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Case Report

Comprehensive Treatment of a Discolored, Endodontically and Periodontally Compromised Upper Central Incisor through Interdisciplinary Approach: A 2-Year Follow Up

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Abstract

Dentistry has evolved leaps and bounds in the past few decades, from simple treatment procedures to more complex, full-mouth life-changing treatment plans. Complex clinical situations necessitate the expertise of various disciplines of dentistry, which must be communicated and co-ordinated, leading to a holistic treatment approach known as Interdisciplinary dentistry.

This case report describes one such clinical situation in which various disciplines of Dentistry- namely Orthodontics, Periodontics, Prosthodontics and Dental Implantology have been integrated to transform the smile of young individual, suffering from dental problems.

To achieve ideal aesthetics of a single maxillary incisor is still the most difficult problem to tackle in Dentistry. This case describes a discoloured, endodontically and periodontally compromised upper central incisor which is complicated by mal-alignment and dental crowding. This case has been successfully treated by an interdisciplinary approach, providing satisfactory and stable results, followed-up over a 2-year period.

Keywords: Interdisciplinary Orthodontics; Dental Implant; Endo-Perio Lesion; Interdisciplinary Dentistry; Discolouration; Socket Preservation

Introduction

Implant therapy has become a viable option for the rehabilitation of partial and single edentulism [1]. In the anterior maxilla, a successful implant procedure requires not only well-anchored implants, but also natural looking result especially when a single incisor needs to be replaced. The only way to gain this result is to correctly place implants in all the three dimensions of bone (i.e. apicocoronal, faciolingual, and mesiodistal) [2]. However, pre-existing endo-periodontal lesions can lead to considerable horizontal hard and soft tissues defects, affecting bone volume and contour. Additionally, the pathologic migration of anterior teeth and pre-existing orthodontic problems like crowding and proclination of other anterior teeth may jeopardize the final esthetic outcome.

Several clinical and histologic studies have shown the dynamic resorptive process that unfolds after tooth extraction [3]. When the alveolar site presents deficiencies, many techniques can be used for its development, one of them being preservation of the alveolar socket at the time of tooth extraction. While ridge augmentation has proven to be effective and predictable, supra-alveolar

periodontal regeneration has not yet been demonstrated. Therefore, in clinical practice, periodontal regeneration should precede alveolar augmentation and implant placement.

The complete healing of such grafted alveolar ridges may take up to 6 - 12 months after tooth extraction and prior to implant placement. During this period, a provisional tooth prosthesis is necessary to restore esthetics, phonetics, mastication and maintain or preserve the gingival architecture post-extraction.

The current case report describes a complete smile make-over of a patient by replacing a discolored maxillary central incisor with significant bone loss by a dental implant prosthesis at a regenerated bone site along with fixed orthodontic therapy to completely transform the smile using an interdisciplinary approach. This case has a follow-up duration of 2 years.

Case Report

A 36-year-old male reported to Zellene Plastic, Cosmetic and Dental Care, Kharghar, Navi Mumbai presenting a discolored and mobile upper left central incisor (21) with extrusion and severe proclination due to history of trauma (Figure 1). The patient also presented with mal-aligned and proclined upper lateral incisors. The upper left central incisor was endodontically treated, but the tooth presented with a reinfection resulting in severe bone loss extending up to the root apex (Figure 2). The following treatment protocol was finalized- (1) Fixed orthodontic therapy for the correction of mal-aligned teeth. (2) extraction of failing 21 and socket preservation, followed by a delayed implant placement after 3 months (3) internal bleaching of the natural crown of 21 and temporization with orthodontic wire (4) Implant placement after 3 months (5) Final Prosthesis after 3 months.

Figure 1: Pre-treatment discoloured, proclined upper left central incisor.

Figure 2: Radiograph showing total bone loss.

Fixed orthodontic therapy with ceramic brackets was started. 21 was extracted with minimal trauma and the socket was curetted to remove all the infected granulation tissue (Figure 3). The remaining alveolar bone was inspected, partial buccal plate dehiscence was present. Socket grafting was done with a combination of Freeze-dried bone allograft (FDBA) bone block as well as FDBA particulate graft (Figure 4) procured from Tata Tissue Bank, Tata Memorial Hospital, Parel, Mumbai. This was covered later by a chorion membrane and sutured.

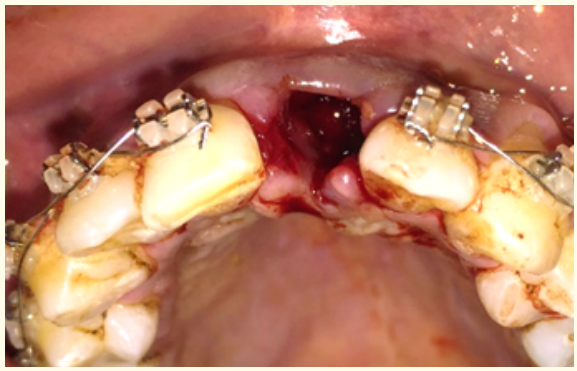

Figure 3: Tooth socket after extraction.

Figure 4: Socket grafted with FDBA particles.

During the same appointment, the extracted 21 was decoronated. The discolored crown was internally bleached with 3% Hydrogen peroxide to lighten the shade and then filled up with a composite resin. An incisor bracket was bonded to the temporary crown, which was later placed at the extraction site, retained by orthodontic wire (Figure 5). Orthodontic treatment continued every month as per the plan. The grafted site was evaluated every month for bone healing and maturation.

Figure 5: Extracted tooth crown used as temporary pontic.

3- months after the extraction, CBCT scanning for implant site evaluation was done. CBCT evaluation showed some supra-alveolar bone regeneration with loss of the labial cortical plate. A 4.0 x 11.5 mm TSIII OSSTEM implant was placed. Due to the labial cortical plate dehiscence, there was exposure of 2 implant threads labially at the crest, whereas the implant was surrounded by bone palatally, mesially and distally (Figure 6). FDBA particulate bone graft was placed labially, covered by a collagen membrane and sutured. The temporary crown was placed back. Orthodontic tooth movement continued. After 3 months, stage 2 implant surgery was performed and slight palatal connective tissue was extracted and transplanted labially, followed by gingival former placement and suturing. 15 days after healing (Figure 7), the impression procedure for implant was carried out. As 11 was fractured, a veneer was planned to correct its shape and aesthetics. After a bisque trial, the final veneer with 11 was bonded and a cement-retained FP3 type metal-free Zirconia prosthesis with cervical pink porcelain was fixed. Simultaneously, debonding of orthodontic brackets was done and a fixed lingual retainer was placed. The patient was extremely overwhelmed and satisfied with the new smile (Figure 8). 6-monthly follow-ups have been carried out since then.

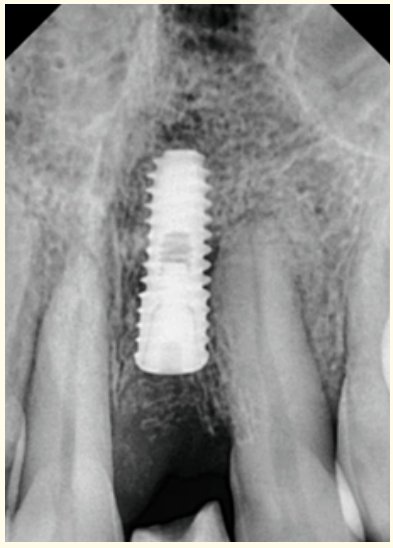

Figure 6: Radiograph showing implant placed.

Figure 7: Healed site after implant placement, prior to final prosthesis.

Figure 8: Post treatment with final prosthesis.

Figure 9: 2-year follow-up showing gingival tissue cuff around the cervical porcelain.

Discussion

Orthodontics has always been the discipline that sets the stage for dentofacial esthetics. Contrary to traditional orthodontics that focuses solely on improvement of static and dynamic occlusal relationships, contemporary orthodontics encompasses treatment modalities which aim at achieving good occlusal results in-conjunction with enhancement of the entire dentogingival apparatus including prime emphasis on its esthetic outcome [4].

The present case was challenging due to the severe bone loss caused by endodontic infection as well as mal positioning of the teeth. In this case, orthodontic therapy played a vital role in repositioning of teeth for subsequently planned implant and smile enhancement restorative procedures. Pre-restorative orthodontic tooth movements assisted in gaining adequate mesio-distal space for placing an ideal implant prosthesis. It is generally best to place an implant during the finishing stage of orthodontic treatment, which allows finer manipulation of space, maintenance of space and sufficient time for osseointegration by the time appliances are removed, which was followed in this case.

The orthodontic wire and bracket also aided to retain and maintain the space for the implant restoration. The concept of "Natural tooth as a Pontic" [5] was integrated in this case which means that the periodontally compromised extracted natural tooth crown was modified and used as a temporary crown restoration, retained by the orthodontic bracket and wire, until the final prosthesis was delivered. This concept negated the requirement of a laboratory-fabricated temporary crown.

As the apico-coronal space for the final prosthesis was more as compared to other anterior teeth, the final prosthesis was FP-3 type. The gingival-colored cervical porcelain replaced the lost soft and hard tissue, providing the necessary emergence profile and lip support. The patient had a low lip line, which was esthetically favorable.

The adjacent incisor (11) which had an Ellis class II fracture previously, was restored with a Lithium disilicate bondable ceramic veneer. The veneer treatment aided in achieving the desirable shape and esthetics of a central incisor.

As the implant prosthesis was a metal-free ceramic, there was growth of cervical gingival tissue around the porcelain during the 2-year follow-up, confirming the affinity of gingival tissues towards ceramic prosthesis and harmony between the final restoration and the adjacent teeth as well as health of the surrounding hard and soft tissues.

An interdisciplinary orthodontic treatment presents the philosophy and treatment strategy that also involves a group of professionals from other disciplines of dentistry as a cohesive team. This approach to manage complex clinical situations is a highly sophisticated treatment modality and requires excellent communication and coordination among the team members. The goal is to simplify and idealize the treatment plan by providing solutions to a variety of clinical situations, which improves the overall treatment prognosis and enhances the treatment results.

Conclusion

Treatment of periodontally and endodontically involved anterior teeth along with malalignment is complex and necessitates interdisciplinary intervention. The timing of implant placement, planning of implant prosthesis, providing an intermediate prosthesis are all important aspects of treatment planning. A team of skilled professionals need to work coherently and plan treatment timelines meticulously to achieve a balanced and esthetic outcome to achieve maximum patient satisfaction.

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