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Occlusal Rehabilitation Through Synergistic Utilization of Fixed Partial and Cast Partial Denture

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Abstract Complexity in occlusal rehabilitation lies primarily on establishing an occlusion that is in functional harmony with various components of stomatognathic complex. Patients primary objectives are aesthetic, if anterior teeth are involved and mastication, if posterior teeth are missing. The systematic and multidisciplinary approach is essential to achieve treatment goals, most of which are prosthetically driven. This article presents a case of a young Saudi female patient who reported with multiple root stumps, missing teeth and grossly decayed multiple posterior teeth. The patient was treated utilizing a combination of multiple fixed partial denture and a maxillary cast partial denture, with both arches having a Kennedy class 3 modification 1 partial edentulous situation. The pain as emergency was controlled with extraction of non restorable involved tooth and pulpal extirpation of a posterior tooth. All treatments were in multiple phases that ranged from surgical (extraction, crown lengthening, endodontic) to non surgical (oral prophylaxis, class I, II, IV restorations, post core crowns, fixed partial and cast partial denture) treatments. The patient was highly satisfied with the treatment outcome as expressed during subsequent followup.

Keywords: *full mouth rehabilitation, endodontic, crown lengthening, cast restoration, dowel, post space, attached gingiv*

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1. Introduction

The planning and executing of the restorative rehabilitation in a decimated occlusion are probably one of the most intellectually and technically demanding tasks facing a restorative dentist. Occlusal rehabilitation not only involves restoring the dentate or partially dentate oral cavity, [1] but it also encompasses the application of psychosocial impact of such oral disfigurement that is associated in such grossly decayed dentitions. [2] The aim of occlusal rehabilitation in such cases is to provide an orderly occlusal contact pattern that will ensure a competent efficient oral function, [3] stability, [4] esthetics, [5] and overall health of the stomatognathic system including the healthy function of temperomandibular joints. [6] Occlusal therapy improves the biological oral stability by improving the relationship of teeth which in turn improves the condition and health of the supporting structures like periodontium. [7] Malaligned teeth are not conducive to self cleansing abilities and therefore must be realigned to enhance self cleansing and physiological toning of the surrounding soft tissues. [8] The ability of the gingiva to protect against microbes largely depends on the keratinized portion since it keeps the tooth firmly attached with the periodontium. Before any occlusal rehabilitation takes place, it is important to establish the mutually protected function of these organs. There is a biological synchronization between various structures due to which they benefit, and in this cycle if one component is disturbed it affect the others. Gingivitis control is therefore essential to ward off developing periodontitis. [3,9] Complete occlusal rehabilitations (COR) are multidimensional, [10] and one must remember that although one may be treating individual tooth units, [11] the basic objective of equalization of forces directed against the supporting structures will eventually be borne by even distant structures like temperomandibular joint. [12] Host response to insults vary and in young patients temperomandibular joint disorders are rarely observed. [13] The chief concern of the patient's whose natural dentition is grossly destroyed have primary concern related to esthetics which itself is multidimensional (biologic, psychological and biomechanical). [14] A clinician must carefully evaluate extra oral dynamic features (lip lines) so that the aesthetic component is also blended with COR. [15] Another essential component of reorganizing occlusion is establishing a satisfactory centric occlusion in centric relation. [16] Existing intercuspal positions may need occlusal equilibration procedures to eliminate tooth interferences in centric relation. Among various goals of occlusal rehabilitation,

the establishment of static coordinated occlusal contacts, functional anterior guidance in harmony with lateral eccentric positions on either side, and disclusion by anterior guidance are mandatory as outlined in various texts of occlusion. [17,18] Anterior guidance has esthetic implications, for the incisal position is important for esthetics. Clinicians judgement is therefore essential to fulfill the above mentioned criterion in occlusal rehabilitation which is essentially a balance between all different components. [19]

Occlusal rehabilitation can be approached either by confirmation or reorganizing, the latter being mostly practiced. [20] CORs require a multidisciplinary approach that may not only involve various other dental specialities but also medical specialities. No occlusal rehabilitation can be successful without an efficient laboratory technical back up which understands the goals of the treatment. [21] Adjunctive treatment procedures are essential that are mainly restorative in nature. Surrounding periodontal tissues may require adjustments to prepare a favorable crown root ratio or to create a self cleansing restoration margin. Very often caries progression has been advanced and reaches subgingival areas where it is difficult to incorporate self cleansing restorative margins. In such cases, crown lengthening is essential to achieve the treatment objectives. All supporting abutments should also have adequate proximal surfaces (mesial and distal) that allow the restoration to counter horizontal dislodging forces otherwise restorations will fail. [22] Pattern of tooth loss at times can be cumbersome and result in complex rehabilitation clinical situations. [23] The tooth loss pattern has been studied extensively especially in the European nations where consumption of saturated sugars is high. Loss of teeth on either side of a tooth converts the standing abutment as a pier abutment which can be only successfully rehabilited with either an implant or a fixed movable bridge. [24]

This article presents a case of a young adult female patient who in the light of above mentioned background presented a similar clinical picture where all factors came into play. The aim and objective of the case presentation is to present a systematic approach in treating such complex occlusal rehabilitation.

2. Case Report

A young born female patient aged 30 years reported to the comprehensive care clinics of the College of dentistry at Jazan University with a chief complaint of pain in the upper and lower left back teeth. The pain had started one week prior to the visit which was severe but intermittent especially during mastication of food. The patient was married and was working with no report of any significant medical and family history except that both her parents were diabetic and hypertensive. Dental history revealed that the patient had undergone extraction of tooth # 15, 16, 37, 47, 48 about 2 years ago. She brushed her teeth twice daily, in horizontal motions and changed her brush every two months. Extra oral examination did not reveal any significant abnormal conditions. Intra orally, the patient exhibited generalized gingivitis, bleeding on probing, staining, plaque accumulation, absence of stippling with no mobility or suppuration in any tooth. Maxillary arch showed missing teeth (#15,16,18), occlusal distal caries (#14,17), occlusal caries (#24,26,27) and residual roots (#25,28) (Figure 1A, 3A). The mandibular arch showed missing teeth (#37,47,48), cervical caries (#42,43), gross caries (#34,36,38,44,46) and residual roots (#35,45) (Figure 2A, 3A). After explaining the patient the possibility of extensive dental treatment, emergency treatment was initiated in the teeth having pain while removal of caries was accomplished for diagnostic purpose. After removing caries, each tooth was assessed for periodontal and pulpal health. A preliminary diagnostic impression was made with alginate (CA 37; Cavex, Haarlem, Holland), diagnostic casts (Elite Model; Zhermack, Badia Polesine, Rovigo, Italy) were obtained following which they were mounted on a semi adjustable articulator (Whip Mix series 3000; Elite Dental Services, Inc, Orlando, Fla) using an arbitrary face bow (#8645 Quick Mount Face-Bow; Whip Mix Corp). The provisional diagnosis was chronic generalized gingivitis with localized periodontitis in a kennedy class 3 modification 1 for both maxillary and mandibular arches. Additional diagnosis included symptomatic irreversible pulpitis with and without apical periodontitis.

Figure 1. (A) Intra oral picture of maxillary arch before rehabilitation with class 3 modification 1 partial edentulous arches (B) Intra oral view of fixed partial denture cementation (C) Removable partial denture over fixed partial denture

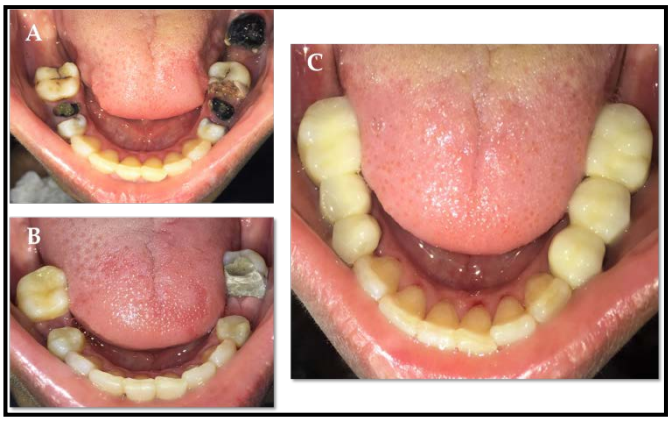

Figure 2. (A) Intra oral picture of mandibular arch before rehabilitation with class 3 modification 1 partial edentulous arches (B) Intra oral view of preprosthetic mouth preparation (C) 3 unit Fixed partial dentures cemented on either side

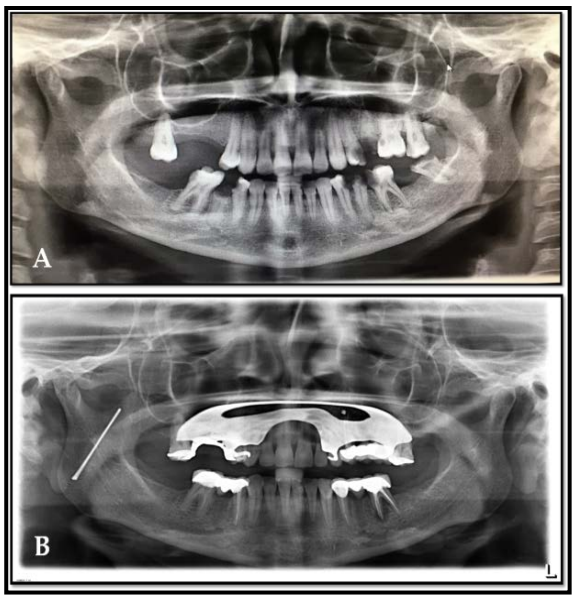

Figure 3. (A) Orthopantomograph before complete occlusal rehabilitation showing grossly decayed dentition with multiple involvement of natural permanent teeth (B) Orthopantomograph post rehabilitation with a combination of multiple fixed partial dentures and removable partial denture

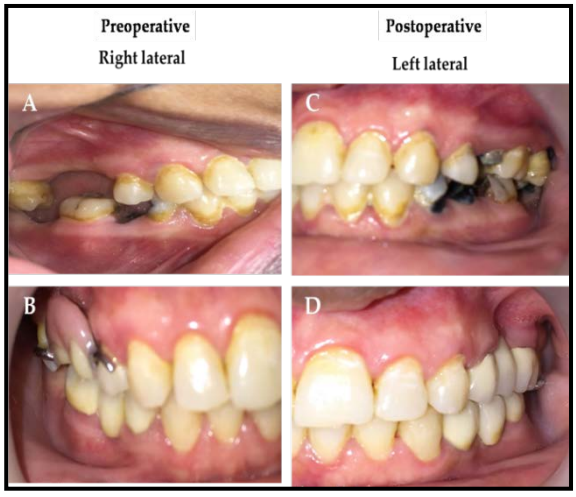

Figure 4. (A) Preoperative Right lateral (B) Post operative right lateral in maximum intercuspation (C) Preoperative left lateral and (D) Postoperative left lateral in maximum intercuspation

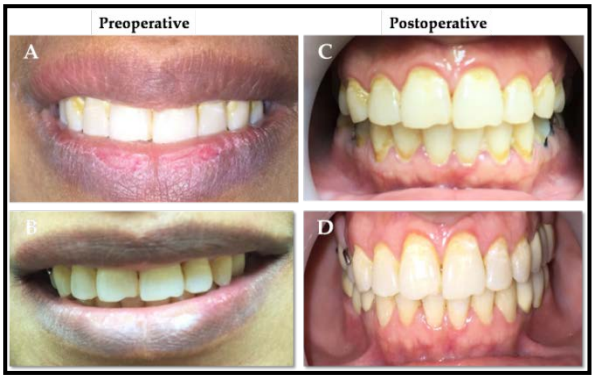

Figure 5. (A) Preoperative frontal view (B) Post operative frontal view during smiling or high lip line (C) and (D) Post operative intra oral frontal views in maximum intercuspation

The treatment objective considered were patient education and motivation towards oral hygiene maintenance and restore the function and esthetics of the patient's dentition. In the emergency phase tooth no 24 underwent pulp extirpation while tooth number 38 was extracted. The treatment option consented by the patient included multiple restorative and endodontic procedures followed by complete occlusal rehabilitation using conventional fixed partial (metal ceramic) and removable partial denture (base metal alloy). Treatment options presented but not consented included implant supported single restorations and cast partial denture for both partially edentulous areas. The entire treatment was carried in five phases. Phase one was predominantly dedicated to oral hygiene.

Maintenance program (3 months), excavation of caries followed by temporary restorations. Phase two included permanent restorations (#14,17,26,27,42, 43,46) with either amalgam or composites, endodontic treatment (#24,34,36,44), residual root extraction (#25,28,35,38, 45) and crown lengthening (#24,34) (Figure 2B, 3A). During phase three treatment included post and core (#24, 34,44), three unit fixed partial denture in relation to missing teeth (#25, 35,45) (Figure 1B, 1C, 2C, 3B, 4D, 5D), cast partial denture (missing 15, 16) (Figure 1C, 3B, 4B, 5D). Phase five was dedicated to maintenance phase for a period of one year in which the patient was given instructions regarding oral hygiene maintenance, prosthesis use and maintenance following during follow up of 1 week, 1 month and every 6 months. At the end of the treatment, the patient was highly satisfied with the functional (Figure 4 A to D) and esthetic (Figure 5 A to D) outcome of the treatment.

3. Discussion

Dental caries can progress to destroy natural dentition if not kept in check. This article presents a rehabilitation of a young Saudi female patient whose entire posterior dentition was affected by either grossly decayed caries or periodontitis. The enormity of the clinic work associated with this rehabilitation can be judged by the fact that seven teeth required restorative treatment, four required endodontic treatment, five teeth had to be extracted, three teeth had to be restored with post and core, three three unit fixed partial dentures and a single cast partial denture sufficed the treatment. The occlusal scheme that was incorporated was mutually protected occlusion which is considered essential in natural dentition. [25] Such occlusion is based on preventing horizontal stresses during excursive movements through proper anterior guidance. [26] In both the arches the patient presented with Kennedy class 3 modified 1. The left side mandibular arch was narrowly prevented from landing into a pier abutment situation which is defined as intermediate abutment located between two abutments and edentulous spaces, and results in undue stresses if not designed correctly. [27] Connector in such cases is required to have a flexible connection to prevent stress on the pier. In this case the mandibular left first molar could have landed in a similar situation if the last molar would have not been grossly decayed and non restorable. One of the favorable findings that did not complicate the rehabilitation process was maintenance of vertical dimensions on one side. [28] The rehabilitation process followed a sequence in which the

first aim was to eliminate the pain and discomfort related to the back teeth in both arches. In complex occlusal rehabilitation it is very significant to choose the correct approach if one wants to accomplish the treatment objectives. [29] The advantage of complete occlusal rehabilitation is to eliminate all occlusal discrepancies and create a nearly ideal occlusion. [30] While the mandibular arch was successfully managed by a fixed partial denture, it was the maxillary arch which was more complicated since a cast partial denture had to be fabricated which would support a cast partial denture. Patients desire was not to have occlusal surface restored with the metal therefore a complete ceramic cover was designed. However, the patient was made aware of the possibility of ceramic debonding due to a metallic component of the cast partial denture. The metal, porcelain three unit bridge and the cast partial denture framework were tried together in the patient's mouth at the stage of porcelain trial for the fixed partial denture. This allowed adjusting the occlusal surface of the porcelain that was unglazed. When glazed porcelain is adjusted, it incorporates microcracks which may propagate later and cause failure of porcelain facing. [31] Complete rehabilitation of occlusion has been considered as a laborious task especially if the patient requires correction of vertical dimensions and occlusal plane. [32,33] =Patient treatment desires have been paid a lot of attention in recent times. The kingdom also follows the same lines in fulfilling patients' treatment desires. Esthetic is highly subjective and individualistic in nature, [34] while patients may lack understanding of the technical difficulties associated with the metal component of cast partial touching the ceramic, the primary concern is always esthetic.

Many teeth in the patient had involvement of the pulp with one of the tooth even have signs in the periodical area. The purpose of endodontic treatment on an abutment tooth like any other tooth is to plug and cover three dimensionally the endodontic space so that the microorganisms cannot leak. [35,36] We employed lateral thermal condensation technique for obturation which provides a hermetic seal that blocks the opening of the dentinal tubules thereby obliterating any chances of microorganism invasion. [37] There were three teeth that received post core restorations from the coronal surface of the natural remaining teeth was not sufficient enough to impart strength. After tooth preparation there would have been no tooth surface in one of the tooth which is why a cast post core was chosen for it. [38] The post core treatment success depends upon multiple factors which also include the quality of other associated treatments like crown lengthening, restoration and endodontic treatment. The post core success has also been attributed to each treatment phase. [39] In one of tooth the height of the crown was less due to which it was essential to place subgingival margins so that adequate retention would be gained for crown restoration. While contact of surrounding tissues must be avoided, [40] subgingival margins are advocated at just a half millimeter below the free marginal gingiva. [41] However, it is important that the choice of restorative material used should be essentially biocompatible and more importantly the transition from the restoration to the natural tooth structure should be smooth without creating any discrepancy that would collect plaque. This was achieved by retraction of the gingiva before making the definitive impression. [42] The natural tooth contours are replicated in the impression which makes the laboratory technician easy to contour restoration margins along the contour of the tooth. The mandibular molar on the right side at three month follow up visit showed periapical radiolucency that was due to the trauma from occlusion resulting due to high occlusion on that side. The occlusal discrepancy was corrected and the lesion resolved, confirmed later at further follow up visits.

4. Conclusion

Complete occlusal rehabilitation of a young Saudi female patient was achieved through a meticulous approach that was systematically organized among various disciplines of dentistry. Treatment was carried out in phases that not only allowed to bring the disease under control, but also ensured the success of extensive restorative and prosthodontic clinical work. A reorganized approach of establishing occlusion was used and a combination of fixed and removable prosthesis was utilized to complete the case of occlusal rehabilitation.

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Figure authenticity: All figures are original creations of the authors and have not been copied from any source.

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