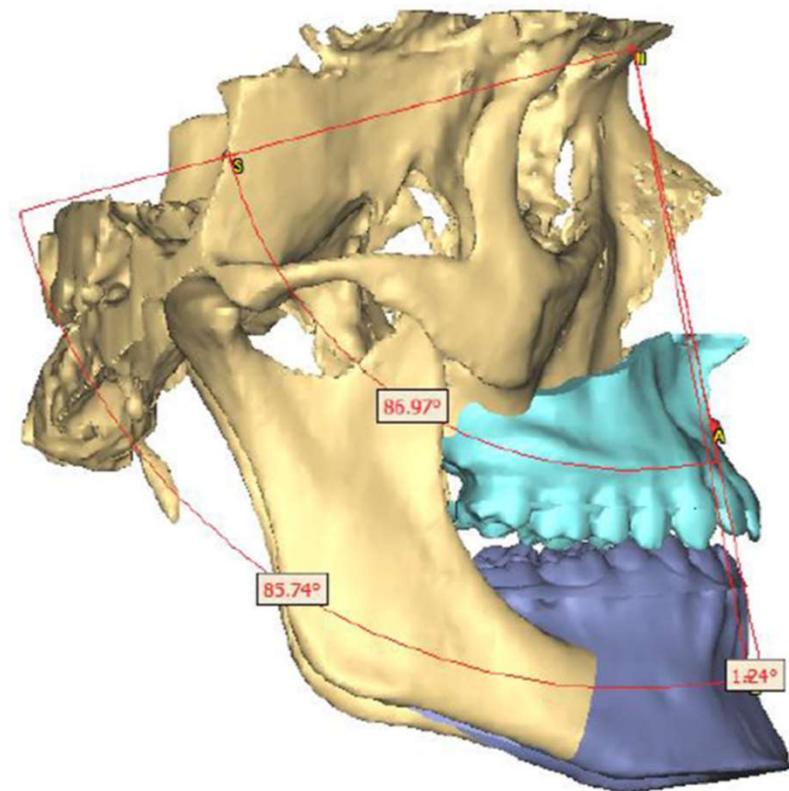
Preoperative: SNA = 87.0°; SNB = 85.7°; ANB = 1.2°;

Simulated Postoperative: SNA = 79.4°; SNB = 87.2°; ANB = 7.9°;

Preoperative



Simulated Postoperative

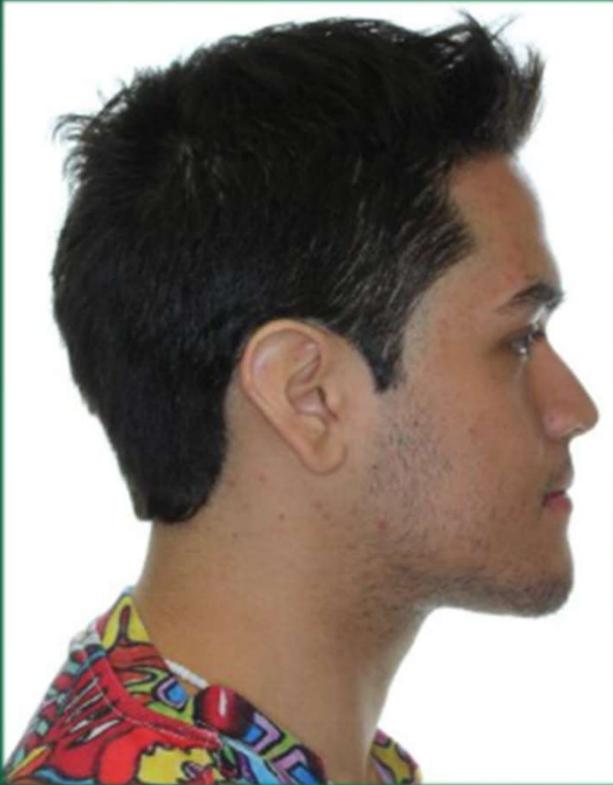


IMMEDIATE POST-OPERATIVE FACIAL PHOTOS





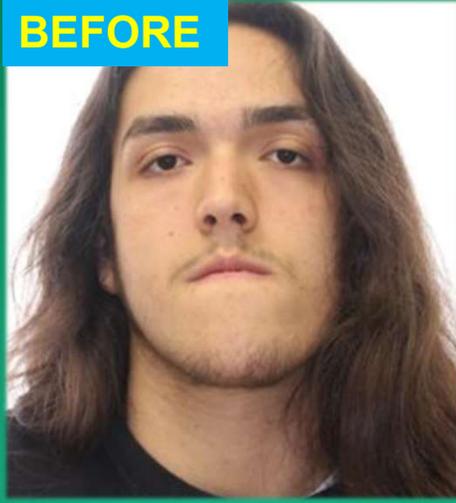
FINAL POST-ORTHODONTIC THERAPY







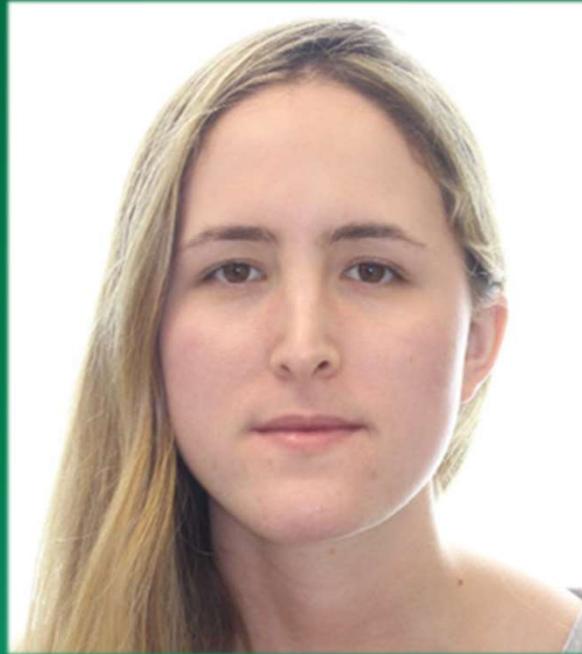
AFTER



BEFORE



INITIAL PRE-OPERATIVE FACIAL PHOTOS



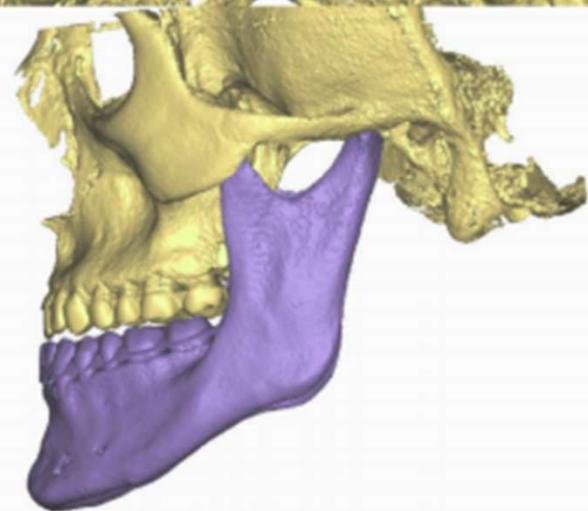
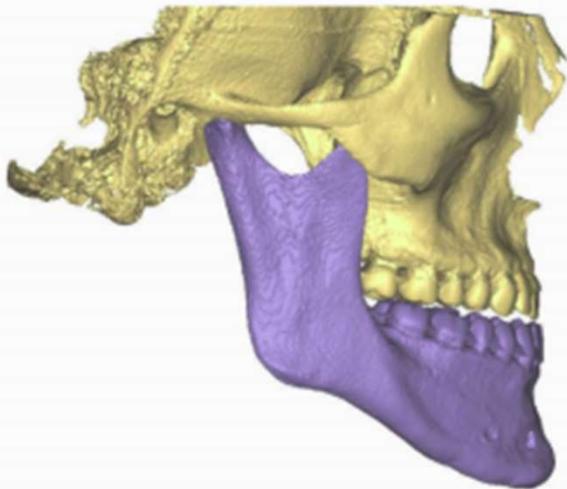
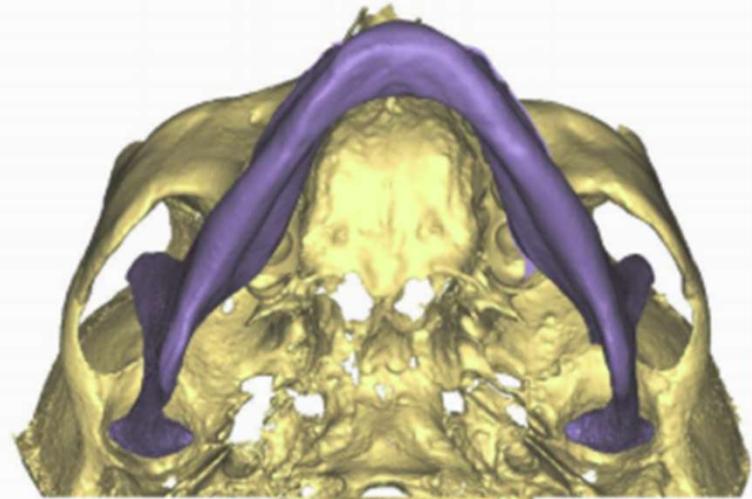
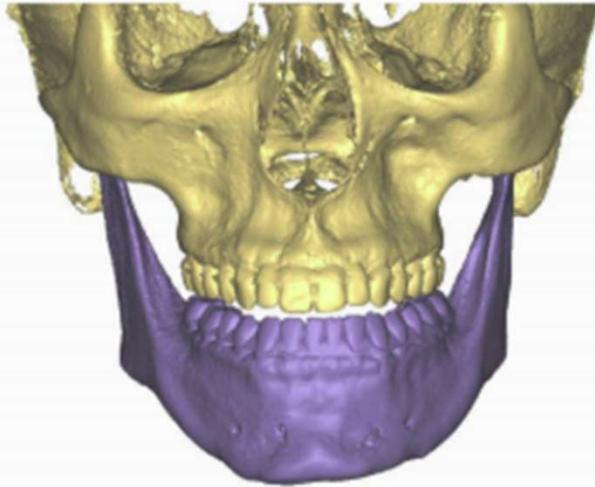
27 y.o. Woman

CC: "I want more symmetry to my smile and my teeth to line-up better"

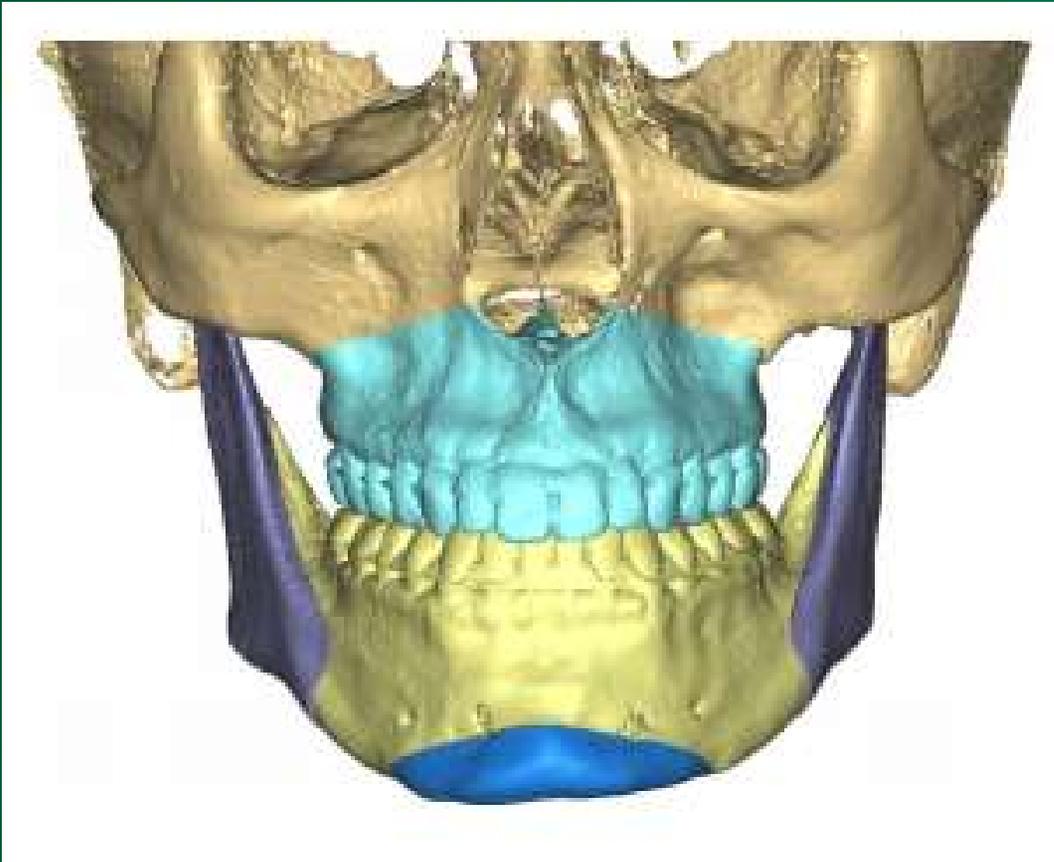
Dx: Mandibular Hyperplasia, Angle Class III Malocclusion , Facial Asymmetry (chin)



Surgical Plan: Preoperative Position



Surgical Plan Overview

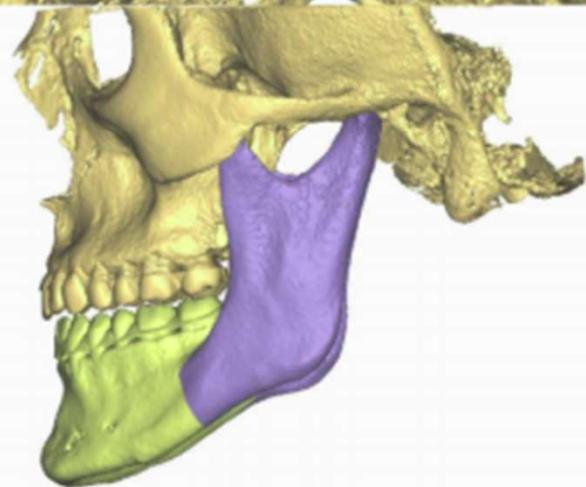
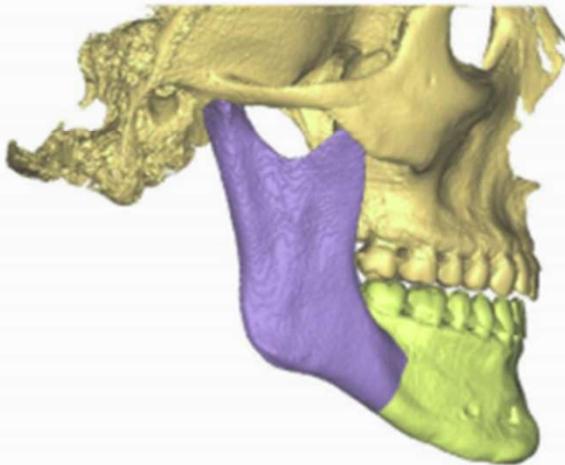
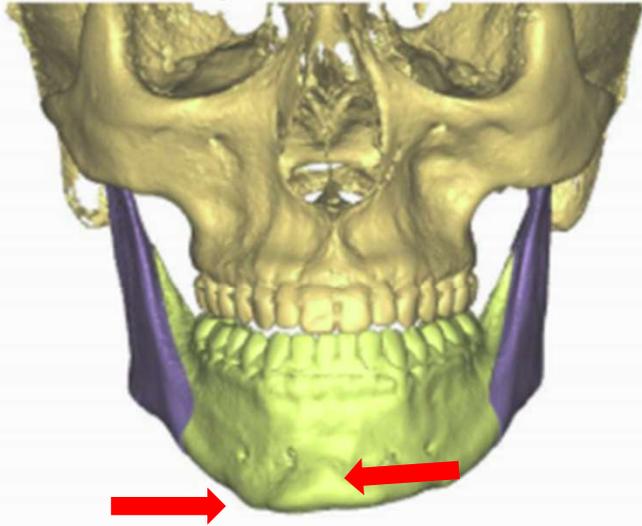


Orthognathic Bimaxillary/Genioplasty Surgery

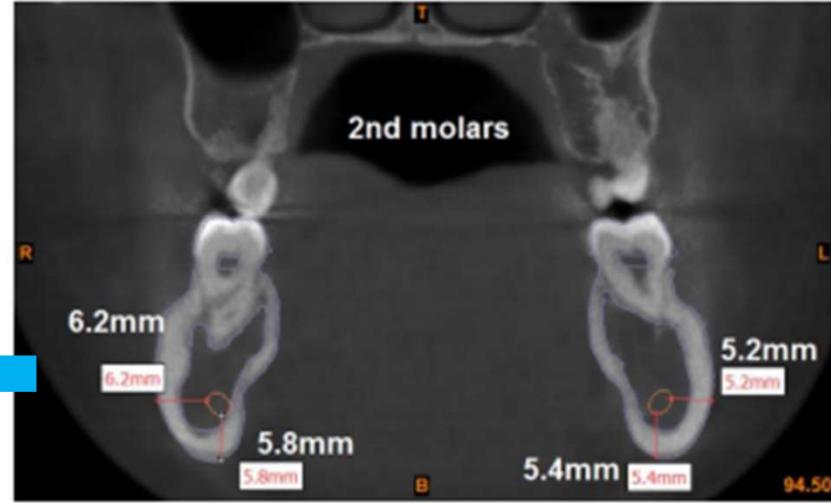
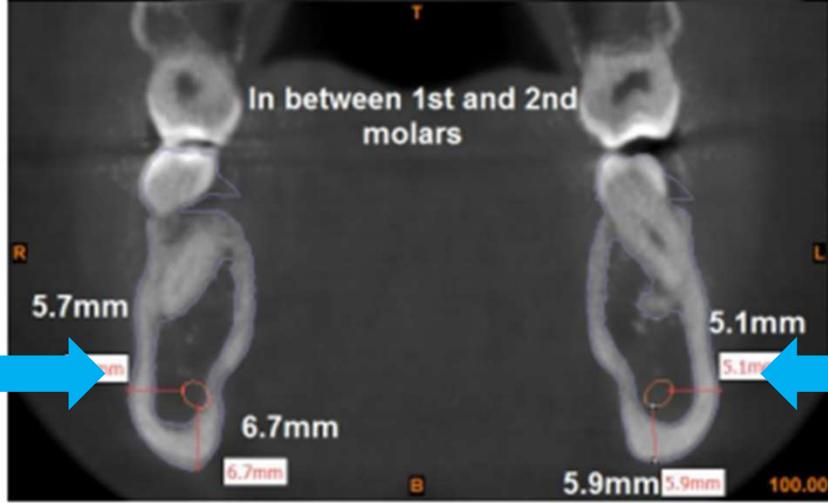
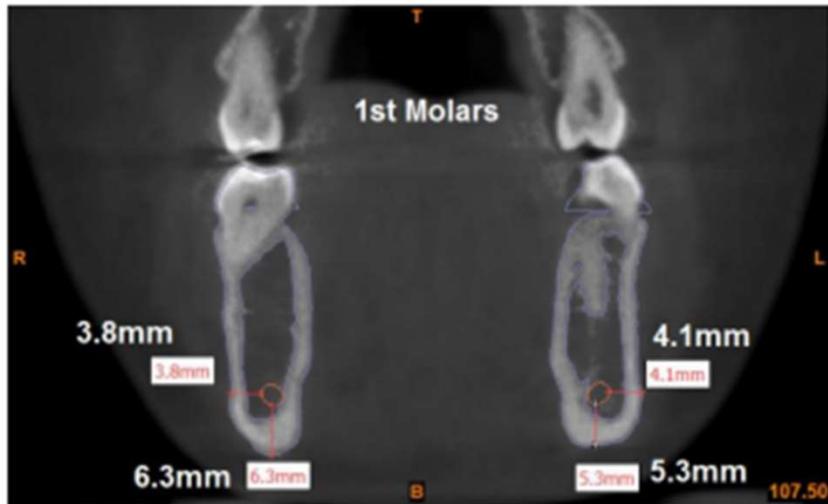
- Mandible surgery first: BSSO → Intermediate splint
- Maxilla surgery: LeFort-I
- Occlusion is based on plaster casts

Surgical Plan: Intermediate Position (Mandible movement first)

Mandible moved according to planned maxilla movements. Complex rotated open

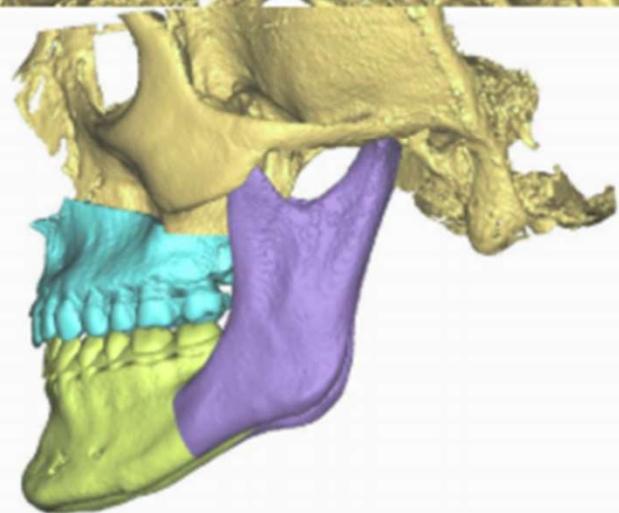
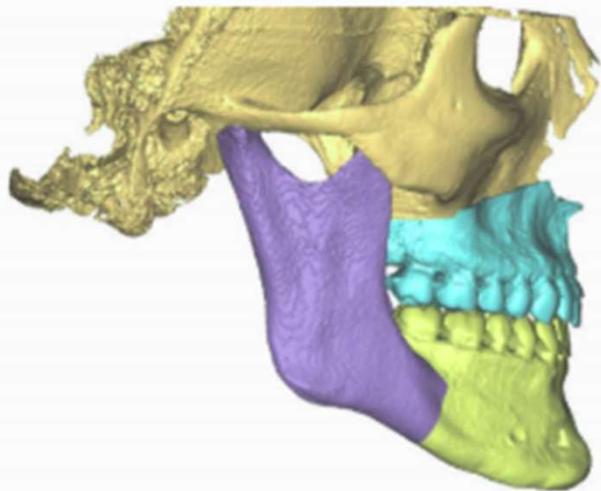
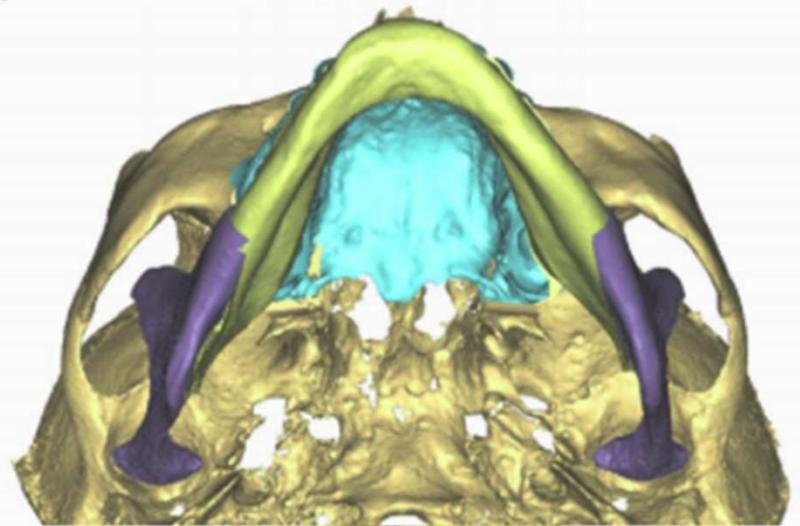
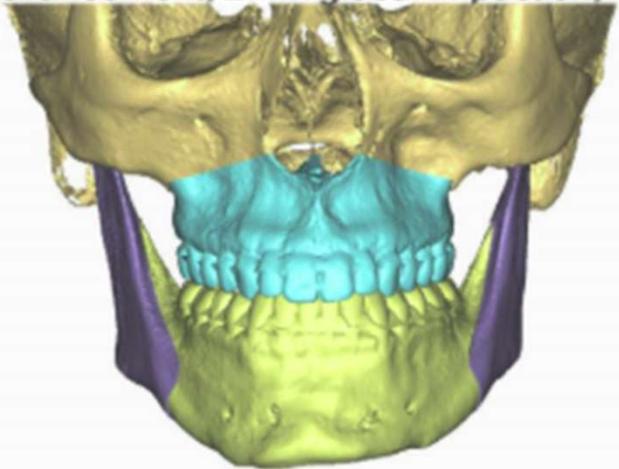


Surgical Plan: Inferior Alveolar Nerve

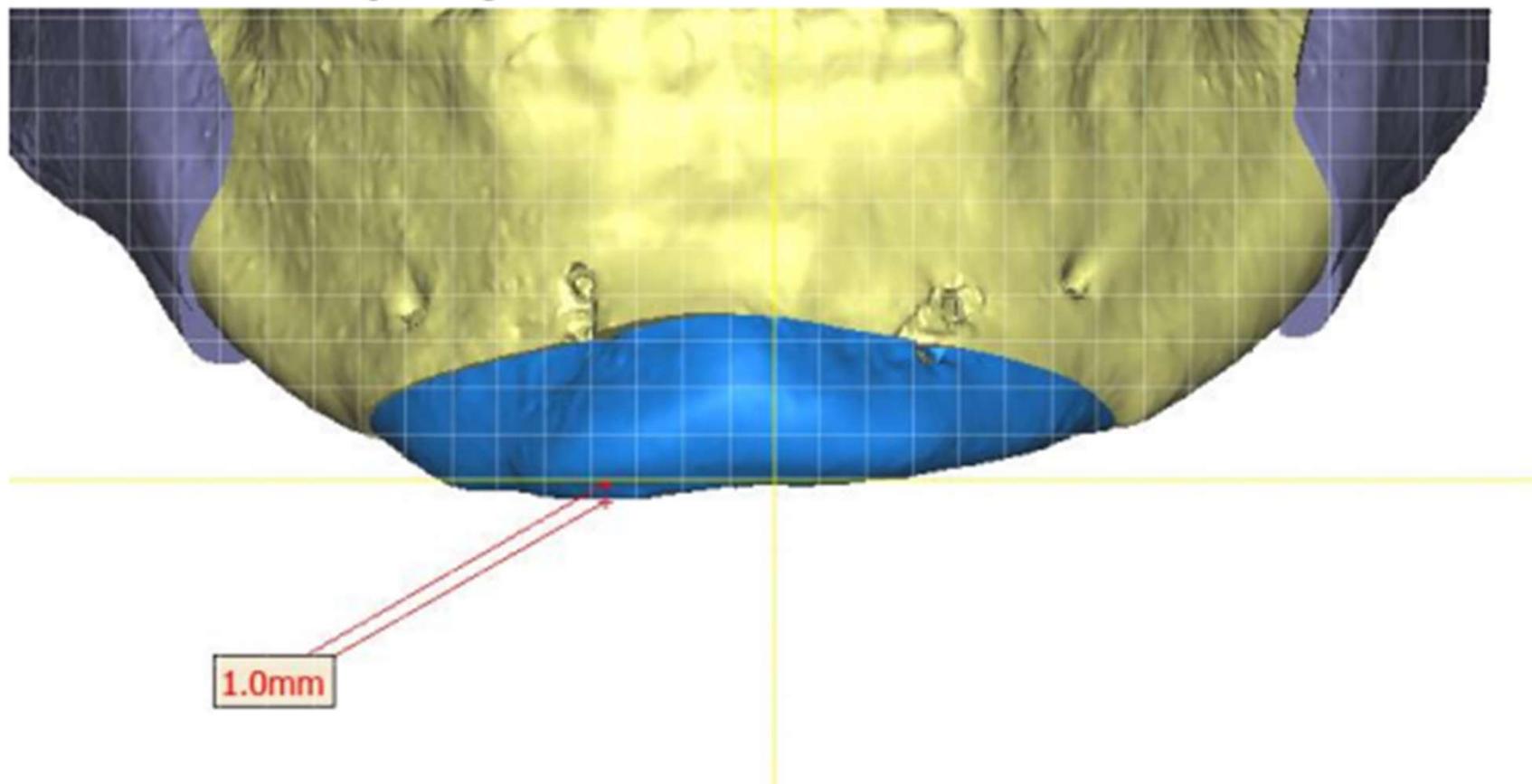


Surgical Plan: Final Position

2.5mm advancement, 2mm global impaction, 1 degree CW yaw correction.



Surgical Plan: Genioplasty additional measurements

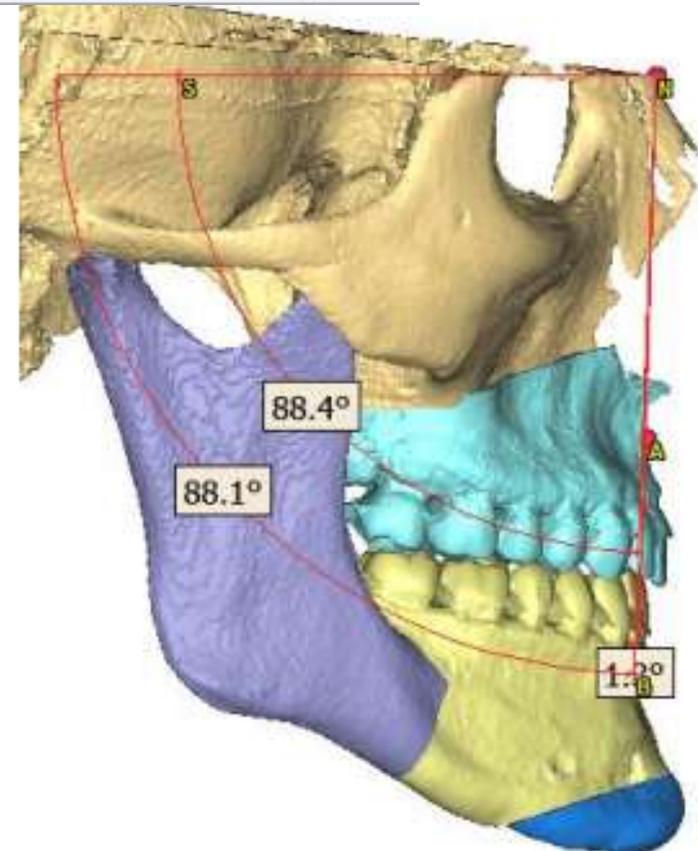


Surgical Plan: Cephalometric Analyses

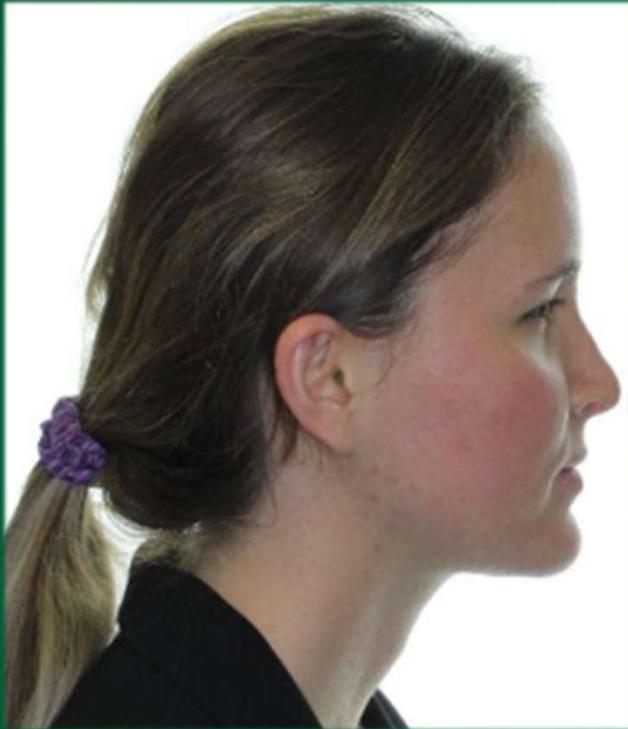
sella–nasion–A point angle	SNA or S-N-A	Average of 82 degrees with +/- of 2 degrees	CT was taken.
sella–nasion–B point angle	SNB or S-N-B	Average of 80 degrees with +/- of 2 degrees	

A	0.0	2.5 Ant	2.0 Up
ANS	0.0	2.5 Ant	2.0 Up
Maxilla Incisor Midline	0.0	2.5 Ant	2.0 Up
Maxilla Canine L	0.1 R	2.2 Ant	2.0 Up
Maxilla Canine R	0.1 R	2.8 Ant	2.0 Up
Maxilla 1st Molar L	0.4 R	2.0 Ant	2.0 Up
Maxilla 1st Molar R	0.4 R	2.9 Ant	2.0 Up
L Lateral Buttress	0.5 R	2.0 Ant	2.0 Up
L Medial Buttress	0.1 R	2.3 Ant	2.0 Up
R Lateral Buttress	0.4 R	3.1 Ant	2.0 Up
R Medial Buttress	0.1 R	2.7 Ant	2.0 Up
B	2.5 R	0.5 Post	5.4 Up
Pog	1.1 R	0.9 Ant	5.9 Up
Me	1.2 R	1.5 Ant	5.6 Up
Mandible Incisor Midline	2.5 R	1.6 Post	5.5 Up
Mandible Canine L	2.2 R	1.2 Post	5.0 Up
Mandible Canine R	2.1 R	2.5 Post	4.9 Up
Mandible 1st Molar L	1.5 R	0.9 Post	3.7 Up
Mandible 1st Molar R	1.6 R	2.9 Post	4.0 Up

Measurement (°)	Pre-Op 3D	Planned 3D	Delta 3D
SNA	85.7	88.4	2.7
SNB	88.5	88.1	-0.4
ANB	2.9	1.3	-1.6
Maxillary Occlusal Plane	7.8	7.8	0



FINAL POST-ORTHODONTIC THERAPY



**6 Months of Orthodontic Therapy
4 Total Visits for the Patient**





AFTER



BEFORE



Thank You For Your Attention!

QUESTIONS?

