

Full Mouth Rehabilitation of a case of rampant caries using a twin-Stage procedure

Anil Kumar S (Maj)¹, Nandkishore Sahoo (Brig)²
Col. Sandhu HS³, Col. Radhakrishnan Vijayanathan⁴



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¹Senior Lecturer (Prosthodontics)
Army College of Dental Sciences

²Dept of Dental Surgery
Armed Forces Medical College
Professor & Head of Department
(Oral And Maxillofacial Surgery), Pune

³Army Dental Centre (R&R),
Professor (Prosthetic Dentistry)

⁴Army College of Dental Sciences

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Email for correspondence: anil.d1@rediffmail.com

ABSTRACT:

Purpose: Dental caries is one of the most common chronic diseases in the world. Restoration of tooth decay is important not only because of aesthetic and functional concern, but also because there may be positive psychological impact for the patient. This case report demonstrates full mouth rehabilitation of a 26 year old female patient with multiple decayed teeth using the Hobo and Takayama twin-stage procedure for restoration of esthetics and function. The patient was rehabilitated with porcelain fused to metal restorations using the twin stage procedure where in posterior restorations were fabricated following which the anterior guidance was set by fabrication of the anterior restorations. Cast partial dentures were fabricated for missing posterior teeth.

Discussion: Full mouth rehabilitation of severely decayed teeth is a challenge in terms of establishing aesthetics and function to the patient. Hobo and Takayama in their article have clearly described the means of restoring anterior guidance and predictable posterior disclusion in harmony with the condylar path.

Key words: Rampant caries, Twin stage procedure, Hobo and Takayama

Introduction

Rampant caries is defined as suddenly appearing, widespread, rapidly burrowing type of caries resulting in early involvement of pulp. Patients affected with rampant caries often have compromised aesthetics and function. Restoration of the carious lesion is a challenge since they are deeply burrowing into the enamel and dentine. Full mouth rehabilitation and philosophies are often intriguing in nature, but the esthetic and functional

accomplishment of rehabilitation is always satisfying. Anterior guidance is crucial in human occlusion because it influences molar disocclusion that controls horizontal forces. Molar disocclusion is determined by a cusp-shape factor and an angle of hinge rotation. There are three factors that determine disocclusion: condylar path, incisal path and cusp angle. Condylar path has been regarded as the main determinant for occlusion in prosthetic treatment. It is measured and used as a clinical reference to restore occlusion. The condylar path has been shown to have deviation within the individual and its influence on disocclusion is minimal (Hobo and Takayama).^{1, 2} The Hobo and Takayama technique develops anterior guidance to create a predetermined, harmonious disocclusion with the condylar path. Condition 1 is used to incorporate a cusp shape factor and condition 2 is used for the angle of hinge rotation.³

This article presents the stages of prosthodontic rehabilitation, from diagnosis to final treatment of a patient with rampant caries with severely worn dentition, some extracted teeth and uneven occlusal plane using light cure core build up, metal ceramic restorations and maxillary-mandibular cast removable partial dentures.

Case Report

A 26 year old female reported to the Department of Prosthodontics, Army Dental Centre Research and Referral, New Delhi with a chief complaint of multiple decayed teeth and unsightly appearance since few years deteriorating gradually over a period of time. The patient did not give any medical history about previous illness. The patient's dental history dated back to 6 to 7 years when she noticed dark black spots on the anterior teeth which deteriorated gradually over a period of time. The patient was not suffering from any TMJ disorders.

Clinical Examination

Extraoral: No facial asymmetry, No abnormality in the TMJ.

Intraoral: Multiple decayed upper and lower dentition with poor oral hygiene. The missing teeth were 24, 26, 36, 37 and 46. Root stumps i.r.t 17, 27, 28, 42, 48 and 45 were present [Fig 1]. Fractured

amalgam restoration i.r.t 16. The patient presented with a bilateral class I canine relationship. There were multiple fractured light cure restorations. The vertical dimension was adequate. After making a diagnosis of rampant caries, the nature of the disease was explained to the patient. At the first visit, caries was excavated from anterior teeth and provisional glass ionomer cement restorations placed to improve her appearance immediately. Particular attention was paid to finishing of the gingival margins of the provisional restorations to minimize further plaque accumulation. In addition, gingival embrasures were maintained to facilitate interproximal cleaning.

Analysis of the three-day dietary diary at the second visit revealed that the patient drank about 10 cups of tea over a period of two hours three times a day. Each cup (about 25 ml) contained three cubes of sugar. The tea-drinking habit was accompanied by snacks which comprised mainly nuts. After explaining to the patient the roll of her sugar consumption pattern in the etiology of rampant caries, she was advised on the need to greatly reduce her sugar consumption and intensify her oral hygiene practices, i.e. brushing with fluoride toothpaste. The oral hygiene measures were to be practiced before and after each meal or snack and before bed. She was also requested to bring along to the clinic the prescribed oral hygiene aids. At the third visit three weeks later, the patient's compliance with oral hygiene instruction and dietary counseling were assessed: plaque index was measured. Grossly carious posterior teeth were temporized by excavating caries and placing modified zinc oxide-eugenol cement restorations. Oral health education was reinforced. At the next two visits, the same procedures were repeated, while small and moderate carious cavities on posterior teeth were restored with amalgam. When the patient was evaluated at a recall visit three months later there was marked improvement in the periodontal condition, the gingival index having fallen from 100% to 20%. At the recall appointment six months later, oral hygiene was excellent. Permanent restorations were then placed on posterior teeth.

Treatment Procedure

1. Extraction of the root stumps i.r.t 17, 27, 28, 42, 48 and 45
2. Root canal treatment of 21, 22, 23, 24, 31, 32, 33, 34, 35, 41, 43, 45, 47 [Fig 2]
3. Repair of the fractured amalgam restoration i.r.t. 16
4. Light cure core build up of the decayed teeth.
5. Maxillary and mandibular impressions were made in the alginate impression material and diagnostic casts were obtained. The anterior portion of the maxillary cast was made removable with dowel pins.
6. The maxillary cast was mounted using face-bow transfer onto a semiadjustable arcon articulator (Whip-mix) and the mandibular cast mounted using the Lucia jig and centric relation record [Fig 3].
7. Diagnostic wax-up was done at the existing vertical dimension to see the final outcome [Fig 4]. The removable anterior segment of the maxillary cast was detached to eliminate the effects of anterior guidance. The articulator (with waxed maxillary and mandibular posterior teeth) was moved in forward, right and left directions (with the anterior segment of the maxillary cast removed the posterior teeth do not disclude during eccentric movements, but the molars should glide smoothly through maximum intercuspation). Interferences in the occlusal wax up that was preventing in smooth eccentric movements were carved out and wax was added to the areas where the tooth contacts were not present in eccentric movements. This was mainly done because if the maxillary and mandibular casts interdigitate evenly during eccentric movement, it means that the cusp becomes parallel to the condylar path and the cusp shape of the molar has been harmoniously established in the wax up. The cusp shape factor is incorporated at this stage.
8. Autopolymerizing resin was placed in a dough stage on the flat incisal table and the resin was molded by moving the incisal pin through protrusive and lateral movements. A second incisal table was prepared identically. These incisal tables are referred to as "Incisal tables without Disclusion". The molded incisal table coincides three dimensionally with the condylar path and molar cusp shape.
9. One of the incisal tables without disclusion was placed on the articulator so that the tip of the incisal pole contacted the incisal table in centric relation. Two 3mm thick spacers were prepared to approximate the protrusive movement position. When the spacers are inserted behind right and left condyles on the articulator, maxillary and mandibular casts are placed in a 3mm protrusive position. A vinyl sheet 1.1 mm thick was applied to the mesiobuccal cusp tips of right and left waxed mandibular first molars, and the articulator was closed. This created an average an average disclusion during protrusive movement of the mandible.
10. The tip of the incisal pin was directed backward and upward from the incisal table. A brush was used to build the autopolymerizing resin into a cone between the incisal pin and the incisal table. The cone marked the three dimensional position of the tip of the incisal pin at a 3 mm protrusive movement with 1.1 mm molar disclusion. This created the angle of hinge rotation required to produce the average disclusion during protrusive movement.
11. The lateral movement was simulated by placing a 3mm spacer behind one of the condyles on the articulator. A 1.1 mm vinyl sheet was positioned on the tip of the mesiobuccal cusp of waxed mandibular first molar on the non working side and the articulator was closed, the incisal pin was directed laterally and upward. The autopolymerizing resin cone was built between the incisal pin and the table. The same procedure was repeated for the other condyle. This created angle of hinge rotation to ensure the average disclusion during lateral movement.
12. The three resin cones were connected with autopolymerizing resin so as to make walls between cones. The top of the wall followed an imaginary line that connected the tips of the

resin cones. After the walls were created, a triangular space remained between the centric relation contact of the incisal pin and the top of the wall. This space was filled with autopolymerizing resin. The articulator was moved through all border and eccentric movements [Fig 5].

13. The tip of the incisal table was easily molded because the centric contact and the three cone tips marked the beginning and end points for eccentric articulator movements. The tip of the incisal pin has a hemispherical shape with a diameter of 8mm and the total articulator movement is limited to 3mm, restricted by the resin cone placement. This resulted in a molded surface that is one continuous concavity from the area where the incisal pin contacted in centric relation through all eccentric movements. This custom incisal table, called an incisal table with disclusion incorporated predetermined degrees of disclusion.
14. Before doing the tooth preparation the vertical dimension of occlusion was recorded.
15. Temporary fixed partial dentures of maxillary and mandibular arch were fabricated using the putty index of the diagnostic wax-up.
16. The teeth were prepared in the maxillary arch first and the temporary FDP was cemented following which the lower teeth were prepared and temporary FDP cemented with ZnO non eugenol cement [Fig 6, 7]. Since the teeth were severely affected by the caries all the active carious lesions were removed while teeth were prepared but the teeth were discolored having arrested caries in few teeth. Maxillary and mandibular interim removable dental prosthesis were fabricated for the missing posterior teeth [Fig 7].
17. A final full arch impression for maxillary/mandibular teeth was made using heavy-body and light-body impression material and poured in die stone. This assembly was mounted on whip-mix articulator using the face-bow, Lucia jig and centric record at the predetermined vertical dimension.
18. Wax patterns were fabricated (keeping in view that a removable cast partial denture will be fabricated at a later stage). The maxillary working cast was made with removable dies. A facebow transfer was used to transfer the maxillary working cast and a centric relation record used to articulate the mandibular working cast. The incisal table without disclusion was initially used in the articulator. The anterior dies from maxillary canine to canine were removed and the posterior occlusal wax-up was completed. The incisal table was changed on the articulator to the incisal table with disclusion prepared earlier. The anterior segment was repositioned for waxing of the lingual surfaces of the maxillary anterior teeth. Melted wax was added to the lingual surfaces and the articulator was closed and moved through all border movements. The wax was contoured by the incisal edges of the mandibular teeth so that they contacted evenly. This procedure established the angle of hinge rotation and developed the anterior guidance in harmony with the condylar path. Since the anterior guidance programmed in this manner is steeper than the condylar path and the molar cuspal inclinations, the posterior restorations provided a predetermined disclusion during eccentric movement.
19. The maxillary and the mandibular models with the wax patterns in place were surveyed using a micro-surveyor. Occlusal rests and guiding planes were carved out in the wax pattern and the wax patterns were cast [Fig 8].
20. The metal copings were tried in [Fig 9]. Definite restorations with PFM crowns were fabricated placing the incisal table with disclusion. Porcelain build up was done in a similar fashion to the wax pattern fabrication taking the guide of incisal table with disclusion. Before doing the final glaze of the crowns the restorations were placed on the maxillary and mandibular master cast and surveyed for the fabrication of cast removable partial dentures [Fig 10]. After performing the modifications required on the bisque baked crowns the models were

articulated back with the restorations onto the whip mix articulator.

21. Permanent cementation was done with GIC type I luting cement.
22. Maxillary and mandibular impressions were made with heavy body and light body impression material and master cast were obtained. Designing of the master cast was done for the removable partial denture, wax pattern was fabricated [Fig 11] invested and casted.
23. A special tray was fabricated on the mandibular framework. Border moulding and final impression of the distal extension edentulous space was made with ZnO eugenol impression paste and the master cast was altered (Altered Cast Technique) [Fig 12]
24. Jaw relations were taken with the removable dentures intraorally, teeth setting were done and trial was taken. The dentures were acrylised finished and inserted [Fig 13].
25. Follow up was done once in 15 days for a period of 3 months and the patient's post operative condition was found to be satisfactory [Fig 14, 15].

Discussion

There are alternative restorative procedures for the rehabilitation of mutilated teeth.³⁻⁹ Each method has limitation and it should be critically reviewed prior to deciding a treatment plan. The treatment for patients with mutilated teeth is related to many factors including the age of the patients, the socio-economic status, the type and severity of the disorder. Treatment plan should have common goal-functional, aesthetic and longevity of restoration. Restoring full mouth with twin stage procedure has its own advantage as the basic concept involved in the new procedure reproduce the occlusal morphology of the posterior teeth without the anterior segment and produce the cusp angle coincidence with standard values of effective cusp angle. Secondly, reproduce anterior morphology with the anterior segment and provide anterior guidance which produces a standard amount of disocclusion. The anterior guidance and the patient's condylar

inclination might or might not be in harmony. The amount of disocclusion changes in patient's mouth, as this technique followed a fixed value of 40° of condylar inclination. So the amount of disocclusion varies from the predetermined value.

Implants have replaced the removable partial dentures in the recent times^[10]. But in some compromised situations it is difficult to place implants and hence removable partial dentures are the alternative to restore the function.

Conclusion

This case report demonstrates full mouth rehabilitation of a female patient who had been affected by severe form of rampant caries using the Hobo and Takayama twin-stage procedure. The final prosthesis with this twin stage technique ensured a restoration with a predictable posterior disclusion and anterior guidance in harmony with the condylar path.

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Fig 1: Pre-operative Intraoral

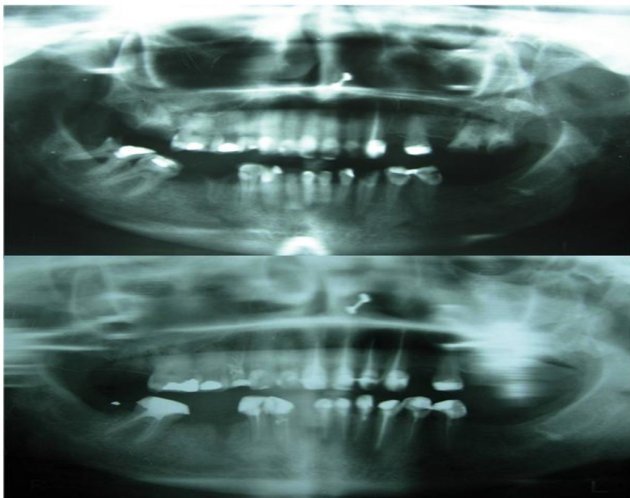


Fig 2: Pre and Post op OPG

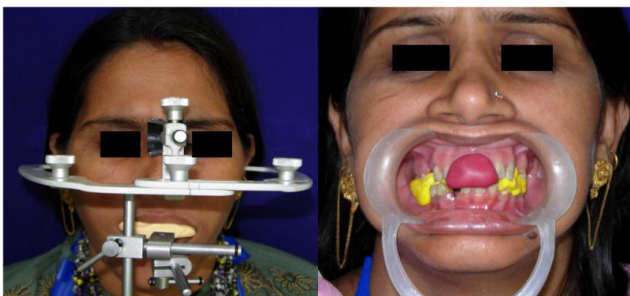


Fig 3: Facebow transfer and centric Record



Fig 4: Diagnostic Wax-up

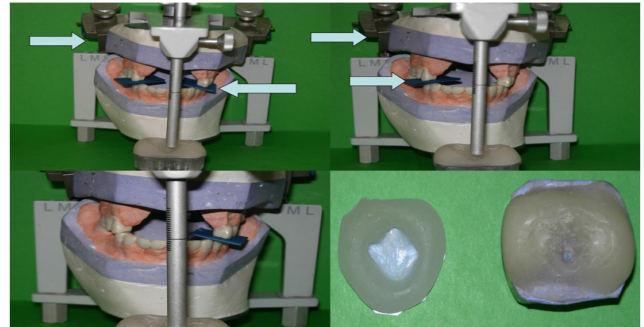


Fig 5: Fabrication of custom incisal guide table



Fig 6: Tooth Preparation and Gingival Retraction



Fig 7: Provisional restorations and RPD inserted



Fig 8: Wax patterns With Occlusal rests carved



Fig 9: Metal coping Try-in

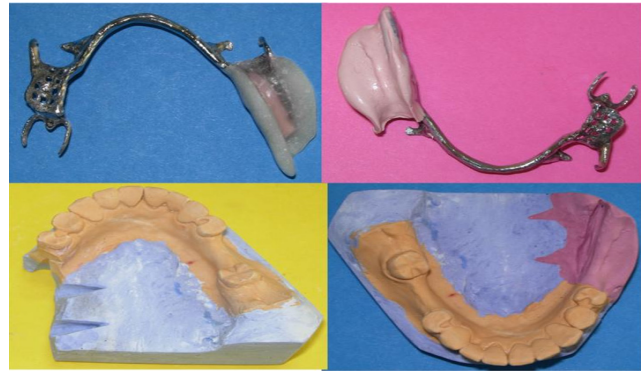


Fig 12: Altered Cast Technique



Fig 10: Surveying of Bisque Baked crowns



Fig 13: Insertion of PFM crowns and Cast RPDs



Fig 14: Post-operative

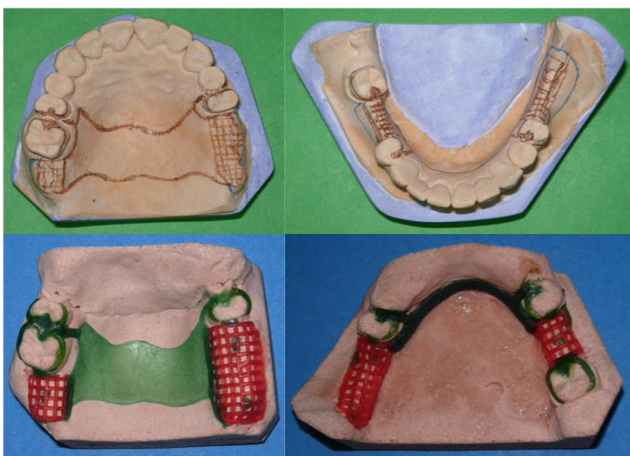


Fig 11: Designing and wax pattern



Fig 15: Post op Extraoral