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Case Report

Full Mouth Rehabilitation using Hobo's Twin Stage Technique- A Case Report Interdisciplinary approach

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ABSTRACT

The wear and depletion of tooth material happens on the occlusal surfaces of teeth throughout life. However, uncontrolled occlusal wear may give rise to trauma to the pulp, occlusal disharmony, esthetic imperfection, and impairment of masticatory function. Tooth wear can be of three types namely, attrition, abrasion, and erosion depending on the etiology. Therefore, it is important to recognize the factors which produce excessive wear and reduced vertical dimension of occlusion. This case report presents the full mouth rehabilitation of complete maxillary and mandibular arch in a 45-year-old male patient with missing teeth and severe attrition. The patient was given porcelain-fused-to-metal crowns on all maxillary and mandibular teeth and treated using the Hobo's twin-stage concept with canine guided occlusal scheme.

Keywords: Reduced vertical dimension, porcelain fused to metal (PFM), broadricks plane Analyser, Attrition.

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Introduction

The slow wear of the occlusal surfaces of teeth is considered normal in the lifetime of a patient. However, excessive occlusal wear can result in pulpal involvement, occlusal disharmony, impairment of function, and esthetic imperfection, hence restoration of aesthetics, function and comfort in badly worn-out dentition and its surrounding supporting tissues like periodontal structures, the muscles of mastication, and the temporomandibular joint (TMJ), often poses great challenge in the field of dentistry[1]. The long-term success of such cases depends largely on simultaneous achieving of satisfying aesthetics and a harmonious occlusion. There is great apprehension involved in rehabilitation of debilitated dentition due to widely divergent views concerning the choice of an appropriate occlusal scheme for successful full mouth rehabilitation.

Turner and Missirlian (1984) classified the patients requiring full mouth rehabilitation into three categories[1,2]:

• Excessive occlusal wear with loss of vertical dimension, but with space available to restore the vertical height.

• Excessive wear without loss of vertical dimension of occlusion but space available.

• Excessive wear without loss of vertical dimension of occlusion but with limited space. Proper diagnosis is mandatory as the etiology of severe occlusal tooth wear is multifactorial in origin. Tooth wear can be in the form of attrition, abrasion, and erosion. Even after the occlusal wear, the vertical dimension at occlusion is maintained by continuous tooth eruption and alveolar bone growth[3]. Assessment of the patient's diet, patient's occupation, eating habits and/or gastric disorders, along with an existing occlusion and parafunctional habit is essential for arriving at a proper treatment plan[4].

Aim of our case report includes

1. Rehabilitation of worn-out dentition with full functional harmony using the twin-stage procedure to produce disocclusion in all eccentric movements.

2. To develop a canine-guided or mutually protected occlusion after proper occlusal plane analysis using broadricks occlusal plane analyser.

Case report

A 45-year-old male patient who is a fisherman reported to the dental college with the chief complaint of broken fixed prosthesis in relation to the right lower back tooth region. On an elaborate case history taking, we concluded that he had difficulty in chewing, pronouncing certain alphabets, and soreness of the masticatory muscles on awakening. We examined the Temporomandibular joint and it was functioning well except a little discomfort on opening and closing the mouth. Intraoral examination revealed a complete wear

of the tooth material [Figure 1]. On evaluating the vertical dimension, we found that the freeway space was 6 mm but his lower facial height was not reduced profoundly due to continuous eruption of teeth. Periodontal, endodontic, orthodontic examinations were done and based on the findings, we arrived at the treatment plan for full-mouth rehabilitation starting from oral prophylaxis, Root canal treatment, cast post, and crown lengthening (in order to gain space for restorative material) followed by with porcelain-fused-to-metal full-coverage fixed dental prosthesis and crowns at an increased VD of 3 mm with canine-guided occlusion to improve aesthetic and functional value of the patient.

The diagnostic impressions were made using Addition silicone [Figure 2]. The patient's casts were mounted on a semi adjustable articulator (Hanau H2) using a facebow record at existing vertical Dimension (VD) [Figure 3]. After tentative or arbitrary wax build up, mandibular occlusal plane was analyzed using Broadrick's occlusal plane analyzer. Divider of Broadrick occlusal plane analyzer was opened at 5.5 inches (for skeletal class II malocclusion) and a mark was obtained on the flag by keeping one end at the distal end of the canine and the second end of the divider at the condyle of the articulator and another mark crossing the first one was obtained [Figure 4a, 4b]. Now, another end of the divider was kept on this intersection of the marks, and an occlusal plane was marked on tentative wax up made on mandibular cast. The semi adjustable Hanau articulator was programmed to Condition 1 of Hobo's twin-stage procedure [Table 1], wherein after removal of the mandibular anterior segment, posterior diagnostic wax-up was done in bilaterally balanced occlusion. The settings were changed to Condition 2 where the mandibular anterior segment was replaced and the anterior wax-up was completed and checked for proper anterior guidance to achieve disocclusion in eccentric movements due to canine-guided occlusion. Provisional crowns were fabricated with self-cure acrylic resin using a polyvinyl siloxane putty matrix produced from the diagnostic wax-up [Figure 5].

Tooth preparation of all maxillary and mandibular teeth was done [Figure 6], and single-stage double-mix putty light-body impression was made with polyvinyl siloxane impression material after the proper cord packing to expose the finish line and unprepared tooth surface (Aquasil, Dentsply) [Figure 7]. The interocclusal record was taken after lucia jig was kept in anterior region with interocclusal recording material at established vertical dimension, and the facebow was used for recording of orientation jaw relation. Provisional crowns were cemented with intermediate restorative material.

Laboratory Procedure

After die cutting, the casts were mounted on a semi adjustable articulator (Hanau wide vue). The wax patterns were fabricated, invested, and casted. The metal copings were retrieved, and metal try-in was done after finishing [Figure 8]. During the metal try-in, interocclusal record was taken at an existing vertical dimension then in articulator it was increased by 4mm followed by ceramic application using Condition 1 and 2 of Hobo's twin stage technique and bisque try-in was completed. [Figure 9,10a, 10b,10 c,11,12a,12b] The canine-guided occlusion was checked in the mouth, [Figure 13a, 13b] and after verification; the crowns were cemented with intermediate restorative material. All the crowns were cemented with Type I glass ionomer cement after 2 weeks, once the patient was comfortable [Figures 14] Postoperative orthopantogram was taken [Figure 15], and oral hygiene instructions and regular checkup were administered. Patient recalled for a checkup after 48 hours of final cementation.

Discussion

Occlusal evaluation schemes in full mouth rehabilitations can be either confirmative (occlusion is established according to the patient's existing intercuspal position) or a reorganized (occlusion is established according to the patient's musculoskeletally stable position) approach[5]. Meticulous planning is needed to correct uneven occlusal planes in the situation where multiple missing teeth need full mouth rehabilitation before any occlusal scheme is adopted.

The most commonly used method for establishing an acceptable plane of occlusion is by using Broadrick's occlusal plane analyser (BOPA)[6, 7]. It can dictate us how much tooth reduction or ceramic addition is needed to correct the occlusal plane. This technique works on the principle of spherical theory of occlusion by monson to develop the occlusal plane.

Treatment for reduced vertical dimension and attrition is not just to increase it, but also to restore the amount of VD loss and associated problems. Full-mouth rehabilitation should be directed towards reestablishing a state of functional harmony with the stomatognathic system[8]. Dawson's statement was that an interocclusal space is never lost and any loss is compensated by tooth eruption, alveolar bone expansion, and muscle action[4, 9].

The etiology of tooth material loss is multifactorial, and clinical controlled trials of restorative and prosthodontic approaches are limited in quantity and quality. The vertical dimension should be raised with overlay prostheses and should be tried between 3 weeks to 5 months for deprogramming of the temporomandibular joint[10]. In this case, 3 mm of VD was raised by intentional root canal treatment of lower anterior, 1mm of restorative space was gained through crown lengthening. The patient was monitored for about 2 months to evaluate the adaptation to the overlay provisional restoration. No discomfort, wear, and muscle fatigue were observed during that period. The increase of VDO was determined by the patient's physiologic factors such as interocclusal rest space and speech. Arbitrary increase of VDO would lead to multiple complications. Moving on to the occlusion, Stuart and Stallard in 1957 said that the cuspid-protected occlusion concept had many advantages over the group function[11]. Hobo and Takayama said that the amount of disocclusion depends on the condylar path, incisal path, and the cusp angle[12]. Posterior disocclusion is very important in controlling harmful lateral forces. This case has demonstrated that if the condyles are seated in centric relation, additional restorative-required space may be obtained.

Good anterior guidance is necessary for eliminating the interferences in the condyles thereby prevents excessive wear of tooth material [13-15]. Hobo and Takayama developed the twin stage concept as the advanced version of Twin-Table technique. In their research they concluded that cusp angle was considered to be the most reliable determinant of occlusion[16, 17] as cusp angle does not deviate and is 4 times more reliable than the condylar and incisal path which show deviation[17].

Conclusion

Proper Diagnosis with meticulous treatment planning with adequate knowledge of clinician, and proper communication with laboratory technician is required for creating the beautiful smile along with the restoration of health of the masticatory system. In addition, the mandible should be seated in a musculoskeletally stable position in glenoid fossa. With this philosophy, it creates a beautiful smile with good comfort and function.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal.

Authors' contribution

Revathi Duraisamy: Manuscript editing, Literature search, data collection

Jaya Krishna Kumar: Data Analysis, manuscript drafting

Raja Sekar & Ashok Jacob- Root canal procedures

Guhan Nathan- Crown lengthening procedures

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Conflict of interest

The authors have nothing to disclose or any conflicts of interest.

Source of funding- None

References

1. Turner KA, Missirlian DM. Restoration of the extremely worn dentition. The Journal of prosthetic dentistry. 1984 Oct 1;52(4):467-74. PubMed: https://www.ncbi.nlm.nih.gov/pubmed/6389829

2. Brown KE. Reconstruction considerations for severe dental attrition. The Journal of prosthetic dentistry. 1980 Oct 1;44(4):384-8. PubMed: https://www.ncbi.nlm.nih.gov/pubmed/6997465

3. Carlsson GE, Ingervall B. Effect of increasing vertical dimension on the masticatory system in subjects with natural teeth. The Journal of prosthetic dentistry. 1979 Mar 1;41(3):284-9. PubMed: https://www.ncbi.nlm.nih.gov/pubmed/283228

4. Dawson PE. Functional occlusion-e-book: from TMJ to smile design. St. Louis, Mo.: Mosby. 2006;647.

5. Hobo S. Twin-tables technique for occlusal rehabilitation: part I—mechanism of anterior guidance. The Journal of Prosthetic Dentistry. 1991 Sep 1;66(3):299-303. PubMed: https://www.ncbi.nlm.nih.gov/pubmed/1800723

6. MANN AW, PANKEY LD. Concepts of occlusion: the PM philosophy of occlusal rehabilitation. Dental Clinics of North America. 1963 Nov 1;7(3):621-36.

7. Schluger S, Youdelis RA, Page RC. Occlusal traumatism as an etiological factor in periodontal disease. Philadelphia: Lea and Febiger. 1971.

8. Hobo S. Twin-tables technique for occlusal rehabilitation: Part IIClinical procedures. J Prosthet Dent. 1991; 66: 471-477. PubMed: https://www.ncbi.nlm.nih.gov/pubmed/1791556

9. Hobo S, Takayama H. Twin-stage procedure. Part 2: A clinical evaluation test. Int J Periodont Rest Dent. 1997; 17: 457-463. PubMed: https://www.ncbi.nlm.nih.gov/pubmed/9497734

10. Shetty M, Joshi N, Prasad DK, Sood S. Complete rehabilitation of a patient with occlusal wear: a case report. The Journal of Indian Prosthodontic Society. 2012 Sep;12(3):191-7. PubMed: https://www.ncbi.nlm.nih.gov/pubmed/23997471

11. Hobo S, Takayama H. Twin-stage procedure. Part 1: A new method to reproduce precise eccentric occlusal relations. International Journal of Periodontics & Restorative Dentistry. 1997 Apr 1;17(2). PubMed: https://www.ncbi.nlm.nih.gov/pubmed/9497706

12. Verma K, Gowda EM, Kalra A, Verma R. Full mouth rehabilitation using twin-stage procedure-a case report. Ann Dent Spec. 2015 Jul 1;3:89-92. PubMed: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3341744/

13. Gambhir A, Rani G. Twin-stage technique for occlusal rehabilitation of a mutilated dentition–A case report. Journal of Oral Health and Craniofacial Science. 2020 May 28;5(1):006-10.

14. Anil Kumar S, Radhakrishnan V, Sandhu HS, Sahoo NK. Full mouth rehabilitation of a case of rampant caries using a twin-stage procedure. Med J Armed Forces India. 2015; 71(Suppl 2): S429-434. PubMed: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4705153/

15. Kalra A, Sandhu HS, Sahoo NK, Nandi AK, Kalra S. Full-mouth rehabilitation using twin-stage technique. International Journal of Oral Health Sciences. 2019 Jan 1;9(1):40.

16. Dawson PE. Evaluation, diagnosis & treatment of occlusal problems. 2nd ed. St Louis: Mosby. 1989; 265.

17. Tiwari B, Ladha K, Lalit A, Dwarakananda Naik B. Occlusal concepts in full mouth rehabilitation: an overview. The Journal of Indian Prosthodontic Society. 2014 Dec;14(4):344-51. PubMed: https://www.ncbi.nlm.nih.gov/pubmed/25489156.

Figures

Figure 1: Intraoral Examination-Complete wear of the tooth material

Figure 2: Diagnostic impressions

Figure 3: Face bow Record and maxillary cast mounting in semi adjustable articulator

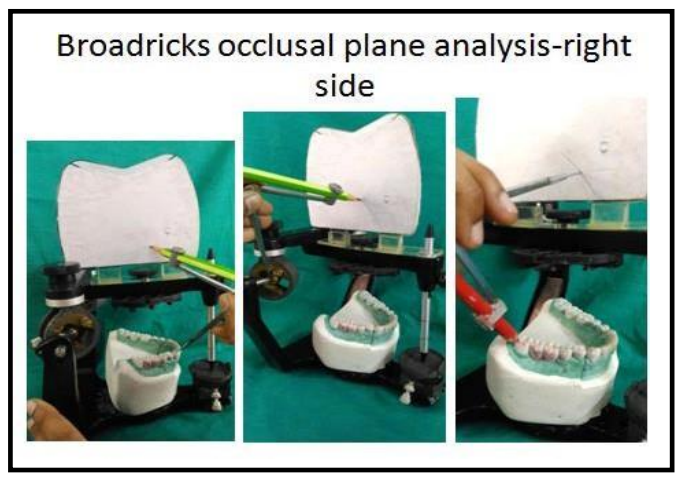

Figure 4a: Broadrick occlusal plane analyzer-An occlusal plane was marked on tentative wax up made on mandibular cast

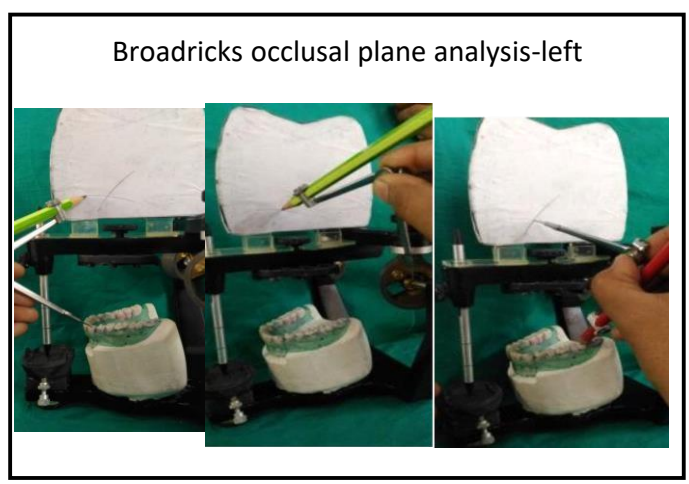

Figure 4b: Broadrick occlusal plane analyzer-An occlusal plane was marked on tentativewax up made on mandibular cast

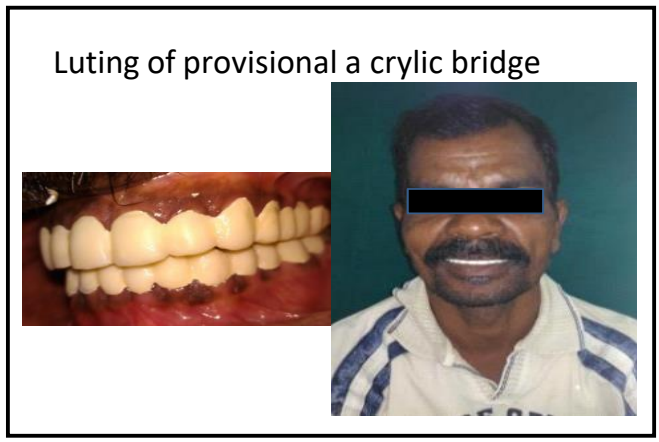

Figure 5: Provisional restoration

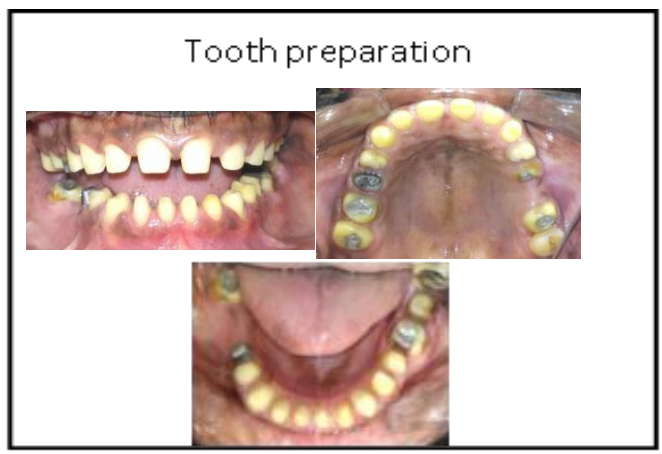

Figure 6: Tooth Preparation

Figure 7: Master Impression

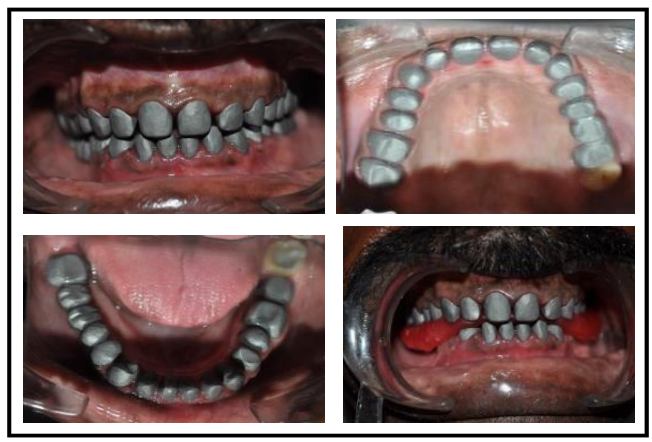

Figure 8: Metal try in – Interocclusal record at existing vertical dimension

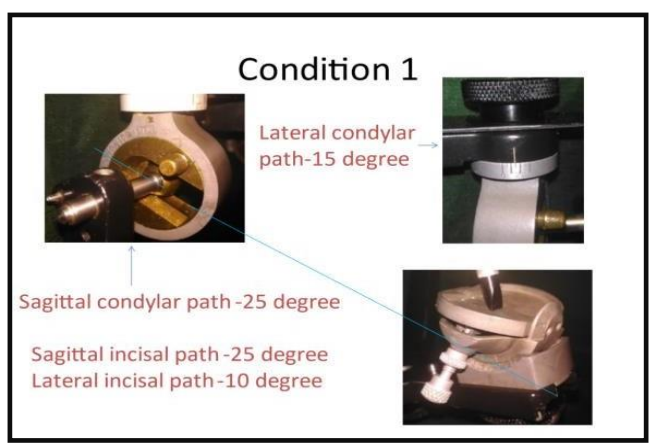

Figure 9: Condition 1 Articulator setting

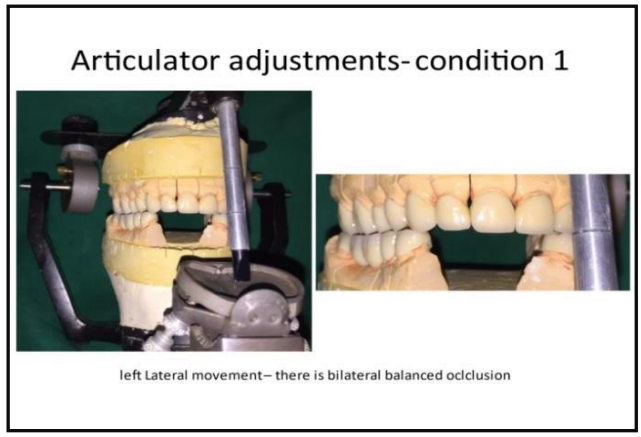

Figure 10a: left Lateral movement in condition 1

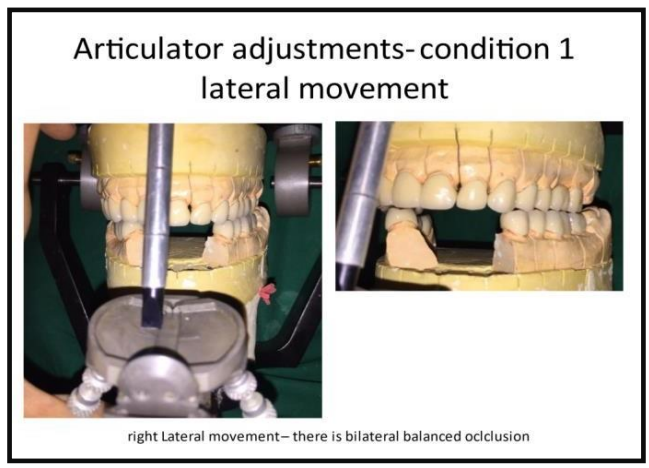

Figure 10b: Right Lateral movement in condition 1

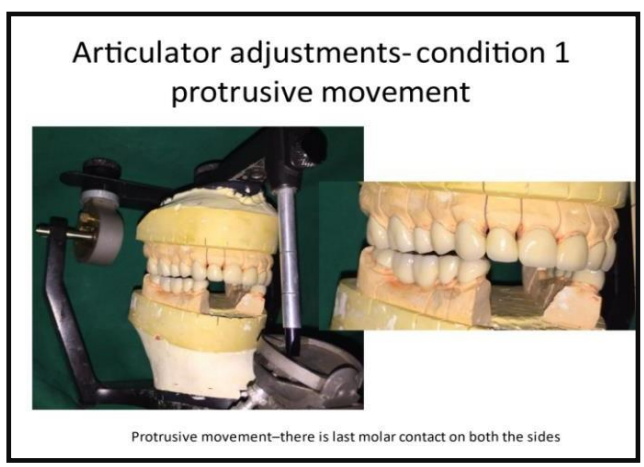

Figure 10c: Protrusive movement in condition 1

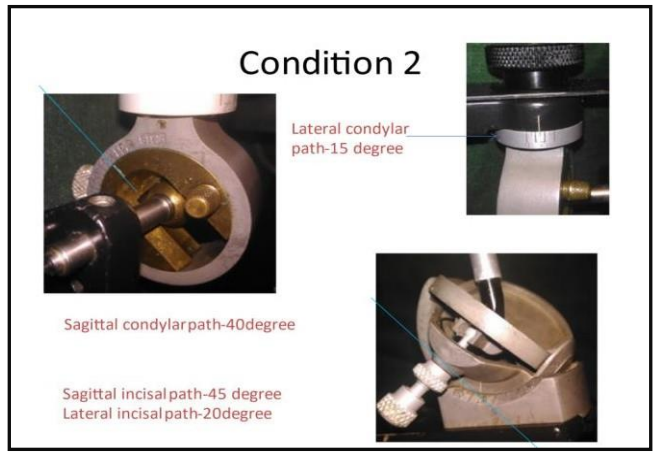

Figure 11: Condition 2 Articulator setting

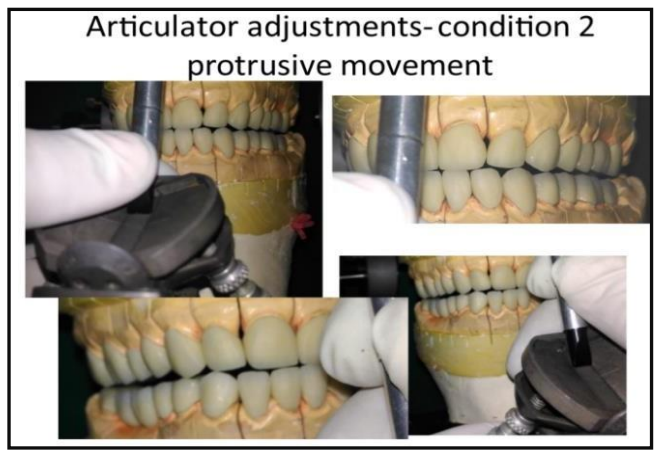

Figure 12a: Protrusive movement in Condition 2

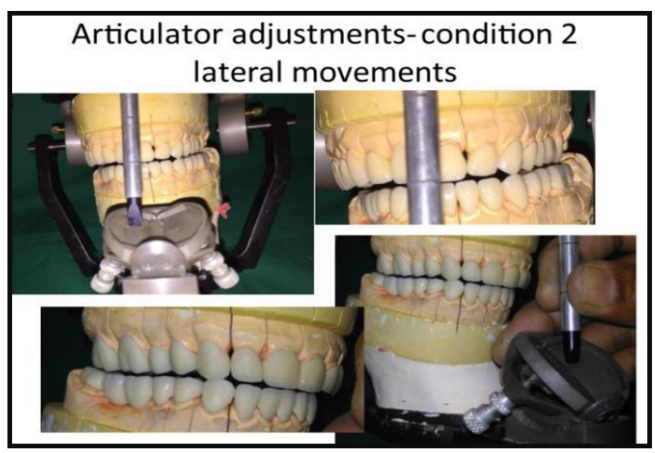

Figure 12b: Right and left lateral movement in condition 2

Figure 13a: posterior Disocclusion on protrusion

Figure 13b: Posterior Disocclusion on Canine guided occlusion

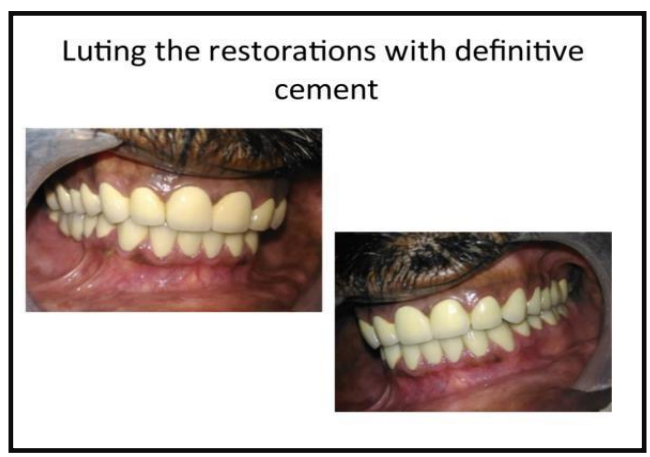

Figure 14: Final Luting with GIC type I

Figure 15: Final Post operative OPG

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