

# Full mouth reconstruction in prosthodontics and case presentation

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# Goals

- Definition of Full mouth reconstruction (rehabilitation)
- What is Centric Relation?
- How to determine OVD?
- Case presentation

# Definition

- Rebuilding and/or replacing all of the teeth in a patient's mouth.
- Full mouth reconstructions combine esthetics with the science of restorative dentistry to improve the health, function, and beauty of the mouth.
- The process of repairing and rebuilding the appearance and function of your mouth, using multiple procedures at once
- Extensive and intensive restorative procedures
- Function and esthetics back to patient.

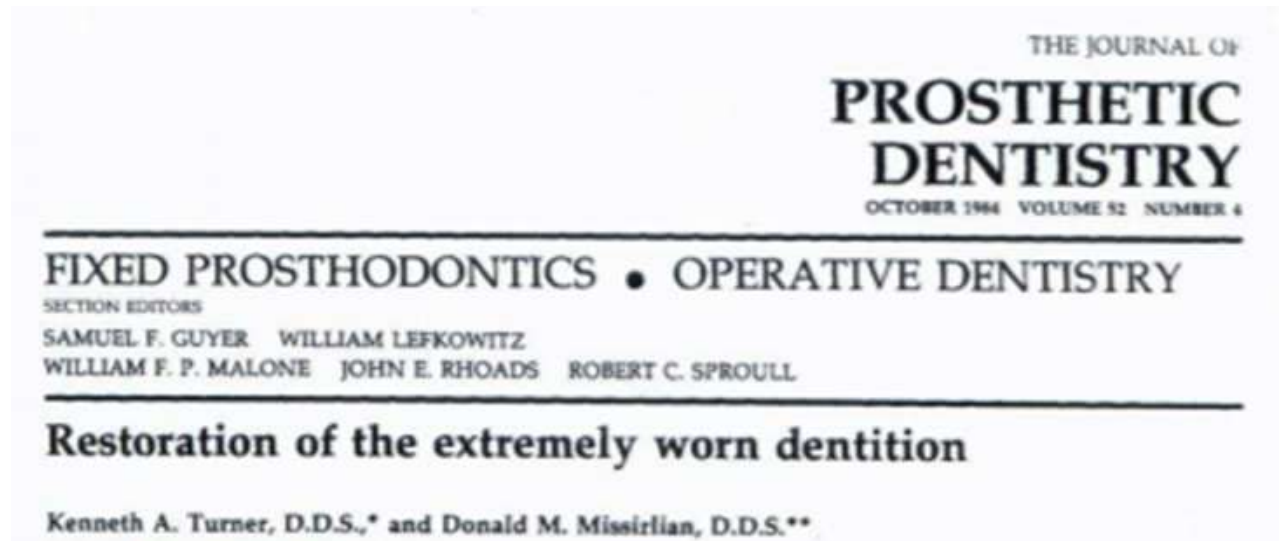
# What procedures are Included in a Full Mouth Reconstruction?

- Placement of veneers can whiten, reshape, resize, close gaps and much more.
- Placement of crowns
- Placement of dental implants with Bone grafting
- Orthodontics may be required in order to help shift move teeth in the necessary positions for an optimal look.
- Contouring of the gums
- In extreme cases, an orthognathic surgery
- Bruxism Treatment: This includes therapy for resolving teeth grinding and symptoms associated with it.

# Objective

- Function -in case of missing teeth, worn down teeth and old fillings that need replacement
- Esthetics, as in case of multiple anterior worn down teeth and missing teeth.
- To obtain and maintain the health of periodontal tissues
- Temporomandibular joint disturbance is another reason
- Amelogenesis imperfecta, dentino

# Classification of patients requiring occlusal rehabilitation



# Classification by Turner and Missirla in 1984

- Category 1 excessive wear **with** loss of vertical dimension of occlusion
- Category 2 excessive wear **without** loss of vertical dimension of occlusion but **with** space available
- Category 3 excessive wear **without** loss of vertical dimension of occlusion but **with limited** space available

# Classification by Turner and Missirlain 1984

- Class 1
  - Excessive wear of anterior teeth
  - Few posterior teeth
  - Unstable posterior occlusion
  - Signs of some loss of facial contour
  - Drooping of the corner of mouth
  - Closest speaking space of 3mm and interocclusal distance of 6mm



*The Journal of Prosthetic Dentistry Volume 52, Issue 4, October 1984, Pages 467-474*



# Classification by Turner and Missirlain 1984

- Class 2
  - Adequate posterior support
  - History of gradual wear and continuous eruption -> maintain OVD
  - Closest speaking space of 1mm and interocclusal distance of 2-3 mm



# Classification by Turner and Missirlain 1984

- Class 3
  - Minimal posterior teeth wear with anterior teeth show excessive gradual wear over a prior of 20-25 years.
  - Centric relation and centric occlusion are coincidental
  - the most difficult



# Etiology of extremely worn dentition

- Attrition
  - the loss of tooth structure by tooth-on-tooth contact.
  - normal aging process,
  - more rapid dental attrition may be due to larger dental problems.
- Abrasion
  - physically worn down by an external force
- Erosion
  - the chemical loss of mineralized tooth substance caused by exposure to acids not derived from oral bacteria.
  - Parafunctional occlusal habit
- Parafunction

# New patient

- Diagnosis
- Treatment plan
- Treatment
- Maintenance

# Diagnosis

- Comprehensive oral examination
- Medical history
- Dental history
- Radiographs –FMS and panoramic radiograph
- Photographs - color of teeth and gingiva is recorded and photographs are necessary to recall to patient's mind the state of his mouth prior to restorative dentistry.

# Treatment plan

- Prior to start of the treatment.
- Communication and patient education are essential for success

# Diagnostic impression, facebow transfer and articulation

- the process of transferring the facebow record of the spatial relationship of the maxillary arch and related anatomic reference point or points to an articulator

# Diagnostic casts





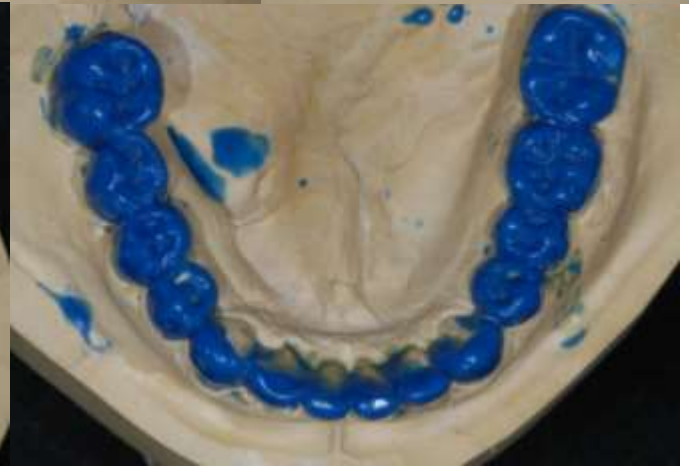
# Diagnostic wax up



# Estimated vertical dimension



Diagnostic wax up



# Diagnostic wax up

- Before diagnostic wax up. The occlusal discrepancies in CR and Eccentric occlusion should be eliminated.
- Diagnostic preparation of gypsum stone teeth that will require prospective crowns is carried out.
- Planning of subgingival margins or surgical crown lengthening, then, wax is used to appropriately shape all crowns and final prosthesis is planned.
- Preparing an elastomeric putty for temporization
- Reduction guide intra-orally.

# Terminology

- Centric Occlusion (CO)
- Centric Relation (CR)
- Maximum Intercuspal Position(MIP)
- Maximum Intercuspation

# Centric relation (CR)

1. A maxillomandibular relationship,
2. **Reproducible position**
3. Independent of tooth contact
4. Determined by the structural features of the TMJ
5. Musculoskeletally stable position
6. Most anterosuperior position
6. CR is an area
7. CR definitions changed over time as well as recording techniques and materials.
  - a. 1950, CR = most retruded/ chin point technique was used
  - b. 1980, CR= RUM= rearmost uppermost and midmost position/ bimanual technique with without Lucia Jig

# Centric occlusion (CO)= Centric relation Occlusion

- The occlusion of opposing teeth when the mandible is in centric relation
- May or may not = MIP

# Maximum Intercuspal position (MIP)

- The complete intercuspation of the opposing teeth independent of condylar position



# Maximum Intercuspatation

- The position of the mandible when the relationship of opposing occlusal surfaces provides for maximum planned contact and/or intercuspation.
- This is a **tooth-determined position**.

# Techniques

1. Bimanual technique –Dawson1973
2. Anterior guidance by a Lucia Jig JPD 1964
3. Anterior guidance by Leaf Gauge-Long-JPD 1973
4. Gothic arch tracings- Gysi 1910

5. Chin poing guidance –Lucia 1960
6. Unassisted free closure by patient with anterior deprogrammer (Campos?)
7. Three finger chin-point guidance method-Celenza-1984
8. Single-handed techniques
9. Anterior guidance by a tongue blade- Long-JPD 1970
10. Power centric registration method-Roth-1981
11. Myotronics
12. Schuyler technique-JADA-1932



# Mandibular deprogramming

- Ask the patient to bite on these with anterior teeth for 5- 10 minutes. The memory position of teeth intercuspation is lost.
  - Anterior jig
  - Leaf gauge
  - Cotton role

# 1. Bilateral manipulation method

- Guiding the condyles into most superior position in the glenoid fossa.
- Condyle is within 0.02 mm accuracy in three dimensions



## 2. Anterior stop technique (Anterior guidance by a Lucia jig)

- Anterior jig prevents posterior teeth from occluding and thus disrupts the proprioceptive memory
- Jig breaks the patient's habitual closure
- Tripod effect along with two condyles.
- The jig can also be made of autopolymerizing acrylic resin on mounted casts and then adjusted intraorally.
- After the jig is made, posterior bite record is taken.

*Lucia, V.O. (1964) A Technique for Recording Centric Relation. JPD, 14, 492-505.*



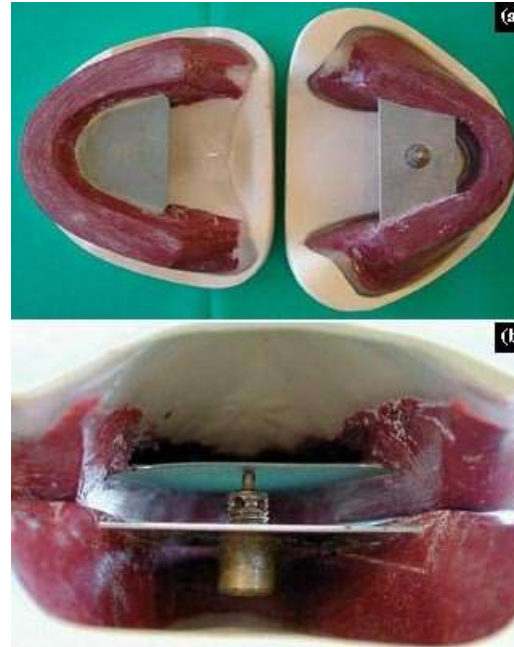
### 3. Leaf guage

- Introduced by Dr. James. H. Long in 1973.
- The most useful and practical alternative to anterior jig.
- Leaf gauges of uniform 0.1mm thickness which are sequentially numbered are described.
- Convenient and measure the exact vertical opening between the incisors.



## 4. Gothic arch

- Gothic arch tracings- Gysi 1910
- Popularized by Alfred Gysi in 1920, with a device called as Gysi's Recording Device



# Vertical dimension

- The distance between two selected anatomic or marked points
- OVD(Occlusal vertical dimension)
- RVD (Rest vertical dimension)
- $RVD - OVD = \text{free way space}$





# Methods of determining Rest Vertical Dimension

- Facial measurement after swallowing and relaxing
- Speech
- Tactile sense
- Measurement of anatomic landmarks
- Facial expression.

# Methods of determining Occlusal Vertical Dimension

- Mechanical methods
  - Ridge relationship
  - Pre extraction records
  - Measurement from formal dentures
  - Physiological methods
  - Using wax occlusal rims
- Physiologic rest position
  - Esthetics
  - Swallowing threshold
  - Tactile sense or neuromuscular perception
  - Patient's perception of comfort.

# Silverman's closest speaking space method

- Proposed by Silverman in 1952
- Silverman identified that the production of certain sounds like S yes ch brings the anterior teeth very close together
- Silverman M.M. "The speaking method in measuring vertical dimension". J. Prosthet. Dent., 1952; 3(2): 192-199.

# Swallowing technique

- Swallowing threshold
- Swallowing reflex is a primitive, innate reflex.
- When a person swallow, the teeth come together with a very light contact at the beginning of swallowing cycle.

# Increasing occlusal vertical dimension – why, when and how

- VD is unrelated to temporomandibular disease (TMD)
- There is no evidence to suggest that by changing VD, one can treat TMD.
- However, VD can be increased or decreased for the best functional and esthetic anterior contact in centric relation as long as the range of change is **within physiologic limitation**.
- Vertical dimension can not be raised for every full mouth reconstruction case.

## Significance of the Frankfort-mandibular plane angle to prosthodontics

~~Girard J. DiPietro, D.D.S.,\* and James R. Moergeli, Jr., D.D.S.\*\*~~  
*Fort Benning, Ga.*

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## Significance of the Frankfort-mandibular plane angle to prosthodontics

Girard J. DiPietro, D.D.S.,\* and James R. Moergeli, Jr., D.D.S.\*\*  
*Fort Benning, Ga.*

Development of the cephalometer has enabled orthodontists to study various anatomic relationships and evolve points, planes, and angles that correlate radiographic measurements with clinical observations. Now, after many years of clinical research and observation, orthodontists use cephalometrics to plan and follow treatment serially before, during, and after active patient care. Through these studies, a sizable amount of pertinent information has been gleaned about prosthodontic diagnosis, treatment planning, and prognosis. However, most prosthodontists have ignored the use of this information and the cephalometer as a major diagnostic tool. This observation is particularly interesting since Broadbent, an orthodontist, and Hofrath, a prosthodontist, reported on cephalometrics almost simultaneously in 1930.<sup>1</sup>

The purpose of this article is to (1) briefly discuss the technique of determining the Frankfort-mandibular plane angle (FMA), (2) review the correlations between radiographic measurements (specifically, FMA) and clinical observations, (3) point out the applicability of this knowledge to prosthodontic diagnosis, treatment planning, and prognosis, and (4) stimulate further research in this area.

### BACKGROUND

Data obtained from the ossified structure of the head can be analyzed by radiographic cephalometry. The technique in common use requires orientation and immobilization of the patient's head by some type of headholder (Fig. 1). The radiographic film is placed beside the head and perpendicular to the line of radiation. With known focus-to-object and focus-to-film distances, a high kilowatt source of x-radiation is directed at the head.

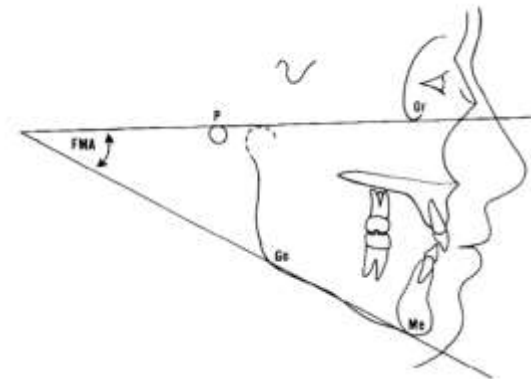
Since the initial development of radiographic cephalometry, more recent methods have made possible the classification of different sets of characteristics into more or

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\*Colonel, DC, USA; Director, Removable Prosthodontic Residency Training; Chief, Prosthodontic Department.

\*\*Major, DC, USA; Senior Resident, Removable Prosthodontics.

- The FMA is an angle formed by the intersection of the Frankfort horizontal plane and the mandibular plane.
- A rule of thumb used by orthodontists is that an FMA of 25.
  - 5 degrees is within normal range.
  - A “high-angle” patient is one with an FMA of 30 degrees or more – Characterized by open bite skeletal pattern
  - A “low-angle” patient is one with an FMA of 20 degrees or less – closed bite skeletal pattern.



*G J Dipietro, J R Moergeli; December 1976, Pages 624-6.*

**Table 1.** Clinical manifestations of high and low FMA

<i>Clinical characteristics</i>	<i>High FMA</i>	<i>Low FMA</i>
1. Biting force	Decreased	Increased
2. Muscular line of force	Arcuate	Vertical
3. Molar position relative to elevators of mandible	Anterior to line of force	Directly in line of force
4. Size of masticatory muscles	Hypotrophic	Hypertrophic
5. Mandibular bony processes	Underdeveloped	Well developed
6. Relative tooth size	Large	Small
7. Relative abrasion potential	Decreased	Increased
8. Tooth eruption	Complete	Incomplete
9. Occluding vertical dimension	Relatively noncritical	Critical
10. Long-span and cantilever fixed partial dentures	Other factors being equal, prognosis more favorable on high-angle case	
11. Complete denture stress directed to residual ridge	Decreased	Increased
12. Fracture of complete denture base	Decreased	Increased
13. Height of alveolar bone	Increased	Decreased
14. Palatal vault	High and narrow	Broad and flat
15. Buccal vestibules	Deep	Shallow
16. Muscle attachments	Base of ridge	Crest of ridge
17. Zone of attached gingiva	Increased	Decreased
18. Planes of face	Hyperdivergent	Hypodivergent
19. Facial profile	Convex	Concave
20. Stability of dentition	Mesial drift	Relatively stable
21. Component of force on prosthesis	Anterior	Vertical
22. Residual ridge relation	Divergent	Parallel
23. Tongue-thrust habit	Prone	Unlikely
24. Lip length relative to skeletal base	Short	Long
25. Position of glenoid fossa (limited studies)	Superior and posterior	Anterior and inferior



# Maintenance phase

- After placement and cementation of a prosthesis the patient treatment continues with carefully structured sequence of follow up appointments to monitor the dental health, stimulate meticulous plaque control habits, identify incipient disease and introduce any corrective measures if required.
- Adequate scaling is done periodically to maintain gingival health.
- Margins of restoration must be evaluated to detect secondary caries.
- Oral hygiene aids prescribed are tooth brushed, oral floss, interdental brush, oral irrigation device and oral rinses.

- At the goal of medicine is to increase the life span of the functioning individual, the goal of the dentistry is to increase the life span of the functioning dentition.

# Case Presentation

- Complete denture
- Implant retained overdenture
- Implant supported fixed complete denture
- Classic full mouth reconstruction

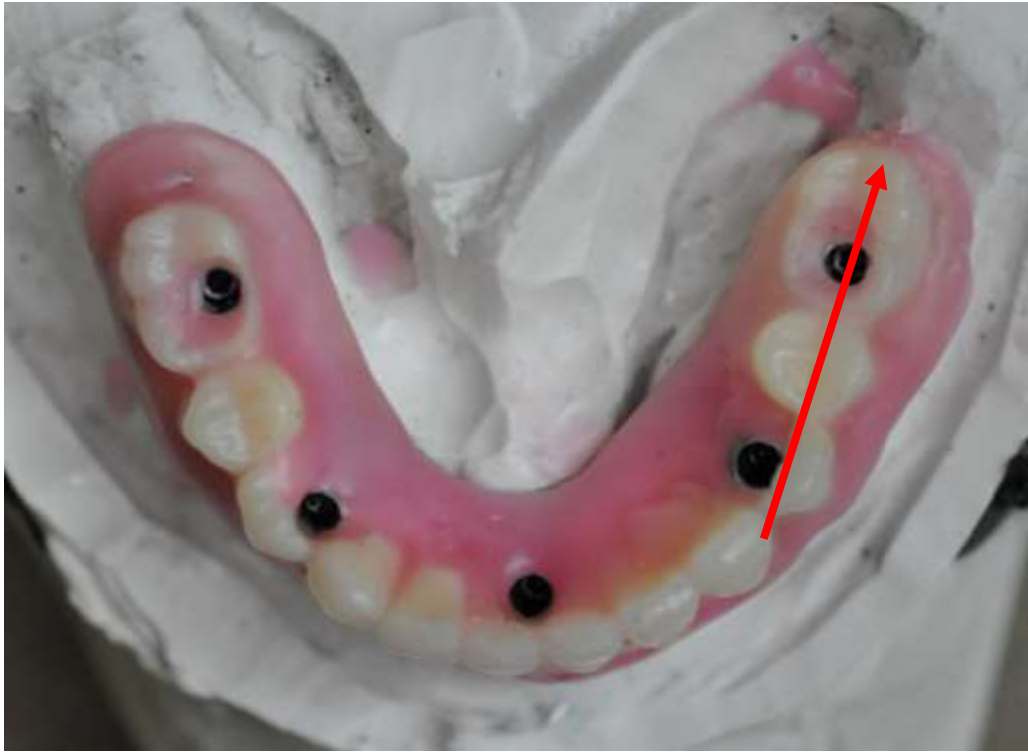
# Case 1 Complete denture



# Case 2 Md. Implant retained overdenture



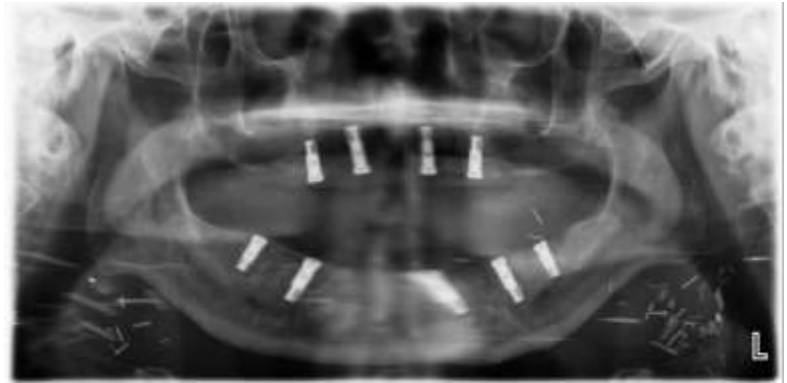
# Case 3 Tooth position



# Case 3 Vertical dimension







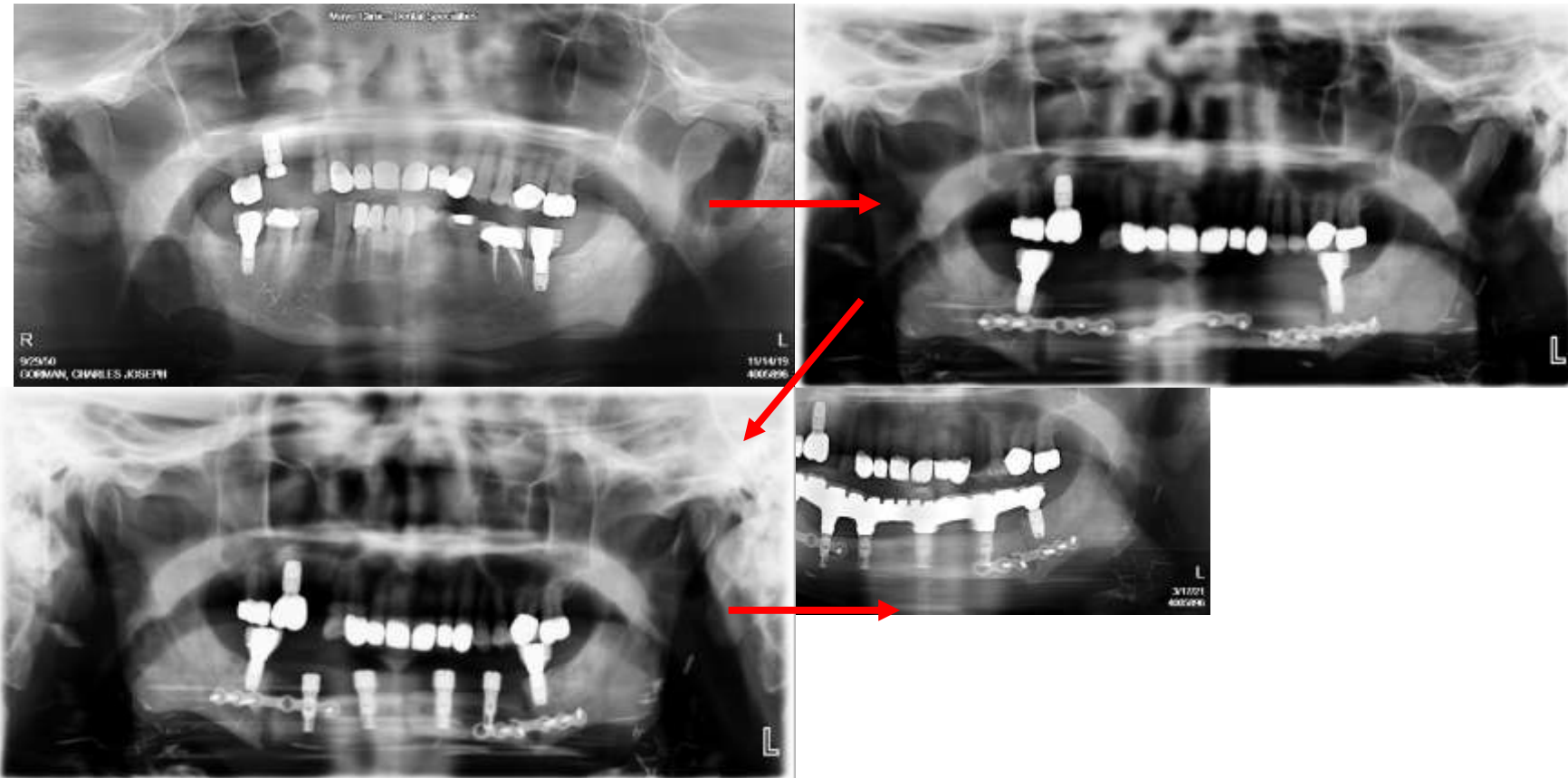


# Case 4 Condyle replacement ( only rotation)





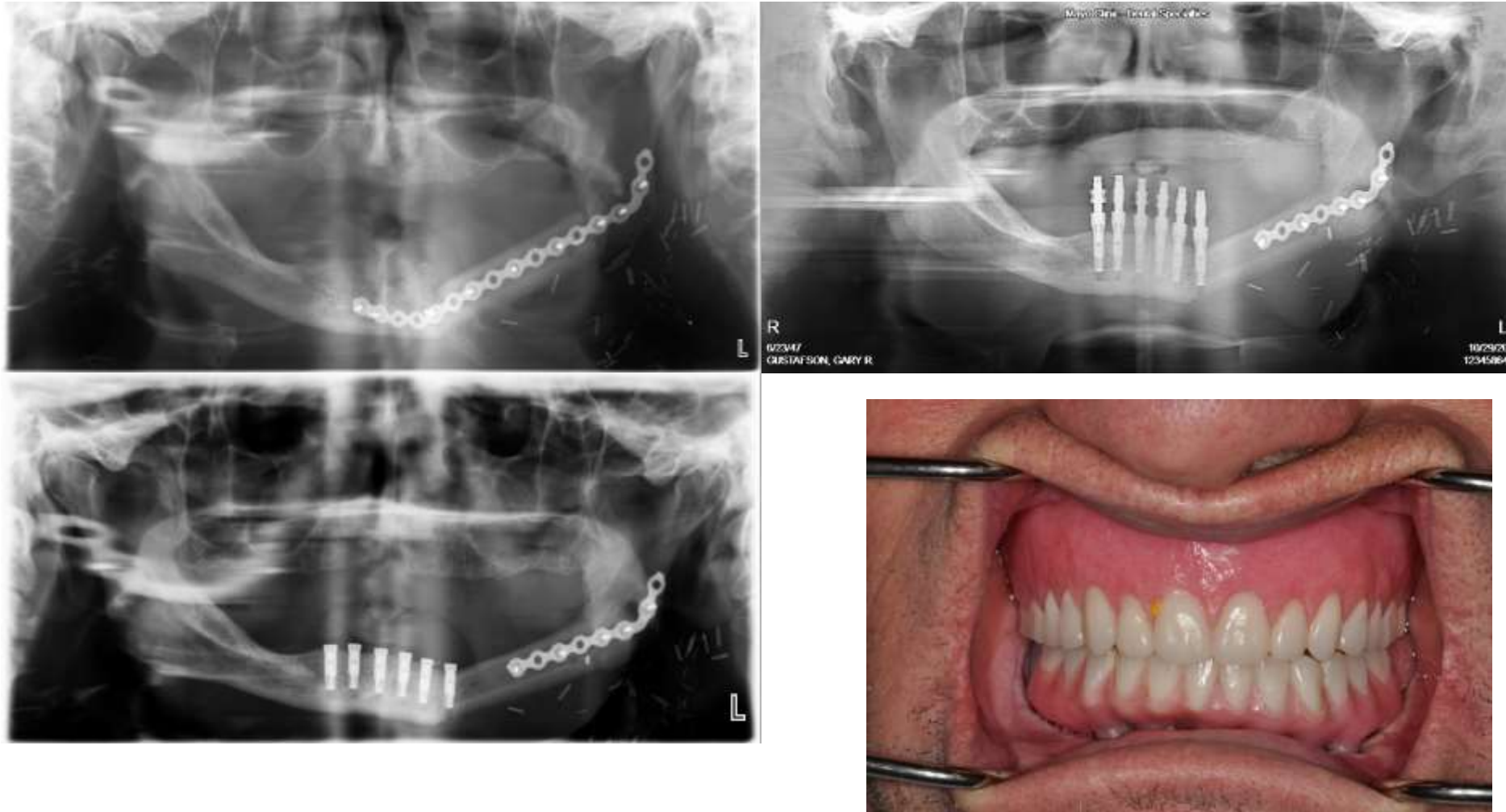
# Case 5. Maintained Vertical dimension

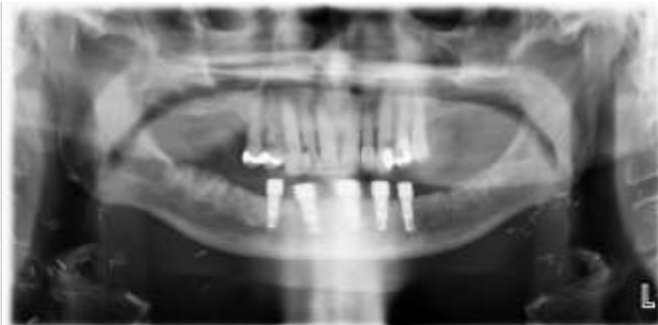
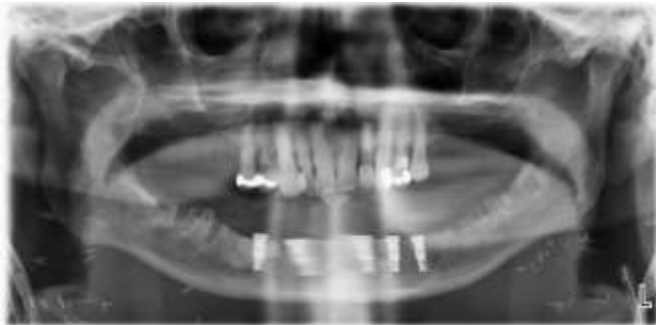






# Case 6 Implant supported fixed complete denture





# Case 7 full mouth reconstruction

- Name : QD
- Age : 64 years old
- Sex : Male
- Race : Caucasian
- Martial status : Married
- Occupation : Retired

## • Chief complaint :

**“My teeth are worn out. I am interested in making them look better and I want to chew better.”**



# Patient expectations

- Esthetics
- Function
- Comfort
- Longevity
- Cost



# Psychological and social appraisal

- Non smoker
- No drink
- Clenching
- Riding horse

## Medical history

- Appendix surgery in 1956
- Quadricep rupture in 2011
- Physical status : ASA1
  
- Medication
- Metformin for diabetics - 500mg bid.day
- Lisinopril for hypertension – 20mg/day
- Simvastatin for high cholesterol – 40mg/day

## Dental history

- WNL
- No TMJ problem
- Clenching habit
- Amalgam filling - #3,5,7,13
- PFM - #12 and 14
- Gold crown - #18 and 31
- Endo - #12 and 14
- Missing teeth  
- #1,2,15,16,17,20,29,30 and 32

# Extraoral photographs



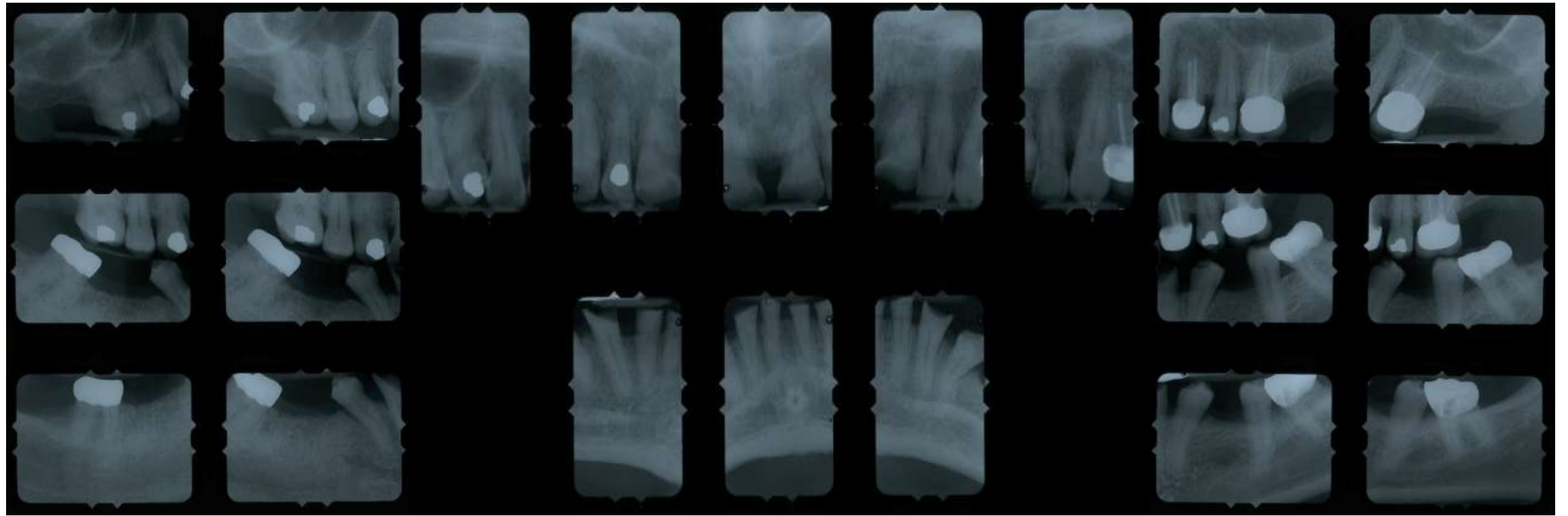
# Occlusal views



# Frontal views



# Full mouth radiograph



# List of problems

- Generalized severe wear (attrition)
  - #6.7.8.9.10.21.22.23.24.25.26. and 27
- Distally inclined teeth - #21 and 28
- Short root - #7 and 8
- Super erupted teeth - #23,24,25, and 26
- Clenching



# Treatment option

## **FULL MOUTH RECONSTRUCTION**

### **Mx .arch**

- PFM - #3,4,5,6,7,10,11,12,13 and 14
- Implants - #8,9 and 15
- Crown lengthening from #7 to #10

### **Mn. arch**

- PFM - #18,20,21,22,27,28 and 31
- Implants -#20,23,26,28 and 29
- Endo, post and core - #22 and 27



# Treatment sequence

- A. Diagnosis
- B. Treatment plan
- C. Treatment
  - a. Surgery phase
  - b. Restorative phase
- D. Maintenance phase

# A. Diagnostic phase

- Existence of posterior support
- History of wear
- Evaluation of existing vertical dimension
- Interocclusal space between VDO and VDR
- Phonetics : closes speaking sound (space)
- Facial Profile

# Restoration of extremely worn down dentition

- **Category 1**

- **Excessive wear with loss of occlusal vertical dimension**
- No posterior teeth & Unstable posterior occlusion
- Can increase VD for reconstruction

- *Turner KA, Missirlian DM. Restoration of the extremely worn dentition J Prosthet Dent. 1984 Oct;52(4):467-74*

# Estimate vertical dimension

- Evaluated VD loss
- Took impressions for Mx. and Mn. Arch with alginate (PVS)
- Took CR record in estimated VD
- Took facebow transfer
- Mounted diagnostic casts on the articulator
- Fabricated modified Lucia jig



# Jaw relation

- Deprogram muscle memory (Engram) by modified Lucia jig which was fabricated in estimated VD last time
- Took 3 sets of CR records with Lucia Jig in tentative VD
- Remounted diagnostic casts with CR records with modified Lucia jig on Hanau articulator

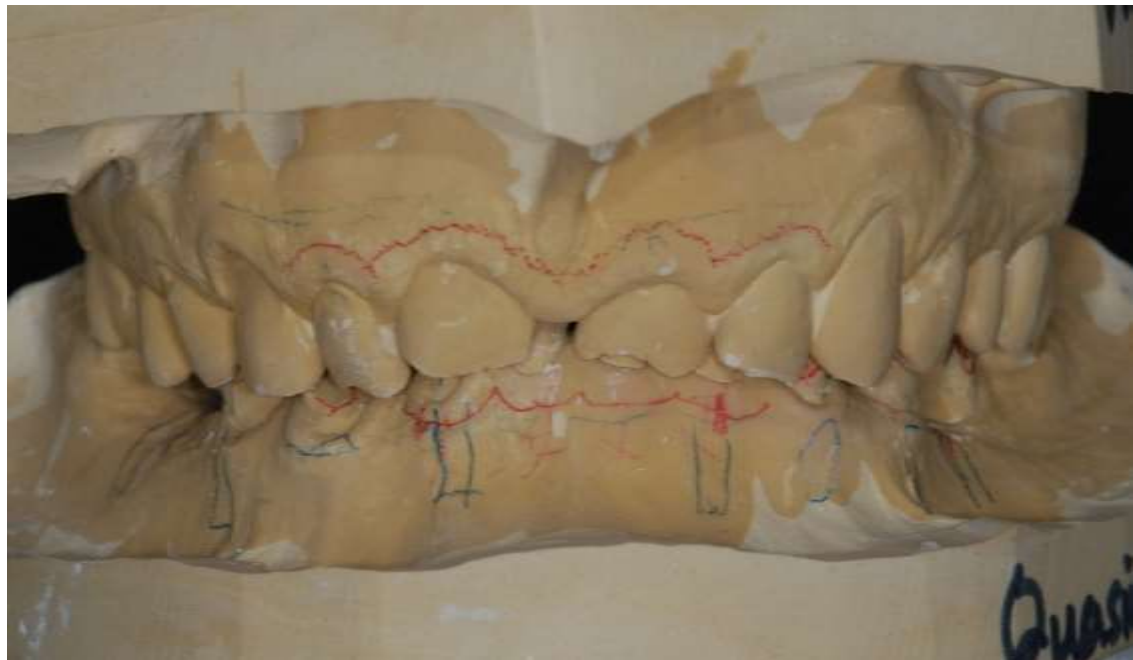


# Diagnostic casts



# Diagnostic wax up



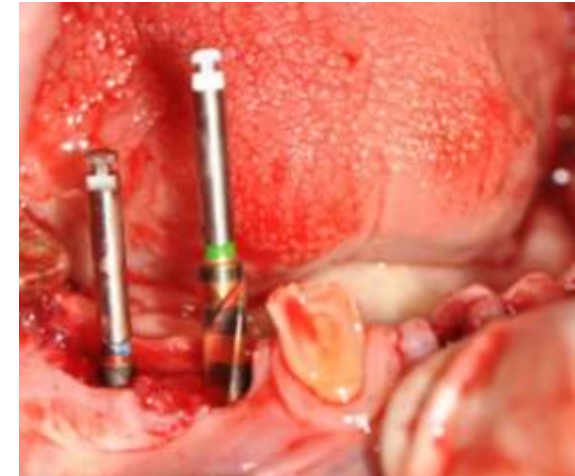




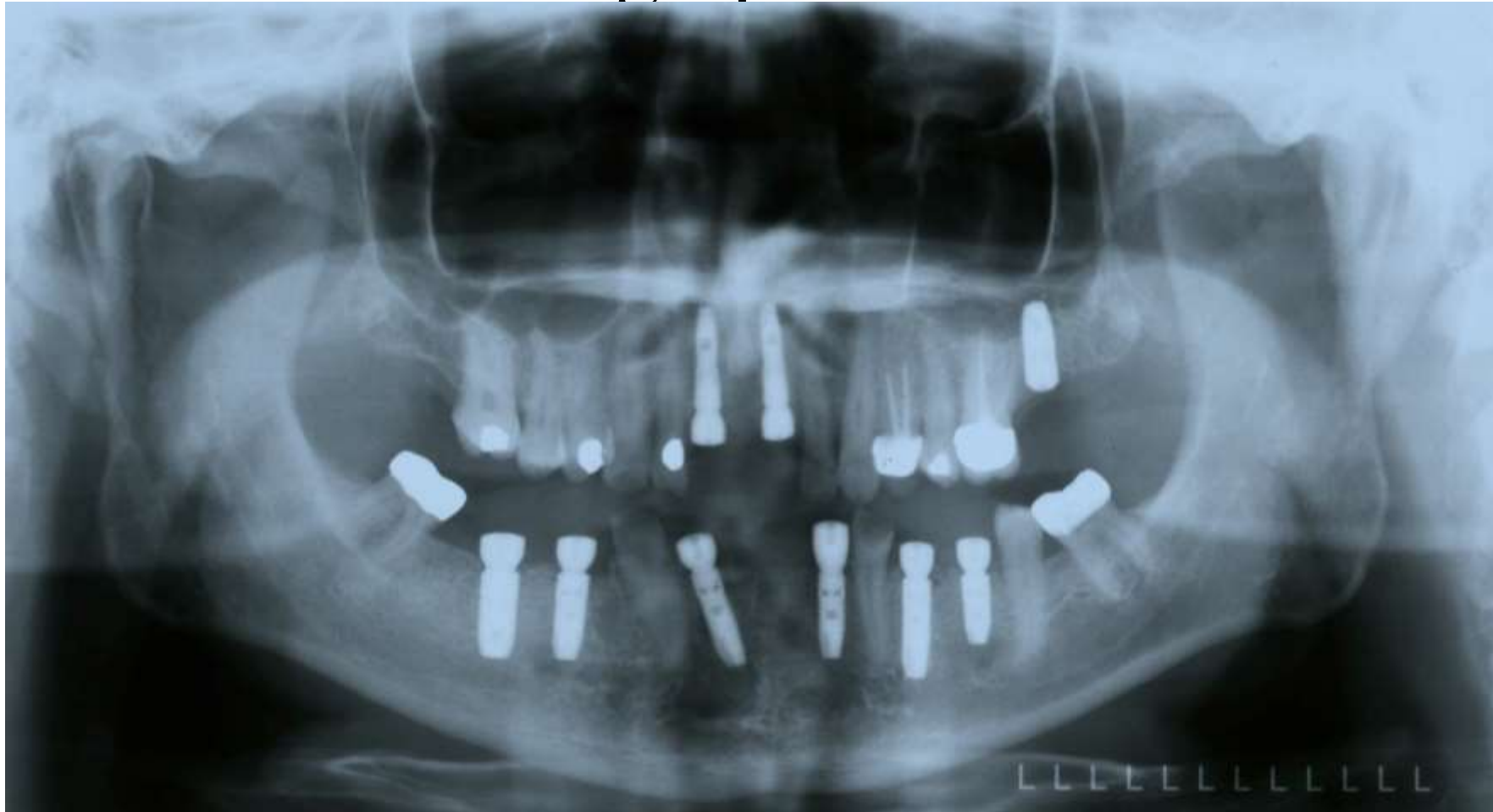
## B. Surgery phase

- Implant placement -  
8,9,15,20,21,23,26,28,29
  - a. #8,9 – Astra 4.5 x 13
  - b. #15 – Astra 5.0 x 11
  - c. #20,21,28 – Astra 4.0 x 9,13 and 11
  - d. #23,26 – Astra 3.5 x 11 and 13
  
- Crown lengthening – Mx. Anterior sites

# Implant placements



# Panoramic radiographs



After healing











# Mock up

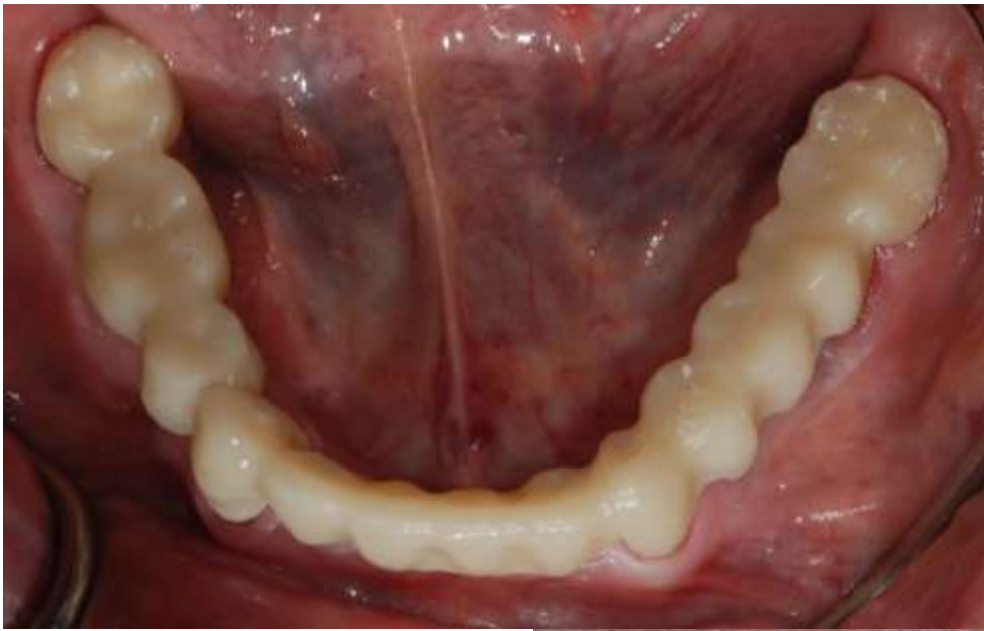






# Initial preparation and temporization



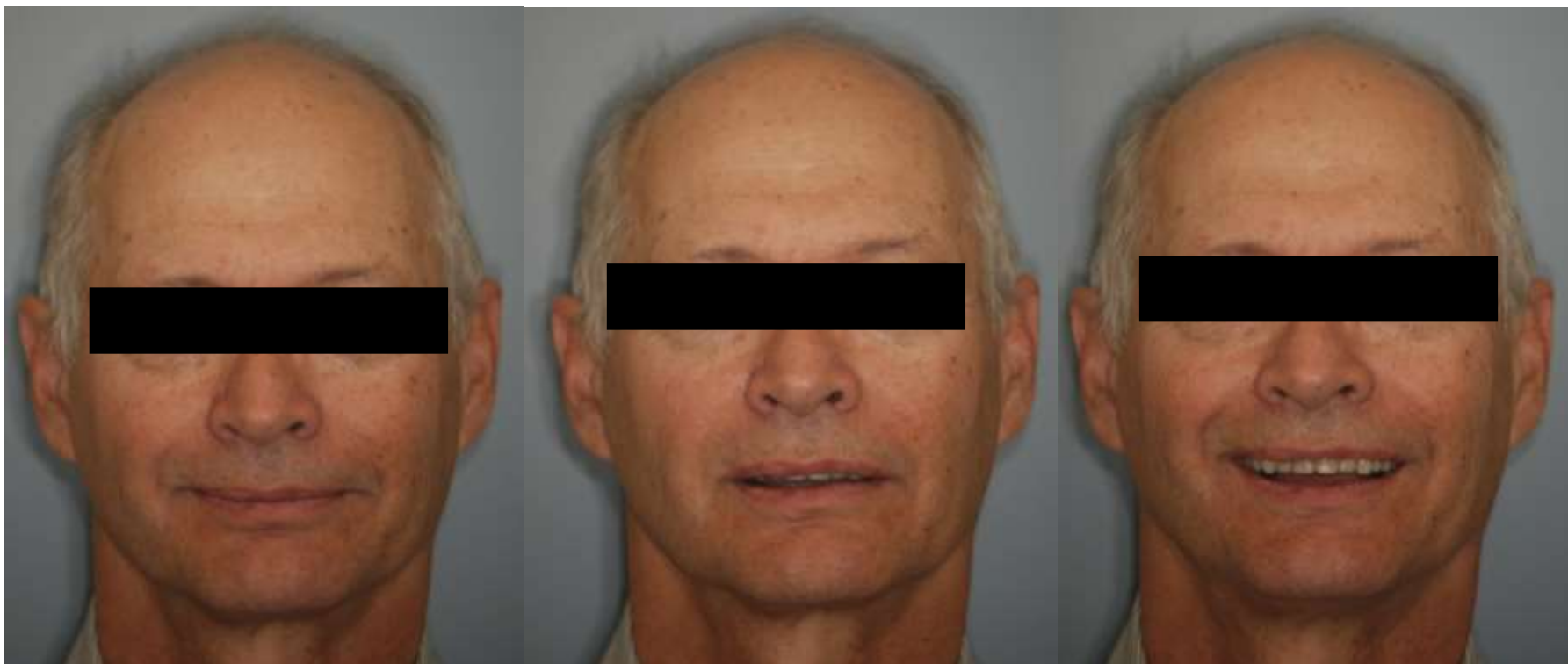


















# 2 pieces of casting post



# Custom tray



# Final impression

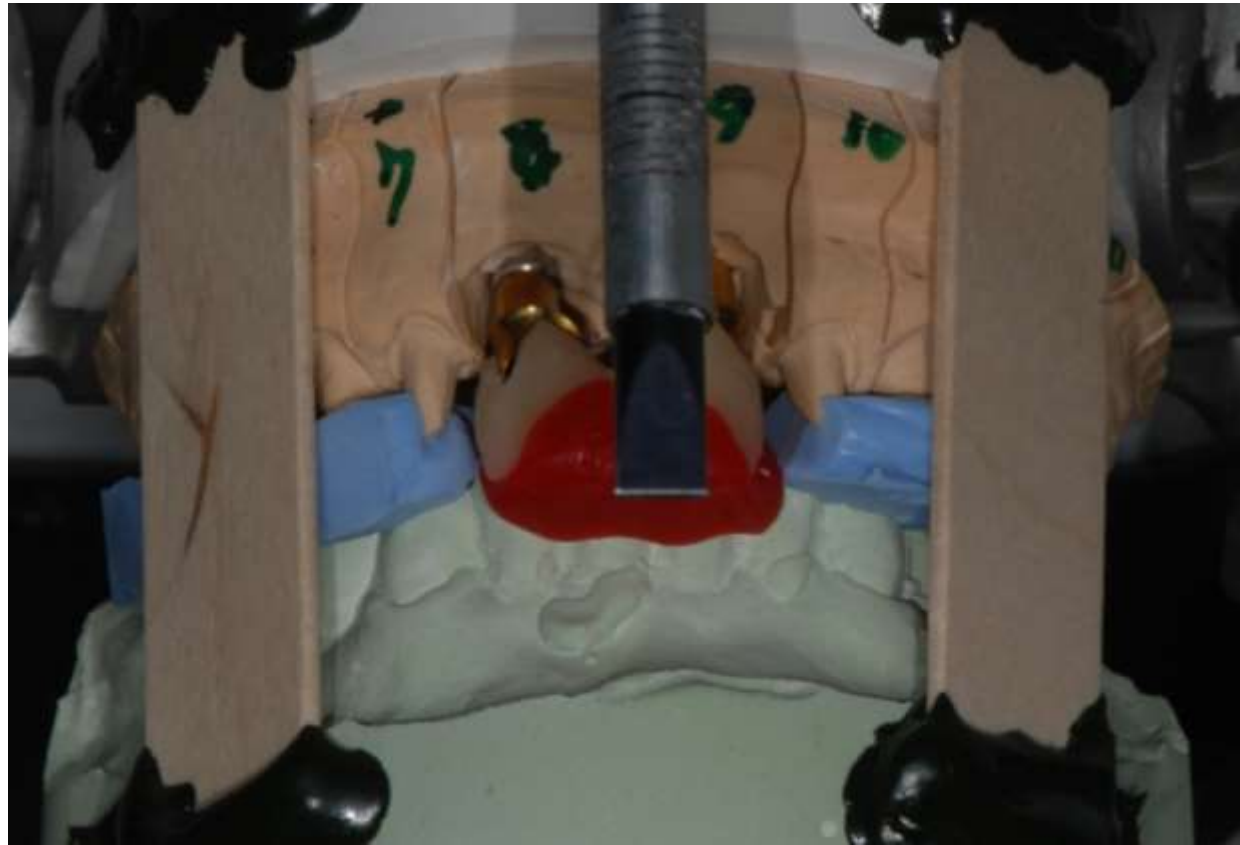






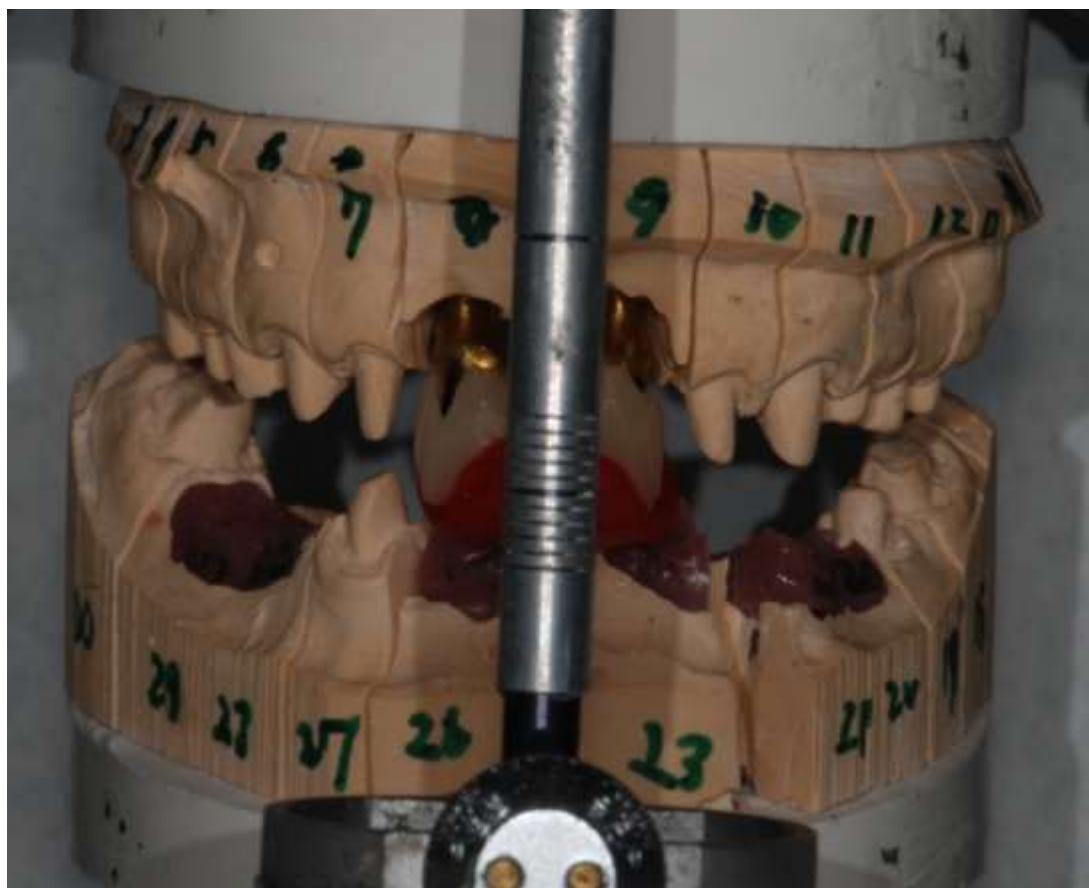
# Cross mounting



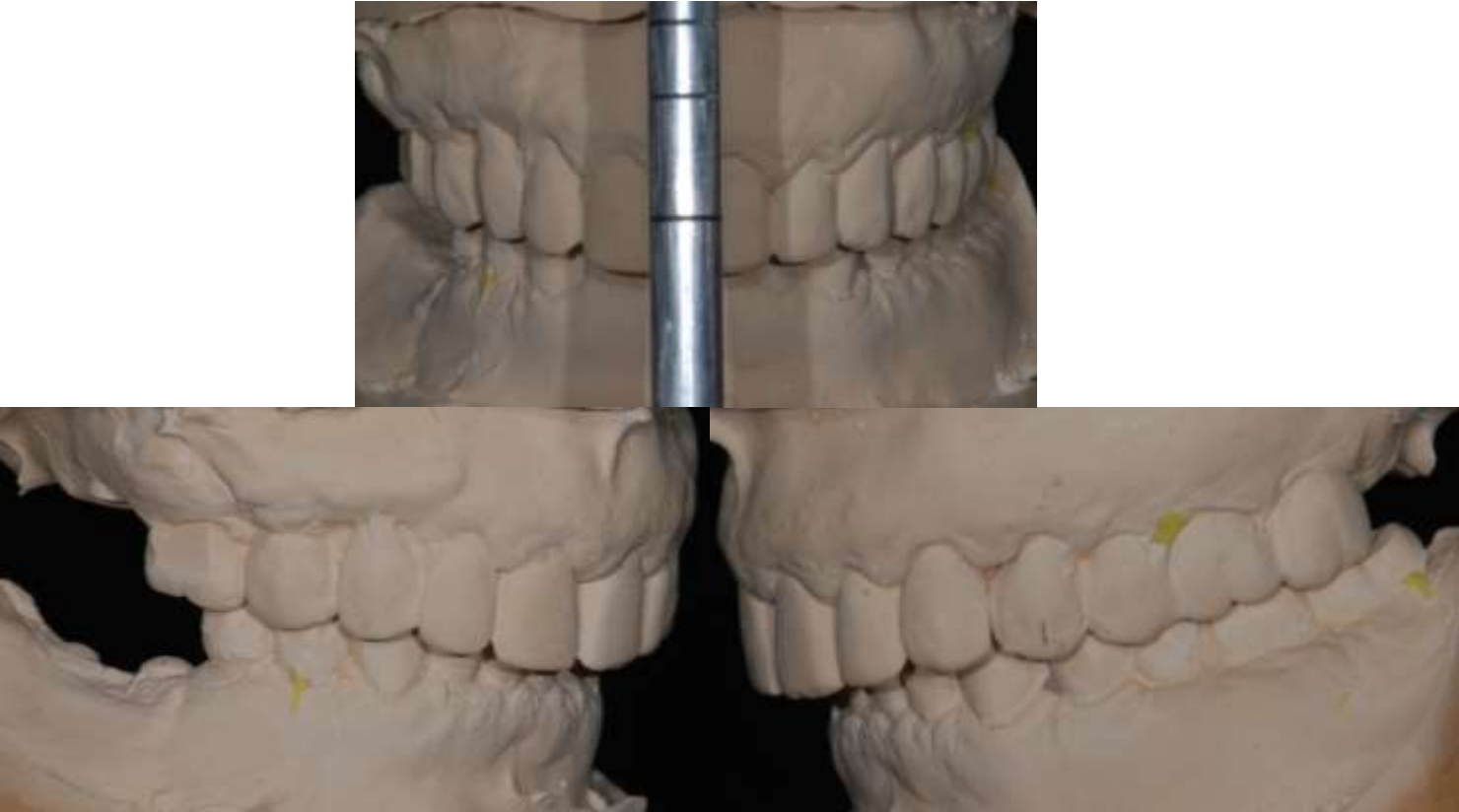








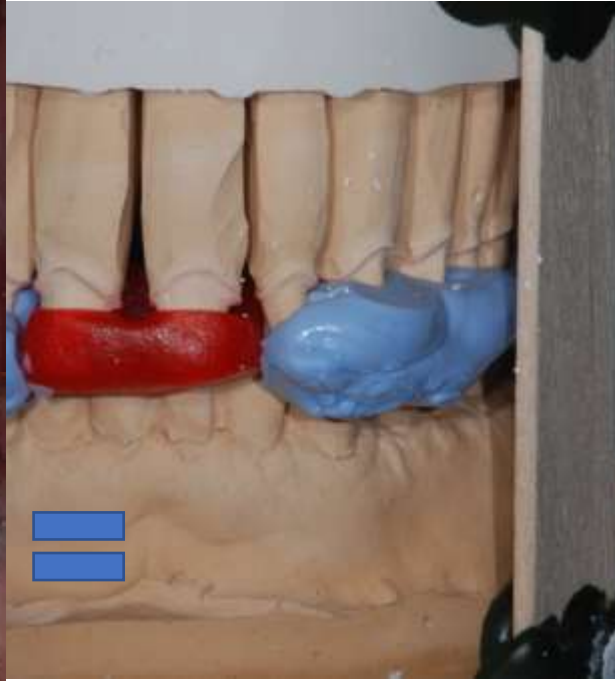
# Mounted Temporary casts



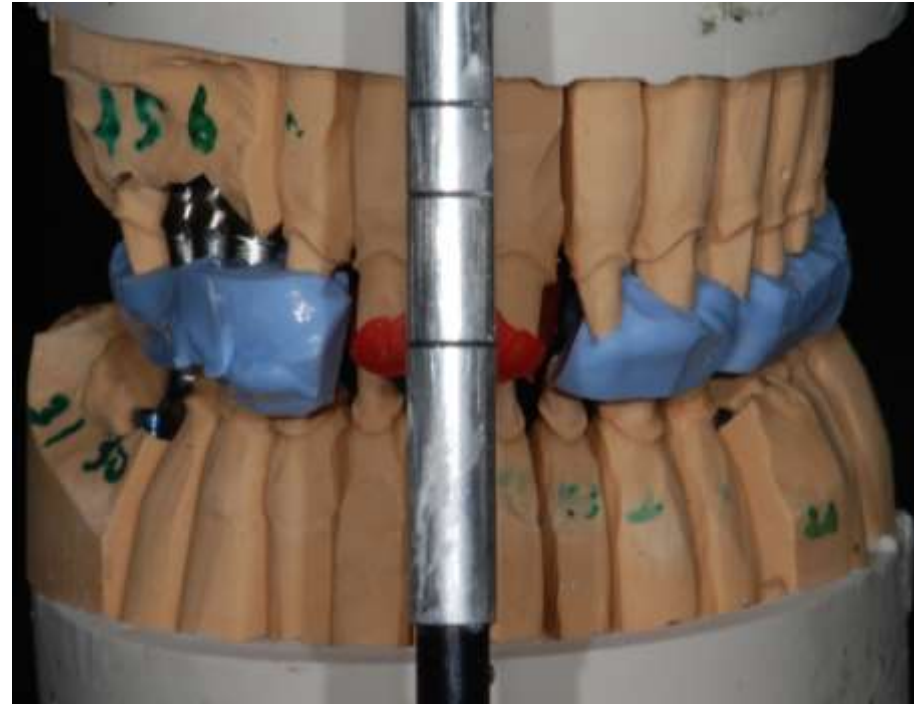
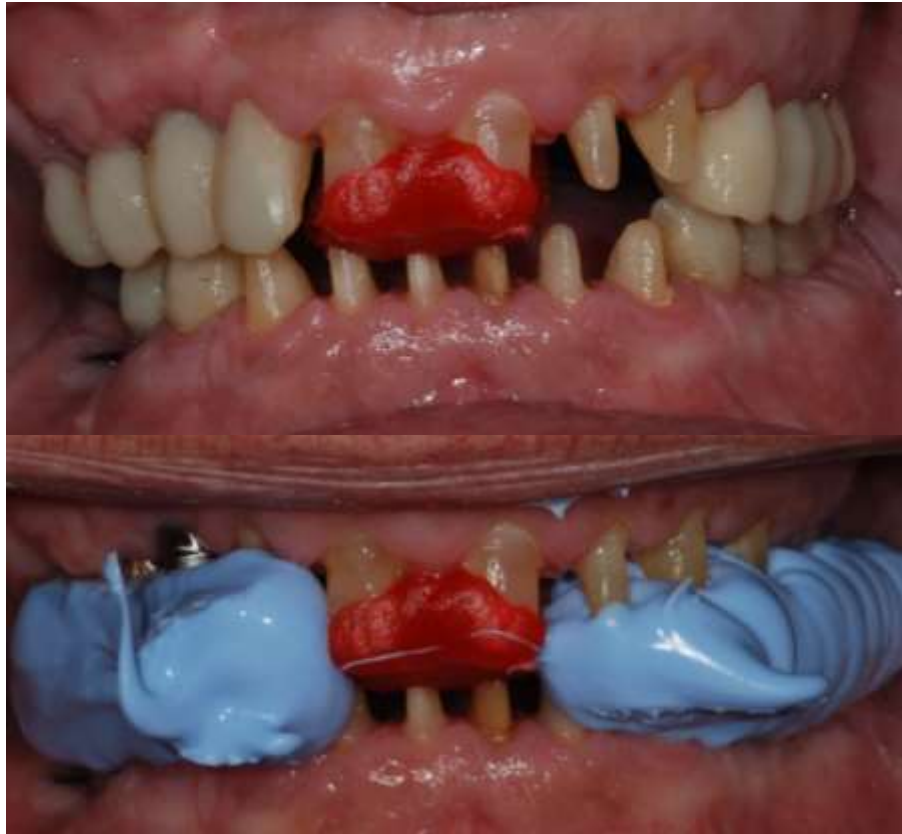


inst Mn.



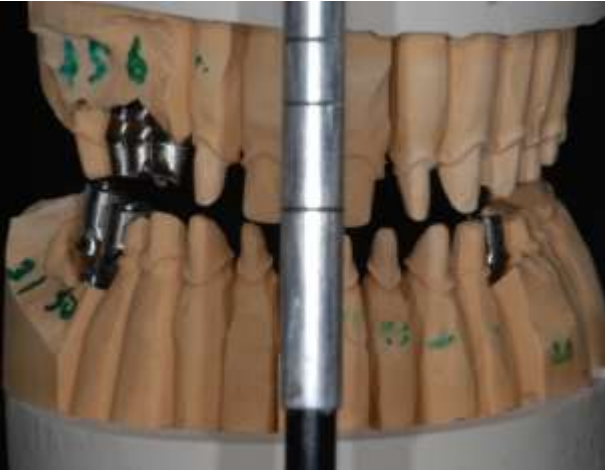


b. MOUNTING Mn. Master cast against mx. maxillary cast





# Mounted master casts on articulator



# Full contour wax up



# Full contour wax up







# Delivery





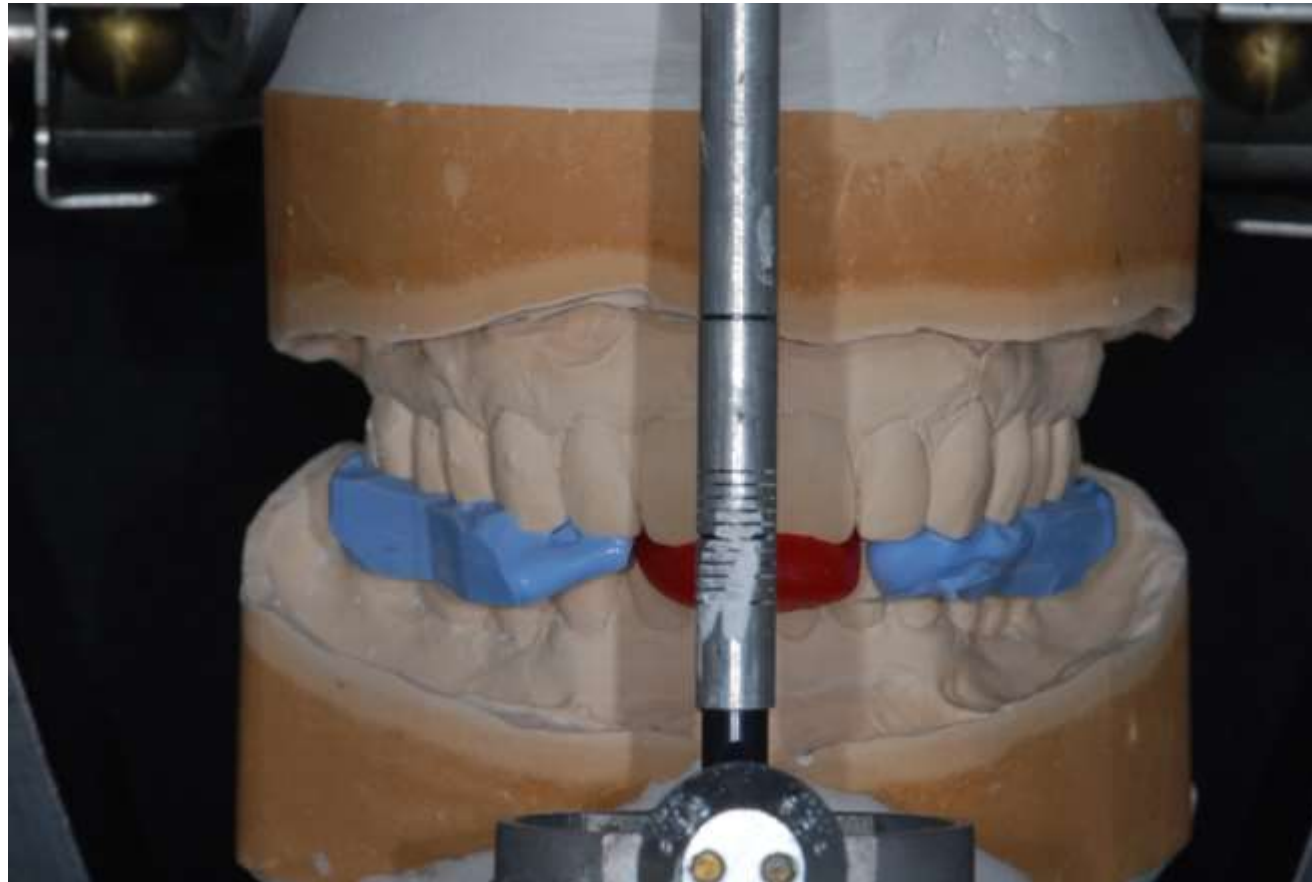






# Night guard





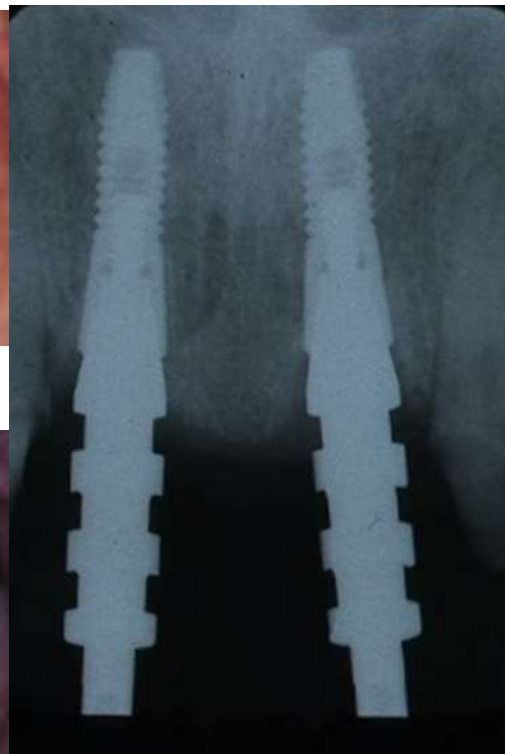








bbb



# Maintenance phase

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- Adequate scaling is done periodically to maintain gingival health.
- Margins of restoration must be evaluated to detect secondary caries.
- Oral hygiene aids prescribed are tooth brushed, oral floss, interdental brush, oral irrigation device and oral rinses.

# Objectives

- Definition of Full mouth reconstruction (rehabilitation)
- What is Centric Relation?
- How to determine OVD?
- Case presentation

# Questions