Functional and esthetic management of grossly mutilated carious teeth with collapsed dentition: A case of full mouth rehabilitation

Abstract:
Full mouth reconstruction, full mouth rehabilitation and full mouth restoration are terms often used interchangeably to describe the process of rebuilding or simultaneously restoring all of the teeth in both the upper and lower jaws. Full mouth rehabilitation creates smile that is not only esthetic but also functionally comfortable. A systematic and organized approach is essential in order to evaluate, diagnose, and resolve esthetic and functional problems predictably in a complex restorative case. This clinical report discusses the oral rehabilitation of a 25-year-old man with multiple carious teeth and missing upper and lower back region teeth. The aim of this treatment was to restore esthetics and masticatory function which further improved and strengthened the self- esteem of the patient.

Key words:
Full mouth rehabilitation, endodontic treatment, post and core, fixed partial denture, flexible removable partial denture, porcelain fused metal crowns, self-esteem.

INTRODUCTION

Full mouth rehabilitation is a treatment modality which not only focuses on the esthetics and functional aspect of the dentition but also improves upon the health of the whole stomatognathic system.[1] Restoration of the severely broken down dentition is one of the most demanding procedures in dentistry. The steps involved in treatment of these patients include a comprehensive examination, diagnostic mounting and diagnostic wax- up, careful planning and sequencing of various steps, discussion with the patient of the different treatment alternatives and careful execution of the treatment plan.[2,3,4] Today esthetics has become a chief priority for patients. The advertisings have led to almost a large percentage of patients refusing metallic restorations in their mouth and demand for restorations called white fillings. Planning and executing the restorative rehabilitation of a decimated occlusion is probably one of the most intellectually and technically demanding tasks facing a restorative dentist.[5] Tooth wear can result from caries, abrasion, attrition, and erosion. While all occlusions wear to some degree over the lifetime of the patient, normal physiological wear usually does not require correction. Severe or excessive wear due to any of the reasons results into tooth destruction that requires restorative intervention.[6, 7] The gradual wear of the occlusal surfaces of teeth is a customary process during the lifetime of a patient. However, excessive occlusal wear can result in pulpal injury, occlusal disharmony, impaired function and aesthetic deformity.[8] Rehabilitation treatment stages, including careful treatment planning of the case by the dental professional in collaboration with the laboratory technician, the selection of suitable ceramic materials, and proper preparation of the teeth, are essential for assuring the long-term survival of the restorations.[9]

With every patient being unique and representing a special blend of age, personality characteristics as well as expectations, our knowledge of interdisciplinary concepts can open a whole range of treatment options and outcomes.[10] Today, every dental practitioner must have a thorough knowledge of the roles of these disciplines in producing an esthetic makeover, with the most conservative and biologically-sound interdisciplinary treatment plan.[11,12] The following report outlines a clinical case of multiple carious maxillary teeth and missing lower posterior teeth with the aim of full-mouth rehabilitation using porcelain fused metal bridges and crowns and a removable partial denture on lower posterior region to achieve excellent esthetic and functional result for the patient.

CASE REPORT

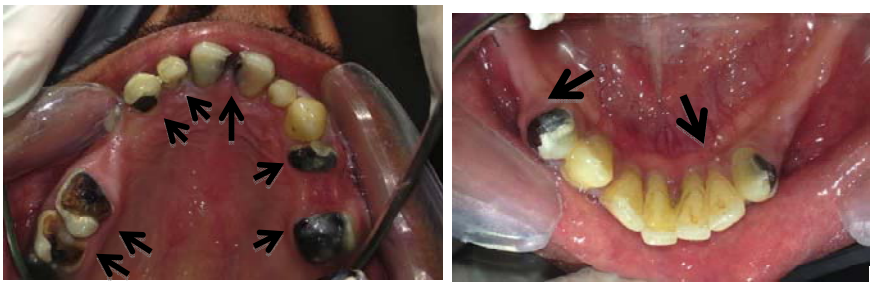
A 25-year-old male patient reported to the Department of Conservative Dentistry and Endodontics at Himachal Dental College and Hospital, Sundernagar, Mandi, H.P with chief complaint of decayed upper front teeth (Figure 1) and missing upper and lower back region teeth (Figure 2 (A) and (B)). The medical history was non-contributory. A review of the patient's dental history revealed that patient had undergone extractions of tooth #14, 15 and 25. The clinical and radiographical examination revealed presence of extensively decayed teeth # 11, 12, 13, 16, 17, 21, 24, 26, 33 and 44 (Figure 3(A) and (B). Patients upper and lower arch impressions were taken in alginate and a set of diagnostic/study casts (pre-operative models) were made to study the occlusion and to plan the anticipated occlusion and treatment (Figure 4 (A) and (B)). Before the commencement of treatment the treatment protocol was explained to the patient.

Figure 1 Decayed upper front teeth

A

B

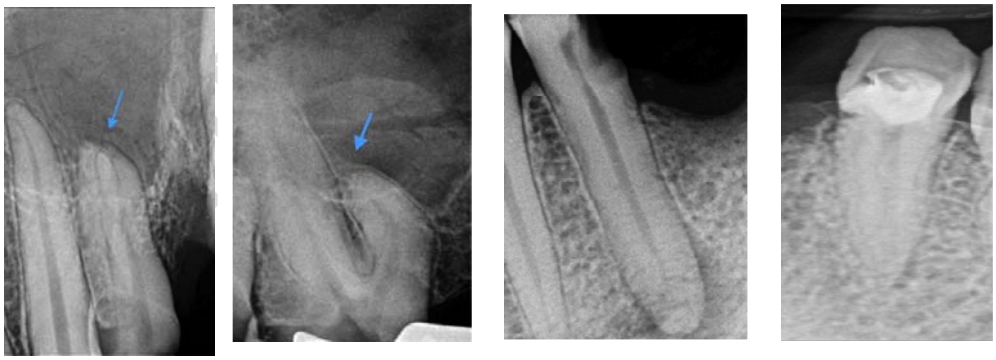
Figure 2 (A) missing upper and (B) lower back region teeth



A B

Figure 3 (A) Extensively decayed teeth # 11, 12, 13, 16, 17, 21, 24, 26 (B) 33 and 44

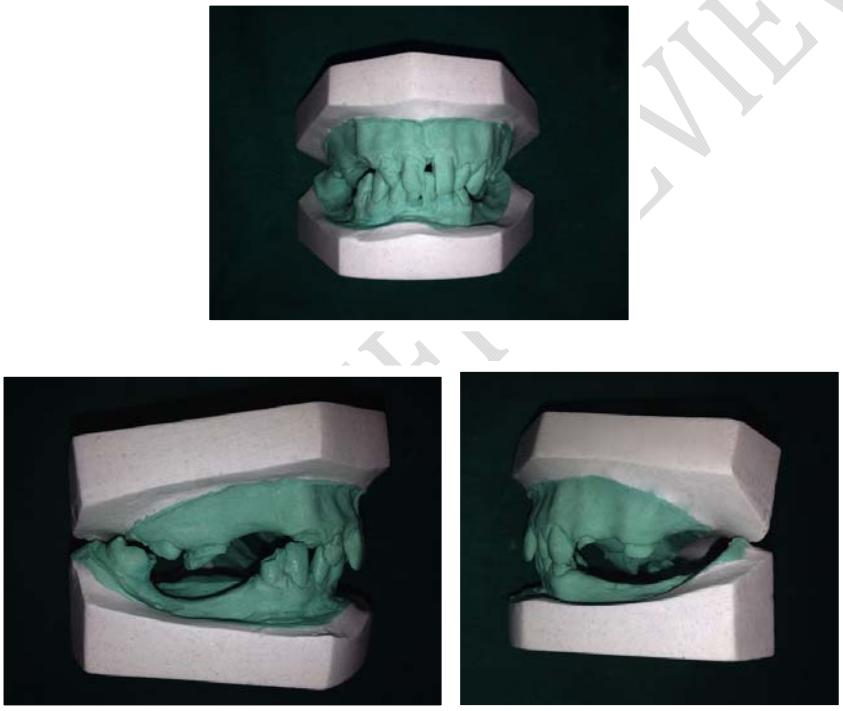
tooth # 11, 21 tooth # 12 tooth # 13 tooth # 16



tooth # 24 tooth # 26 tooth # 33 tooth # 44

Figure 3 (B) Pre- operative radiographs of extensively decayed teeth # 11, 12, 13, 16, 17, 21, 24, 26, 33 and 44

A



B

Figure 4 (A) Upper and lower arch impressions in alginate and

(B) Pre-operative models to study occlusion

TREATMENT PLAN

- Caries management program
- Periodontal treatment
- Extraction w.r.t 17
- Endodontic therapy tooth # 11, 12, 13, 16, 21, 24, 26

- Post and core w.r.t 11, 12, 13, 21, 24, 26
- Fixed partial denture tooth # 11-16 & 21-26
- Endodontic therapy tooth # 33 and 44 followed by PFM crowns
- Restoration w.r.t 48
- Removable partial denture on lower posterior region
- Maintenance and recall.

TREATMENT SEQUENCING/PROCEDURES

A caries management program, including dietary assessment and reinforcement of oral hygiene measures, was initiated before the treatment was started. Periodontal treatment was completed before starting other treatment procedures.

Tooth #17 had lost extensive tooth structure and was extracted due to poor prognosis. Teeth #11, 12, 13, 16, 21, 24 and 26 were carious and had lost some tooth structure. Endodontic therapy was recommended for them followed by cast post and core and a Fixed Partial Denture from tooth # 11-16 & 21-26. Similarly, tooth # 33and 44 were carious and it was decided to do endodontic therapy on them followed by PFM crowns. Finally, a Removable partial denture on lower posterior region was planned.

Firstly diagnostic radiograph of tooth # 11and 21 was done to assess the root canal anatomy (Figure 5). After administering local anesthesia 2% lidocaine (Septodont, St Maur Des Fosses Cedex, France) with 1:80 000 epinephrine, isolation was achieved using rubber dam and saliva ejector placed in position. Access openings were done and working length was determined with the help of apex locator (Apex ID, Sybron Endo) and later confirmed by radiograph (Figure 6). A glide path was prepared till no. 15 K files (Dentsply Maillefer, Switzerland). The biomechanical preparation was done with Protaper (Dentsply Maillefer, Switzerland) rotary file system. 2.5% sodium hypochloride and normal saline were used as irrigants. After the completion of biomechanical preparation, root canals were dried with the help of paper points (Dentsply Maillefer, Switzerland) and the obturations were done with gutta-percha points (Dentsply Maillefer, Switzerland) using AH plus (Dentsply Maillefer, Switzerland) sealer following cold lateral compaction technique (Figure 7). In the similar manner endodntic therapy of tooth #12, 13, 16, 24, 26, 33 and 44 was carried out (Figure 8 A to G).

Figure 5 Pre- operative radiograph of tooth # 11and 21

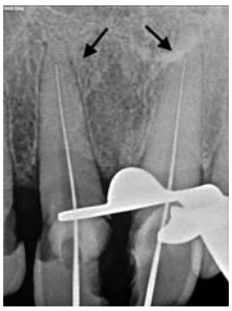
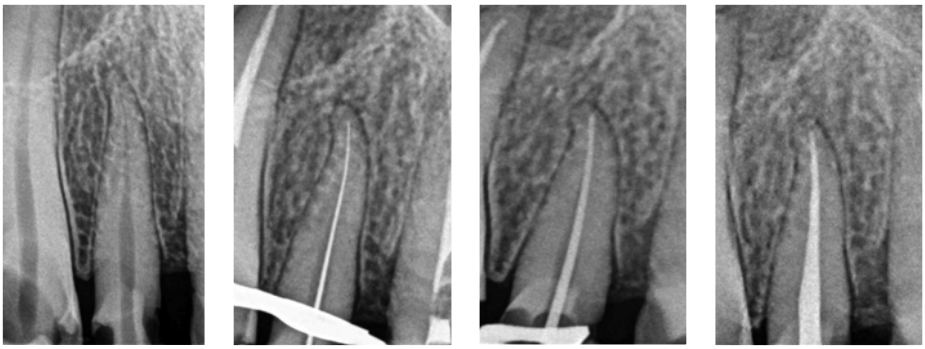


Figure 6 Working length radiograph

A B

Figure 7 (A) Master cone radiograph and (B) Radiograph of completed root canal treatment of tooth # 11and 21

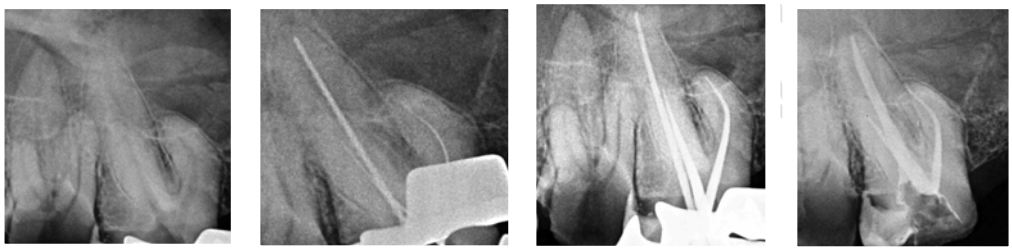


Pre-operative Working length Master cone Post-obturation

Figure 8 (A) Radiographs taken during endodontic therapy of tooth # 12

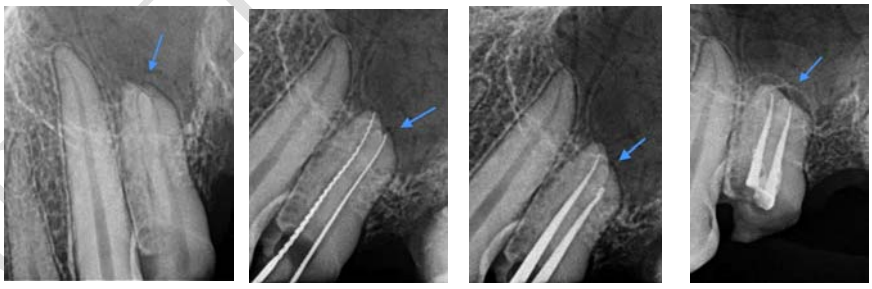
Pre-operative Working length Master cone Post-obturation

Figure 8 (B) Radiographs taken during endodontic therapy of tooth # 13



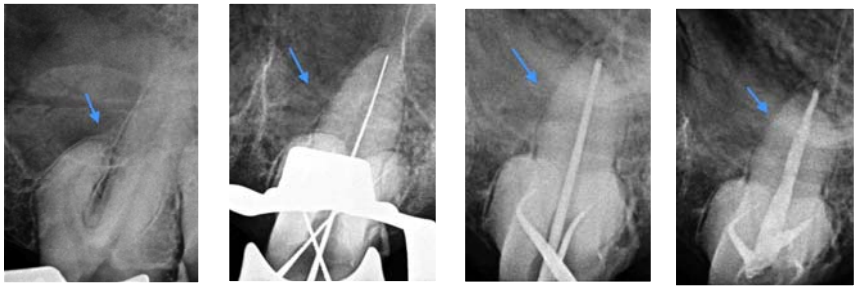
Pre-operative Working length Master cone Post-obturation

Figure 8 (C) Radiographs taken during endodontic therapy of tooth # 16



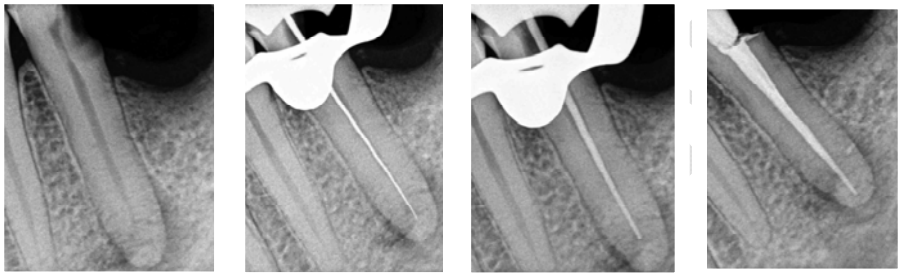
Pre-operative Working length Master cone Post-obturation

Figure 8 (D) Radiographs taken during endodontic therapy of tooth # 24



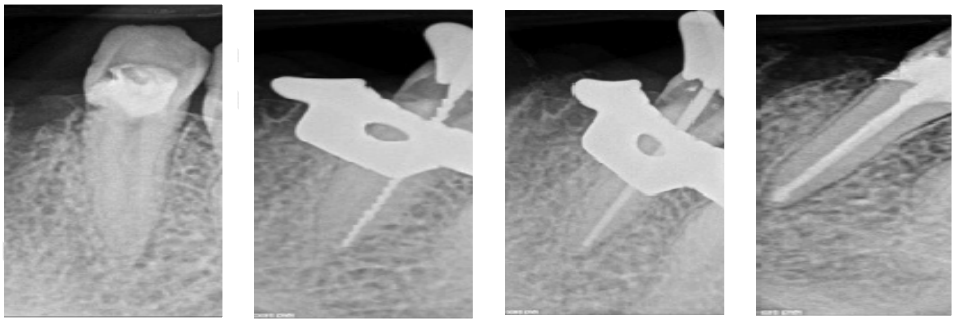
Pre-operative Working length Master cone Post-obturation

Figure 8 (E) Radiographs taken during endodontic therapy of tooth # 26



Pre-operative Working length Master cone Post-obturation

Figure 8 (F) Radiographs taken during endodontic therapy of tooth # 33



Pre-operative Working length Master cone Post-obturation

Figure 8 (G) Radiographs taken during endodontic therapy of tooth # 44

The mesio - buccal canal of tooth # 26 was curved at middle-third level so the biomechanical preparation was carried out very carefully to prevent any procedural errors (Figure 9).

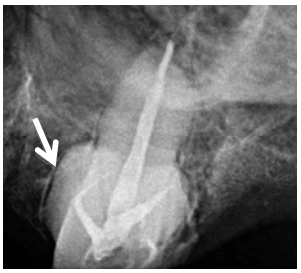


Figure 9 Curved mesio - buccal canal of tooth # 26 at middle-third level

After the completion of root canal treatments, post space were prepared in tooth # 11, 12, 13, 21, 24 and 26 (Figure 10). Guttapercha filling was removed from two third of canal with the help of peeso-reamers #1-6 (MANI), retaining approximately 5-6mm of gutta-percha apically (Figure 11). Dental inlay casting wax (GC inlay wax medium) and metal and wooden sprue formers were used to make impressions of post and core (Figure 12). Then the spruing of wax patterns was done. The wax pattern were cleaned of any debris, grease or oil. The post and core wax pattern were then invested in phosphate bonded investment material (Deguvest Impact, DeguDent GmbH, Dentsply, Australia). After that invested rings were placed in a room temperature furnace and Phosphate-bonded investments were heated for wax elimination. Afterwards castings were done in base metal alloy (NDN alloy, DFS-Diamon GmbH Germany) using centrifugal casting machine.

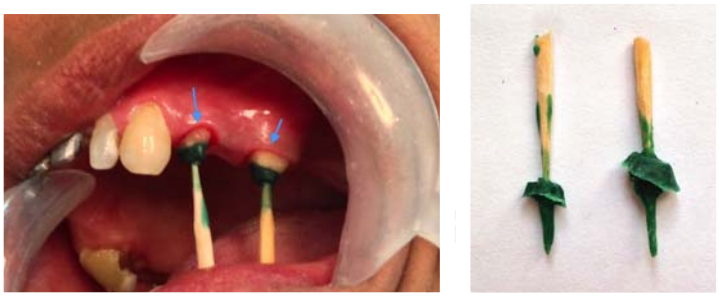
tooth # 11, 12, 13, 21 tooth # 24 and 26

Figure 10 Post space preparation photographs of tooth # 11, 12, 13, 21, 24 and 26

tooth # 11, 21 tooth # 12, 13 tooth # 24 tooth # 26

Figure 11 Post space preparation radiographs of tooth # 11, 12, 13, 21, 24 and 26

A



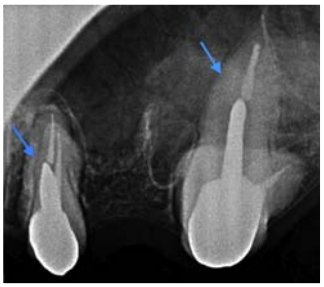
B

Figure 12 (A) Wax pattern of tooth # 11, 12, 13, 21 and (B) tooth # 24, 26

Casted patterns (Figure 13) were placed in the root canal to the desired length and confirmed with the help of a radiograph. During metal trial, fit of the castings and occlusal clearance were checked. After the post length was confirmed, luting agent (GC Fuji I Glass ionomer dental cement, Tokyo, Japan) was mixed according to manufacturer's instruction in 2:1 ratio and applied to root canal. The post and core were then luted in the canal and post post–cementation radiographs were done to confirm the fit (Figure 14).

Figure 13 Casted patterns





tooth # 11, 12, 13 tooth # 21 tooth # 24, 26

Figure 14 (A) Post Post-cementation radiographs tooth # 11, 12, 13, 21, 24, 26


Figure 14 (B) Post cementation photographs of tooth # 11, 12, 13, 21, 24, 26

Tooth preparation were carried on tooth # 11, 12, 13, 16, 21, 22, 23, 24 and 26 for fixed partial dentures and on tooth #33 and 44 for PFM (porcelain fused metal) crowns (Figure 15). Then special trays were fabricated and final impressions were made with vinylpolysiloxane (VPS) impression material (Figure 16). Master casts were poured and interocclusal records were taken for fabrication of fixed and removable prosthesis (Figure 17).


TOOTH #11, 12, 13, 16, 21, 22, 23, 24, 26 TOOTH # 33, 44

Figure 15 Tooth preparation on tooth # 11, 12, 13, 16, 21, 22, 23, 24, 26, 33 and 44

A B

Figure 16 (A) Special trays (B) Final impressions

A

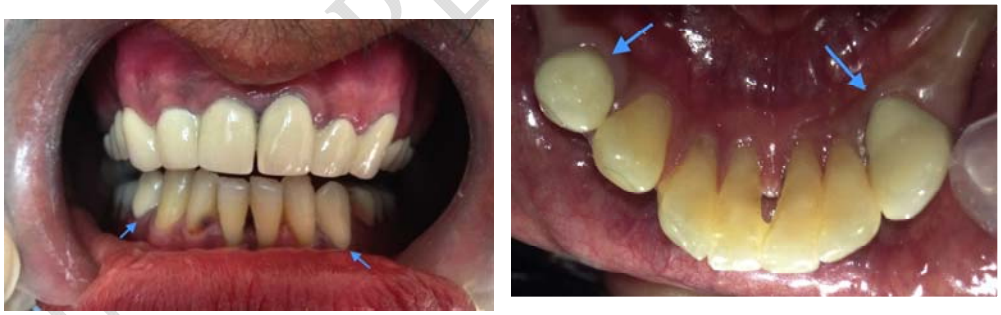
B

Figure 17 (A) Models preparation & (B) Occlusal records for fabrication of fixed and removable prosthesis.

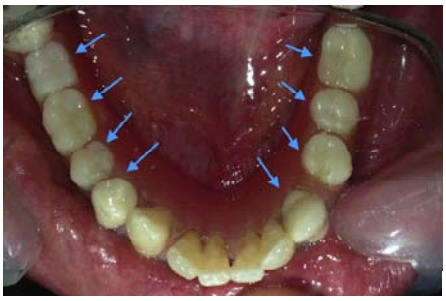
Maxillary Fixed partial denture (FPD) was fabricated from tooth #11-16 & 21-26 and a removable partial denture was fabricated for lower posterior region (Figure 18). Tooth #33 and 44 were given porcelain fused metal (PFM) crowns. Tooth # 48 had occlusal caries and was restored with Fuji IX (GC Corp., Tokyo, Japan) restorative material to receive removable partial denture. And finally post operative photographs (Figure 19) and an OPG of the patient was done (Figure 20).

Figure 18 Fabricated maxillary FPD from tooth #11-16 & 21-26 and mandibular rpd for lower posterior region

A



B



C

Figure 19 Post- operative photographs of case completion (A) Fabricated maxillary FPD from tooth #11-16 & 21-26 (B) PFM crowns on tooth # 33, 44 and (C) a mandibular rpd for lower posterior region

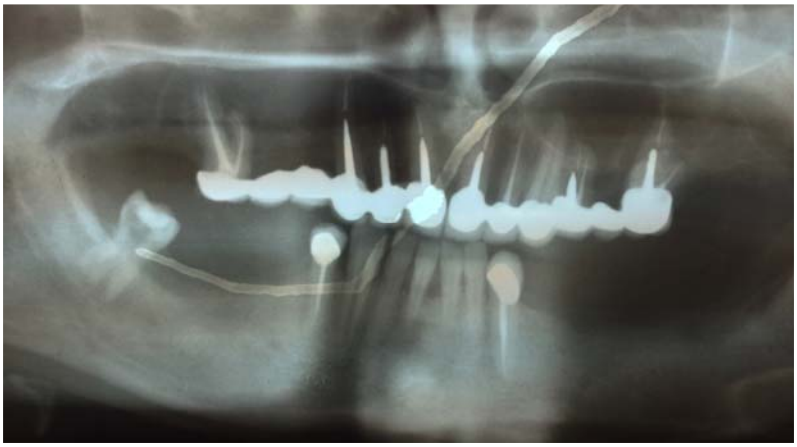


Figure 20 Post- operative OPG

POSTTREATMENT THERAPY AND PROGNOSIS

The patient was satisfied with the treatment and was very motivated to maintain the final prostheses with excellent oral hygiene practices. Oral hygiene instructions were reinforced throughout the treatment and after the treatment. The patient was placed on one week, three months and six months recall schedule. The teeth were functional and asymptomatic. The restoration of the patient's dentition, coupled with the excellent oral hygiene practices, and a positive attitude assures a favorable long-term prognosis.

PYSHCOLOGICAL ASPECT

The patient when first entered the clinics was pretty flimsy and lacked self-confidence due to carious and unesthetic anterior teeth. He was reluctant to undergo the treatment because of the prolonged treatment time and the anticipated outcome. The treatment escalated his self- confidence. On his follow up visits he was well dressed and talked very confidently. He was satisfied with the treatment and was very motivated to maintain the final prostheses with excellent oral hygiene practices. Oral hygiene instructions were reinforced throughout the treatment and after the treatment. The treatment contentment further motivated him to go for implants instead of removable partial denture on lower posterior region. The treatment resulted in increased psychological confidence and social activity of patient.

DISCUSSION

Dental caries is a multifactorial disease. The patient's dietary habits, inadequate oral hygiene and history of dental treatment could also contribute to caries formation. Full-mouth rehabilitation is one of the most complex treatment procedures to be managed in dental applications. Loss of tooth substance or even severe tooth wear might be a contributing factor to dental occlusion problems. [13] Patients with these problems often seek treatment because of an unpleasant appearance, impaired mastication, and speech difficulties.[14]

Complete oral rehabilitation is the combination of dental occlusion, dental balance, and functionality, with dental esthetics. The goal for a clinician is to find a position in which the masticatory function, facial & dental esthetics must be enhanced. Immediate value for the patient is determined by the esthetics of the case, the comfort of the reconstruction and the care in which the dentistry was delivered. Long-term value will be determined by longevity and continuing patient satisfaction. [15] A case has to be treated not only by correcting worn out, broken or discolored teeth but also require optimizing oral function.[16,17]

Many factors affect restoration choice. All-ceramic restorations have less sufficient mechanical properties than metal-ceramic restorations. This limits their clinical indications.[18] A previous study suggested that these materials can predictably achieve esthetic results in the anterior regions. They have traditionally been contraindicated for posterior regions, because of the greater stresses present in these areas.[19] One of the most common clinical features observed in the Class II deep-bite patient is tension in the facial and masticatory muscles. Thus, increased masticatory forces occur in anterior and posterior regions. Therefore, metal-ceramic restorations were selected instead of all-ceramic restorations. In another study, the use of metal occlusal surfaces was suggested to reduce the chance of porcelain fracture. [20] However, in the present patient, it was not applied because of his esthetic demands.

Metal-ceramic crowns continue to be the most frequently used full-coverage restoration, and when coupled with the use of porcelain facial margins, proper tooth preparation, and soft tissue management, provides the best combination of decent esthetics and clinical longevity.[21] Material options were given to the patient and a metal ceramic prosthesis was chosen.

Conventional methods of fabrication of the removable partial denture continues to be an essential prosthetic consideration in many oral reconstructions, especially when implant therapy may not be used to replace missing natural teeth for some patients.[22] Removable partial dentures (RPD) have provided a viable treatment for partially edentulous patients. There are several treatment options for rehabilitation of partial edentulism including the use of conventional or implant-retained fixed prostheses.[9] It was decided to give a removable partial denture to this patient as there was no posterior abutment on lower left region. The flexible partial denture was preferred due to its ability to adapt to the constant movement and flexibility in the mouth. Patient was advised implants for the replacement of lower posterior teeth. However, due to financial constraints the patient presently agreed for a removable partial denture and implants were postpond for a future date. The restoration of the patient's dentition with the oral hygiene practices, and a positive attitude assures a favorable long-term prognosis.

CONCLUSION

A functional and esthetic protocol for full-mouth rehabilitation must have a well-defined diagnosis, prognosis, and treatment plan. The patient was extremely pleased with the final result and exhibited a full smile with considerably more tooth display than preoperatively. As a result of his improved esthetics, the patient has taken an increased interest in his oral hygiene, showing a marked improvement. The patient's dentition was restored, a stable, comfortable occlusion was provided, and care was taken to minimize biomechanical risk.

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