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Restoring Maxillary Teeth by Separated Bridges with Non-Rigid Connector at the Aesthetic Zone and Bleaching of Mandibular Teeth

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Abstract : Aesthetic requirements for anterior maxillary teeth restoration is one of the greatest challenges for dentists in daily clinical practice. A simple designed with a proper treatment plan for a young patient will result in patient satisfactory and enhancement. The purpose of this case report was to create a fixed prosthesis in the maxillary arch with a pier abutment and a long span in the aesthetic zone. A non-rigid connector in 3 bridges of the maxillary arch was fabricated for a 25-year-old female patient who attended the clinic with a multi edentulous space. An in-office bleaching for the mandibular natural teeth was considered for better color matching and harmony of the prostheses.

Keywords:non-rigid connectors, aesthetic, maxilla, pier abutment

I. Introduction

The comprehensive treatment for a young female patient implies the involvement of all diagnostic, therapeutic, restorative procedures at our command for the treatment and prevention of dental diseaseand achieving harmony between the existing occlusion and temporomandibular joint. It also covered maintenance of the health of the entire oral mechanism [1-2]. Usually, patients expect from his dentist to provide restorations that reproduce natural beauty while ensuring stability and functionality. In achieving this goal, the dentist faces numerous dilemmas. The number of lost teeth to be replaced, the position of the lost teeth and the final shape of the prostheses [3].The occlusal forces applied to a fixed dental prosthesis (FDP) are transmitted to the supporting structures through the pontic, connectors, and retainers. Variables that may influence the longevity of an FDP and its abutment include occlusion, span length, bone loss, and quality of periodontium [4]. The excessive flexing of the long-span FDP, which varies with the cube of the length of span, can lead to material failure of the prosthesis. Stress concentration around the connectors of the prosthesis plays an important role in the potential for failure in long-span FDP [5]. The conventional use of a non-rigid connector (NRC) aids in compensating for the difference in the resistance and retention form between the abutments. The design and passive fit of NRC are critical to the success of a long-span FDP. The connector that permits limited movement between the otherwise, independent members of the FDPs is the NRC.The NRC could be made by an incorporation of prefabricated wax patterns, prefabricated inserts or by custom-milling machine [4-5]. The connector should provide adequate access for the maintenance of oral hygiene and also should avoid the display of metalespecially in the aesthetic zone and a young patient. The connector should be elliptical with a definite curve facio-lingually and should have a smooth transition Mesio-distally [5,7].It should be prepared within the contours of the retainers with the male component (Tenon) attached to the pontic [7].

For many years, porcelain fused to metal (PFM) restorations have represented the most widely used restorative prostheses for anterior as well as posterior teeth, this popularity may have attributed to the clinical longevity and accepted aesthetic [8].

Bleaching of teeth is a conservative method for changingthe intrinsicdiscoloration stain of teeth[9]. In this technique, different concentrations of hydrogen peroxide (15-38%) formulation was used directly on the toothsurface [10]. Torres et al., indicate the use oflight-activated power to enhance the bleaching action due totheir greater security inpromoting selective heating over longer periods without the risk of pulpal damage [11]. The aim of this case report was to show a comprehensive treatment of a 25-year young female patient complained of esthetic in the aesthetic zone of the maxillary arch. It also demonstrates the combination of fixed prostheses and bleaching to achieve a successful aesthetic in a form of harmony of the shade of the cemented prostheses and the reaming natural teeth.

II. Case Report

A 25-years-female, unemployed, single patient was referred to the comprehensive dental clinic by the diagnostic unit in the College of Dentistry, at Jazan University. Her chief complaint was " I do not like the appearance of my anterior teeth I want teeth and good smile ". The patient was medically fit. She was not cooperativeto the treatment, and sometimes she falls below the indifferent group according to house

classification and mostly she was with a hysterical group, but actually, her attitude becomes more positive with progress in the treatment. Her dental history had started previously with root canal treatment for teeth #12,11,21,22 since5 years ago with temporary restorationin tooth #16 since 2-year back.

She had composite restoration for teeth #17,13,23,25,27,36,46 and 47. Extraction was done for teeth # 14,15 and 26 since more than 7-years ago due to severe pain, without any dental complications as mentioned by the patient. The oral health was questionable at the examination and well control after initial scaling and root planning with strict oral hygiene regimen.

The extra-oral view showed equal facial height proportion, competent lip with low smile line (Figure 1). No TMJ or muscles problems were detected. The clinical intra-oral examination showed inflamed soft tissues. Also, it showed badly destructed maxillary incisors, multiple missing teeth, and many defected restorations. Class III molar occlusion was noticed (figure 2).

The intraoral radiographs had been taken for the patient and shown localized horizontal and localized vertical bone loss, multiple caries, root canal treated teeth and restored teeth (figure 3).The panoramic radiograph showed a moderate bone loss, normal anatomy of glenoid fossa and normal position of the condyles on both sides (Figure 3). The full mouth charting was scanned from the R4 system (Figure 4).

After collecting all diagnostic data, a multidisciplinary team (prosthodontist, psychologist, preventive dentist, periodontist, endodontist and dental ceramist) were involved in formulating the treatment plan. The patient was diagnosed with generalized chronic gingivitis, reversible pulpitis for teeth #18,17,25,28,38,37,47 and 48, irreversible pulpitis for tooth #13,23,27,36,42,44,45,46 and missing tooth # 26. Additionally, partial edentulous areas with loss of vertical space and multiple remaining roots recognized. The treatment plan and its sequences were discussed with the patient. It was applied according to Rosenstil, et al [5]. It was started with oral prophylaxis and disease control. Scaling and root planning, polishing, motivation and education of the patient were done. The patient was advised to use Chlorhexidine mouthwash 0.12% (INTERMED CHLORHEXIL, Greece) as a mouth rinse, three times per a day for 2 weeks.

At phase, I, an alginate maxillary and mandibular alginate impressions were taken for diagnostic casts. Later on, those casts were mounted on semi-adjustable Whip-Mix articulator (Waterpik Technologies, Fort Collins, Co, USA) utilizing face bow (Hanau Spring bow) transfer and bite registration (Take 1, Kerr, Romulus, MI, USA) in centric and eccentric movements (figure 5).

In phase II, crown lengthening of the maxillary anterior teeth #13,21 and 23 (Figure 6) was done and post-operative zinc oxide dressing (Wards, Wohdrpack, Kirkland- Ksisen Box Parke, Periodress PPC) was applied. The extractions of indicated teeth were done under local anesthesia. A transitional removable partial denture was constructed and inserted into the patient mouth for an aesthetic reason (figure 7).

Excavation of caries, temporization and then final restoration with composite resin (Tertic-N-Ceramic, Ivoclar Vivadent, Lichenestine) and with glass ionomer for the indicated teeth (Ketac Silver, 3M ESPE; Miracle Mix, GC America) according to manufacturer instructions. Custom made post and core were done on tooth #21. Glass fiber post (Relaxy Fiber Post, 3MESPE, Germany) and composite resin core were accomplished for tooth #44 and 45. Then root canal treatments were done for the indicated teeth (figure 8).

In phase III, finalization of all teeth preparations for maxillary and mandibular teeth was done. The final impression of maxillary and mandibular arches was done to construct PFM bridges and crowns. A bite registration was done using putty rubber base and face bow transfer. After that, maxillary and mandibular final impressions were taken with addition Silicon (Virtual Ivoclar Vivadent, Lichtenstein) using double mixing techniques. Then cementation of the provisional restoration of the maxillary arch was done with temporary cement (Temp-Bond NT, Italy) (figure 9).

The final impressions were poured and dies were ditched. All the metal castings were constructed from a nickel-chromium dental casting alloy (Wiron99, Bego, Germany). All the laboratory procedures were carried out as per the manufacturer's instruction. All metal copping were tried in the patient mouth. At the subsequent appointment, all PFM bridges for maxillary teeth were placed in its positions. Then crowns were seated in the patient mouth. The occlusion adjustment during centric and eccentric movements was done. The canine guidance was verified at both sides before glazing and cementation of all prostheses. The used cement was modified glass ionomer type cement (Relaxy, 3M ESPE, German). The maxillary arch bridges consisted of three bridges. The first bridge was cemented from tooth # 17 to tooth # 13, with a female non-rigid connector part on the mesial part of tooth # 13. The second bridge was cemented from tooth # 27 to tooth # 24 which is cantilever (figure 10). The third bridge extends from tooth # 12, 23 with tooth # 21 as a pier abutment and a male non-rigid connector part on the distal part of tooth # 21 (figure 11). Gingival porcelain was applied foran aesthetic reason on tooth #44. Also, bleaching was done for mandibular anterior teeth,

In phase IV, the patient was recalled after 1 and 3 months intervalsfor maintenance. Also, a post-operative panoramic view was taken and kept in the patient file (figure12).During the follow-up visits, a marked facial aesthetic appearance improvement was noticed. Also an improvement in the oral hygiene of the patient.

III. Discussion

At the beginning of treatment, a removable partial denture was used and resulted in slight patient satisfaction about the aesthetic. After completing the root canal treatment and extraction of remaining teeth, patient reaches maximum satisfaction of aesthetic with the maxillary provisional bridges. This end with ultimate motivation, the cooperation of the patient and maintained of excellent oral hygiene, which was obvious during last steps of the comprehensive treatments.

The non–rigid connectors had some certain limitation such as it cannot be given in abutments having a large pulp size and reduced clinical height [4,5] but in this case, in the area of planned NRC, all abutments were root canal treated and crown lengthening was done for them.

This case has described the use of NRC in the maxillary anterior aesthetic zone with modification. A balancing phenomenon was incorporated with Tenon on mesial side of 13. As the teeth were misaligned the preparation for PFM bridge. The component parts did not have a common path of placement and therefore segmenting of the maxillary arch bridges into three parts, with shorter components resulted in compensating the difference in resistance and retention form between the abutments. The non-rigid interconnection employed a semi-precision type of attachment. Hence, the possible problem of overloading the tooth or potential intrusion phenomenon that might be associated with tooth migration was not noticed with NRCs [12-14].Also, make the design of the bridge were as simple which helps the practitioner for proper follow-up the case during maintenance appointments. In addition to that, by using NRC on the mesial aspect of tooth #13 this was done to overcome mechanical failure with long span while the patient refuses the removable prosthesis (figure 11).

In this case, since the patient had mild stains in the mandibular arch and the patient wants the same color of a maxillary artificial prosthesis. So in-office vital bleaching procedure with McInnes solution was advocated. This solution has been successfully used for treating the mild stain. This technique is relatively non-invasive and it could be finished with minimum chair side time [15]. Generally, vital bleaching is more successful for mild staining in younger patients rather than older patients with a darker type of brown stains [16].

The clinical significant in this case was that proper design of NRC in maxillary arch will distribute the load over a long area. Which minimize the bone resorption around the pier abutment # 21. The using of in-office bleaching in mandibular arch resulted in color matching with the opposing prostheses.

IV. Conclusion

The location, size, shape and type of the connector play important role in future success of a PFM bridges. The proper non-connector design is an important step in treatment planning of pier abutment in aesthetic zone, scenes it transfers less stress to abutments and allowing physiologic tooth movement. Thus, passive fit and design of non-rigid connectors areextremely important to the success of a long span PFM bridges. Teeth bleaching considered as a conservative treatment for matching of restoration for a female patient.

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Figure 1; pre-operative extra oral views
Figure 2; pre-operative intraoral views

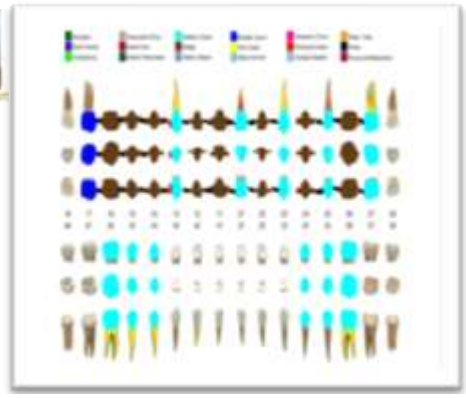

Figure 3; pre-operative intra-oral and panoramic x-rays
Figure 4; full mouth charting from the R4 system

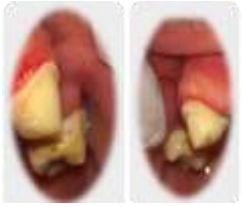

Figure 5; pre-operative castes mounted in Whip-Mix articulator
Figure 6; crown lengthening of the maxillary anterior teeth
Figure 7; transitional removable denture at the patient mouth

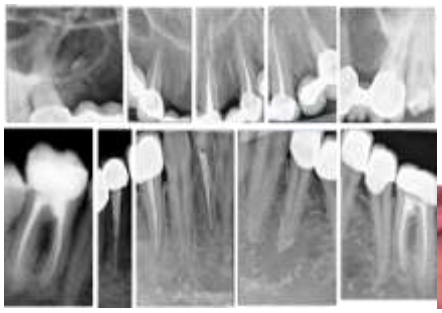

Figure 8; post-operative pre-apical views
Figure 9: Provisional bridge cemented in maxillary arch

Figure 10: Bridges and crowns during try-in and after cementation

Figure 11: anterior maxillary teeth with non-rigid connector.

Figure 12; post-operative panoramic x-ray