Full Mouth Rehabilitation of a Class II Div 1 Malocclusion Patient - A Multidisciplinary Approach

Bhushan Kumar1*, Chetan P Patil1, A Navin Kumar1 and Prabhdeep Kaur Sandhu2

1Graded Specialist, Army Dental Corps, India
2Private Practitioner, Ambala Cantt, Haryana, India

*Corresponding Author: Bhushan Kumar, Department of Prosthodontics, Graded Specialist, Army Dental Corps, India.

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Abstract

This article reports the comprehensive, interdisciplinary treatment of 45 years old adult female patient with class II div 1 malocclusion, deep bite, periodontally compromised teeth and missing posterior teeth. After initial periodontal treatment, the maxillary incisors were tipped palatally by fixed orthodontic appliance. The mandibular arch was restored prosthodontically using crown and bridge work. At the end of the interdisciplinary therapy, the results were esthetically pleasing, with the patient’s oral functions restored to the optimum. The emphasis of this report is to highlight the importance of integrating various specialties such as prosthodontics, periodontics, orthodontics and endodontics towards a common goal of improving the patient’s oral health, function, and esthetics.

Clinical Significance: This case report is presenting a realistic treatment plan for managing an adult complicated case of class-II div 1 malocclusion in a simplified way to achieve excellent results.

Keywords: Occlusal Rehabilitation; Malocclusion; Incisal Guidance

Introduction

Full mouth rehabilitation is a challenging treatment modality that enhances the appearance of the patient and corrects imperfections in the occlusion. The complexity in treating full mouth rehabilitation cases is not only because of its long treatment time but also at times the lack of clarity in the treatment objective. A case has to be treated not only by correcting worn out, broken or discolored teeth but also requires treating the oral cavity holistically. That means even minor looking complains should also be addressed for a successful treatment outcome [1]. Dental class II div 1 malocclusion is the most prevalent malocclusion which brings the patient to the dental clinic. Every patient with class II div 1 malocclusion has unique treatment needs. This kind of occlusion is often presented with complex dentoalveolar problems like increased proclination of anterior teeth leading to incompetent lips, deep bite, interdental spacing and mouth breathing. Besides these the psychological distress faced by such patients is massive especially for the female gender due to its unaesthetic appearance. All these factors may predispose the patient to dental caries, periodontal disease which might lead to loss of tooth [2]. Prosthodontic treatment for replacement of the missing teeth alone is not sufficient to address the chief complains of the patients. A comprehensive multidisciplinary approach for the treatment planning is essential for achieving the desired results, which involves a team comprising of a prosthodontist, orthodontist, endodontist and periodontist to ensure accurate diagnosis and appropriate treatment outcome [3]. This article reports a sequence of Full mouth rehabilitation steps in such patient covering all areas of oral cavity requiring improvement.

Case Report

A 45 years old female patient reported to the dental OPD with chief complaint of stick out teeth owing to which she was unable to close her lips and feeling embarrassed during social interactions (Figure 1A and 1B). Her additional requirement was the replacement of the
missing teeth (Figure 1D). Patient’s dental and medical history was insignificant. On clinical examination the patient showed a good range of mandibular movements and no TMJ symptoms. Intraoral examination revealed that the patient had Class II canine relationship (36, 46 were missing), excessively proclined maxillary incisors with an overjet of 10 mm and associated cingulum contact by the lower incisors (complete deep bite) with interdental spacing between the incisors (Figure 1B, 1C and 2B). The lower incisors were slightly proclined labially and periodontally compromised with grade 1 mobility (Figure 1D). The significant findings in posterior segment were interdental gaps which led to food lodgment, end on occlusion of the posteriors on right side (Figure 2A), root canal treated 23, 24, extruded 16, 26, missing 36, 46 (Figure 1C and 1D). Complete data was discussed among the group of dental specialists in order to formulate a treatment plan for long term results.

**Figure 1:** A and B Pre-operative extra oral view, C and D Pre-operative occlusal view.

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Treatment plan

Esthetics correction and reduction of interdental gaps: Fixed mechanotherapy (Orthodontic treatment) was planned to correct the upper incisors crown inclination by using controlled tipping. The lower anterior teeth were periodontally weak and were not indicated for orthodontic treatment. The lower anterior teeth were planned for root canal treatment followed by prosthetic crowns with reduced clinical crown height. The rationale behind the reduction of clinical crown height was not only the correction of deep bite and clearance of upper incisors from blocking effect from incisal edges of lower anterior teeth, but also to increase the root to crown ratio to improve the periodontal health. These modifications were aimed to achieve the lip competence, an esthetic smile and periodontal health of the weak teeth.

Occlusal Plane correction: Amongst the extruded teeth (16, 26), 16 had a large cervical restoration which led to acute pulpitis and required endodontic treatment whereas 26 was already root canal treated. Prosthetic crowns were planned for 16, 26. The other previously root canal treated teeth (23, 24, 17) were also planned for prosthetic crowns. Patient was not agreeing for dental implants so PFM bridges were planned to replace missing teeth (36, 46) supported over abutments (35, 37 and 45, 47). The semi-adjustable articulator and face bow was planned to use during occlusal reconstruction. Gnathological and Pankey mann schuyler philosophy were followed for this particular case with slight modifications wherever required.

Treatment progress

Diagnostic casts were mounted, analysed, correlated with clinical findings and patient complains to draw possible treatment plan and sequence of steps to carry out treatment.

Step 1: Correction of mandibular anterior teeth: As lower anterior teeth were periodontally compromised and orthodontic treatment was not a feasible option for them. Other alternative was to perform endodontic treatment followed by post and core and selective tooth preparation so that crown height can be reduced and the angulations of final prosthetic clinical crown can be made lingual to their natural position. This simple step will provide clearance for retraction of upper incisors along with correction of deep-bite. Provisional crowns splinted together were given.

Step 2: Correction of maxillary incisors inclination: Orthodontic treatment was commensurate for correction of inclination of upper incisors. Fixed mechanotherapy was planned in the maxillary arch using 0.022 x 0.028” Roth prescription. All the maxillary teeth were bonded taking posteriors as anchorage unit; the maxillary incisors were retracted using 0.016” stainless steel wire with helix anterior to the canine (Figure 3A). On subsequent visits, the cuspid tie was reapplied. After 4 months, closing loop in 0.016 x 0.022 stainless steel with
increased α-bend was given to close the remaining space between the incisors and to intrude the anterior teeth simultaneously (Figure 3B). The closing loop was activated on subsequent visits. After 3 months, debonding was done followed by fixed retainer using coaxial wire on 11, 12, 13, 21, 22.

**Step 3**: Gingival zenith correction: As sulcus depth was enough, minor gingival contouring was done by gingivectomy. One noticeable finding was black triangles between maxillary incisors, for which connective tissue graft was planned but patient was happy with the achieved esthetics and did not agree for this surgery.

**Step 4**: Endodontic treatment for extruded teeth was done followed by selective occlusal surface reduction to correct the occlusal plane.

**Step 5**: Crown preparations were done on indicated teeth (upper posterior segment and lower complete arch except 34, 44) (Figure 4A and 4B).
Step 6: Fabrication of provisional restorations with corrected occlusal plane and occlusal surfaces (Pankey Mann Schuyler Technique). Impressions were recorded at this stage as diagnostic impressions and diagnostic casts were mounted on semi adjustable articulator after facebow transfer and centric bite record. Protrusive records were taken for programming of articulator. Diagnostic wax-up was completed on mounted casts and were used to form index for fabrication of provisional restorations (by direct method).

Step 7: Customized incisal guidance: All needed adjustments were done intra-orally in the provisional crowns for variables like tooth form, position, vertical dimension of occlusion and harmony with the patient’s envelope of function. Once satisfied with disocclusion then these details were captured in impression and casts were poured. The cast of the upper provisional restorations is transferred to the articulator using facebow; the lower is articulated with a very thin interocclusal record (Figure 5A). A customized incisal guide table is engraved in autopolymerising acrylic resin after releasing the locking mechanism of articulator, and by performing the protrusive and right-left lateral movements guided by incisal guidance of provisional’s cast (Figure 5B).

Step 8: Fabrication of final restoration (PFM crown/bridge): Master casts were mounted on semi adjustable articulator using facebow transfer and inter-occlusal record (Figure 5C). Wax copings were fabricated and later casted in base metal alloys. In this particular case, maxillary anterior teeth were retracted palatally and their final position after completion of treatment was recorded for prosthodontic restoration phase and incisal guidance was restored during ceramic build-up of lower anterior teeth (directed by both the customized incisal guide table and palatal surfaces of maxillary incisors). Following this, maxillary posteriors were completed with ceramic build up considering esthetics and occlusal plane as primary determinant. Lastly mandibular posteriors were completed. The mutually protected occlusal scheme (disocclusion of posteriors in eccentric movements) was adopted. Final restorations were checked intra-orally and required corrections were completed before glazing (Bisque trail) (Figure 6A-6C). Glass ionomer cement (GC Luting and lining cement, GC Corporation, Japan) was used for cementation. Patient was happy with final outcome of the treatment (Figure 7).

Step 9: Patient was given all necessary instructions for do’s or don’ts and oral hygiene maintenance. Dental floss was prescribed for interdental space cleansing and Superfloss (Oral B) was prescribed for pontic area cleansing and their use was demonstrated to the patient.

Figure 5: Prosthodontic replacement phase.
Figure 6: Prosthodontic replacement phase.

Figure 7: Treatment outcome.
**Step 10:** Patient was recalled on weekly basis for the first one month for clinical evaluation of gingival health, occlusion, TMJ and muscles of mastication. Oral hygiene maintenance was reinforced during each follow up visit.

**Discussion**

The patients with class II div 1 are generally treated by orthodontics and patient with edentulism by prosthodontics. If a case is presenting with both the clinical findings then full mouth rehabilitation becomes more challenging for dental professionals until there is active involvement of different dental specialties and layout of an effective treatment plan. The Gnathological Technique and the Pankey-Mann-Schuyler Technique are two proven methods in predictably satisfying the requirements of occlusion in oral rehabilitation of natural dentition [4,5]. The present case was restored by modifying these two techniques as per existing clinical conditions.

There were two major changes which influenced the existing incisal guidance of the patient. Firstly, the Orthodontist retracted and intruded the maxillary incisors for esthetics which led to change in incisal guidance, so there was a need to correct occlusion of posterior segment in harmony with the new incisal guidance. Secondly, the lower anterior teeth were reduced in clinical height to almost two-third which reduced crown/root ratio drastically and resulted in improvement in their periodontal health. Also by selective tooth preparation on lower anterior teeth, their angulations were made slightly lingual to their natural position [6].

The extruded molars were root canal treated hence they were managed with crowns to correct occlusal plane instead of choosing orthodontic intrusion which requires longer duration and is difficult to achieve in adult patients.

In mutually protected occlusion the canines and anterior teeth function as natural stress breakers leading to disocclusion of the posteriors in all eccentric movements, while in centric occlusion only posteriors occlude thus bearing the load and there is no contact in anteriors. This concept is now a proven successful scheme for maintaining the harmonious functioning of the masticatory system in natural dentition. This occlusal scheme was followed for the present case. To achieve mutually protected occlusion the proposed concepts in literature are Gnathological technique, Pankey Mann Schuyler Technique and Hobo and Takayama method [4,5,7-9]. Although their procedures of achieving disocclusion are different but the final results are similar. In this present case report a combination of the Gnathological and Pankey Mann Schuyler Technique were followed with few modifications. The achieved results are satisfactory for the patient as well for the clinician. The only unattended finding was black triangles between maxillary incisors which could have been managed periodontally for even better esthetics.

**Conclusion**

Onset of class II div 1 malocclusion can be multifactorial and rehabilitation of its varied clinical features can be a challenge for the dental professionals. A combination of mechanical, biological, esthetic factors is mandatory for full mouth rehabilitation. A critical aspect is to determine the occlusal vertical dimension (OVD) and a systematic approach that can lead to a predictable and favorable treatment prognosis. Multidisciplinary approach can simplify this mammoth task. An accurate clinical evaluation, radiographic examination, a diagnostic wax-up, enlisting all significant patient complains and expert opinion of the concerned specialist is a must for comprehensive treatment planning and predictable treatment outcome prior to start of this complex process.

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