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Case Series

Orthodontic Extrusion: An Option to Improve the Peri-Implant Condition in Aesthetic Zone — Clinical Reports

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Abstract

The immediate implant with its installation followed by extraction dental is an available treatment option. The immediate implant procedures in the aesthetic zone require pre and/or trans-surgical procedures for a better aesthetic result. The literature that describes orthodontic extrusion as a reliable method to favor the pre-implant site. The objective of this article consists of a clinical cases series in which the orthodontic extrusion technique was applied before installation of implants in the aesthetic zone with satisfactory results.

Keywords: *Immediate Implants, Orthodontic Extrusion, Aesthetic Zone*

Introduction

Bone resorption and remaining defects of the alveolar ridge after removal of a compromised tooth often produce unfavorable conditions for the installation of implants in the aesthetic zone[1]. Guided bone regeneration (GBR) with the use of bone grafting materials and mucogingival surgery are methods commonly used to improve the condition of peri-implant tissues[2].

To replace a single tooth, several treatment protocols have been proposed with the aim of improving aesthetic-functional results and reducing treatment time.[3-6] One of the available treatment options is the immediate implant with its installation followed by extraction. dental[7-8], as long as tissue conditions are favorable at the time of implant placement[4]. In most cases, the amount of soft tissue and underlying bone structure is not sufficient due to site-specific anatomical limitations.[9-11] Therefore, most immediate implant procedures in the aesthetic zone require pre- and/or trans-surgical procedures for a better aesthetic result.[12,13.]

In 1993, Salama introduced a non-surgical method of orthodontic extrusion, to improve the condition of the peri-implant tissues of the implant site prior to exodontia of a compromised tooth element.[2] Although this approach was originally introduced to save traumatized teeth, and has been suggested as a method to manipulate soft and hard tissues through gradual extrusion of a compromised tooth prior to implant installation.[3] Several reports are available in the literature that describe orthodontic extrusion as a reliable method to favor the pre-implant site[3,5,14] The objective of this article, consists in a clinical cases series in which the orthodontic extrusion technique was applied in compromised teeth before installation of implants in the aesthetic zone with satisfactory results.

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Indications and contraindications for orthodontic extrusion

Compromised teeth are not considered useless, as they have periodontal ligament, bone and cementum [3,15,16]. The indication for extrusion is generally indicated for the anterior region of the maxilla where aesthetics is an important and determining factor for success.[17] Although the literature does not provide clear information about this approach, cases of compromised teeth that present remnants with ligament insertion periodontal on the root surface and sufficient stability to pull the supporting tissues, can be used in this practice3. Situations such as: root resorption, bone loss, endodontic lesions,

Root fractures, failed root canal fillings, unsuccessful apicoectomies or severe root cavities are most often indicated for extraction of dental elements[18]. Orthodontic extrusion of these teeth induces the formation of buccal and coronal bone, as well as the traction of soft tissues , avoiding the need for additional surgical procedures [3,5] . On the other hand, serious hard and soft tissue defects, such as large gingival retractions and large bone resorptions, are contraindications for orthodontic extrusion, and in these cases guided bone regeneration is the best option [3,5]

Although orthodontic extrusion is considered a safe technique and a predictable procedure, complications such as bone dehiscence and gingival recession can occur in cases where the buccal bone is thin and strategically unfavorable for immediate implantation[17]. For this reason, the indications for orthodontic extrusion are limited to moderate bone defects characterized by moderate resorption of the buccal bone and general recession up to the middle third of the root[3]. However, several case reports have demonstrated the success of the pre-implant extrusion procedure of a tooth with periodontal involvement[19,20]. Other contraindications include radicular ankylosis or hypercementosis[18] and uncontrolled chronic inflammation[19]

Case Presentation

Case 1

Patient S.G. male age 49 presented element 21 compromised with external root resorption. Traction with extrusion of the remaining element was then proposed with the aim of preserving bone tissue and peri-implant gums. In a period of approximately 12 months, it can be seen from the clinical and radiographic conditions that the tooth could be removed to install the implant. Exodontia was then performed with immediate installation of the implant with a primary stability of 45 Ncm filled with biomaterials. A temporary crown was then installed and maintained for a period of 6 months without occlusal contacts, with the patient being monitored monthly. After this period, a screw-retained metal-ceramic crown was installed (Figures 1 to 5).

Fig 1. *Preoperative X-ray.*

Fig 2. *Extrusion of 21.*

Fig 3. *Immediate implant submitted to immediate loading with previsualization.*

Fig 4. *Gingival profile.*

Fig 5. *Final prosthesis.*

Case 2

Patient M.C.D. Male age 54 had element 21 compromised with mobility and after probing, proximal bone loss was found. Traction with extrusion of the remaining element was then proposed with the aim of preserving the conditions of bone tissue and peri-implant gums. To avoid occlusal interference during the traction period, the crown was worn, as can be seen in figure 8. After approximately 10 months, due to clinical and radiographic conditions, extraction was then performed. Due to the presence of an extensive bone defect, the implant was installed without immediate loading and regeneration was carried out with biomaterials and a slow reabsorption membrane. After a period of 6 months, a temporary crown was installed and then a screw-retained metal-ceramic crown (Figures 6 to 14).

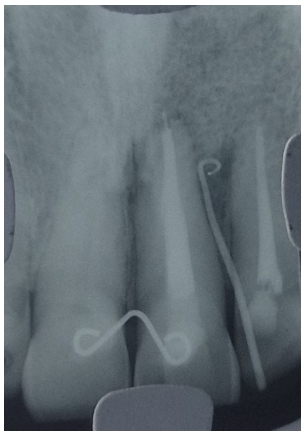

Fig 6. *Preoperative radiograph.*

Fig 7. *Orthodontic extrusion of element 21.*

Fig 8. *End of orthodontic extrusion of element 21.*

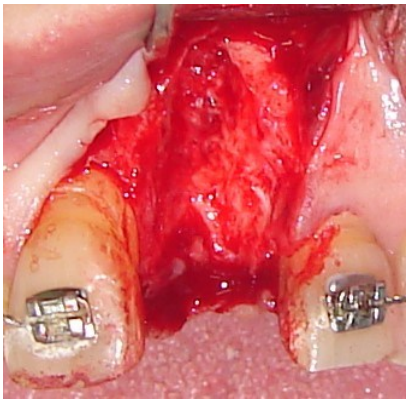

Fig 9. *Socket after extraction of 21.*

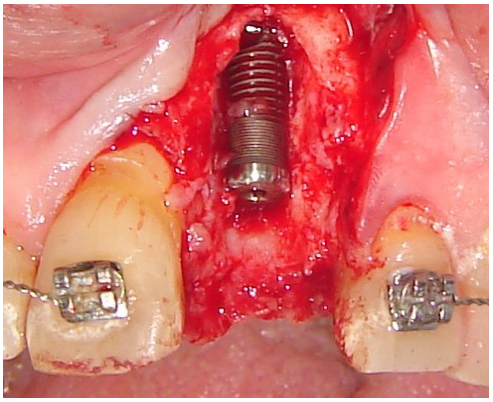

Fig 10. *Implant installation.*

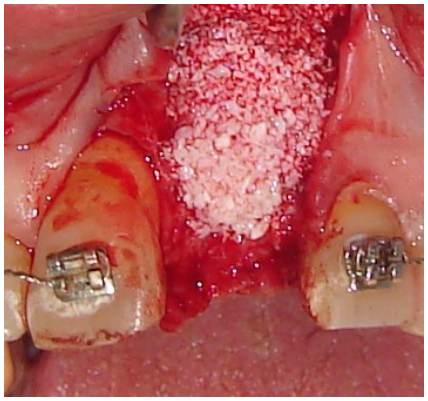

Fig 11. *Biomaterial graft.*

Fig 12. *Temporary crown of element 21.*

Fig 13. *Gingival profile.*

Fig 14. *Radiographic Control.*

Case 3

Patient R.S.A. male age 68 presented elements 11 and 21 compromised with periapical lesions and bone loss. It was then proposed to extrude the compromised elements to improve the remaining conditions for implant installation. The evolution of the case can be seen in the radiographic images, which was carried out over a period of 12 months. Firstly, extractions were performed with biomaterial grafting and after 5 months the implants were installed in the pre-grafted area and subjected to immediate loading. Prosthetic rehabilitation with metal-ceramic crowns cemented onto Morse cone implants. (Figures 15 to 23).

Fig 15. *Pre-operative radiograph.*

Fig 16. *Orthodontic traction of 11 and 21.*

Fig 17. *Bone condition after the end of extrusion.*

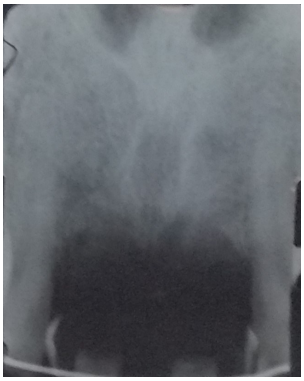

Fig 18. *Bone condition after extraction and grafting.*

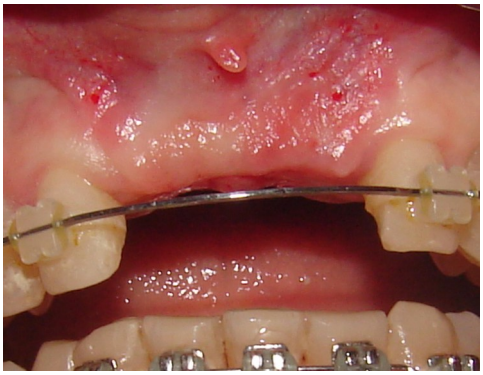

Fig 19. *Mucosal condition after extraction and biomaterial grafting.*

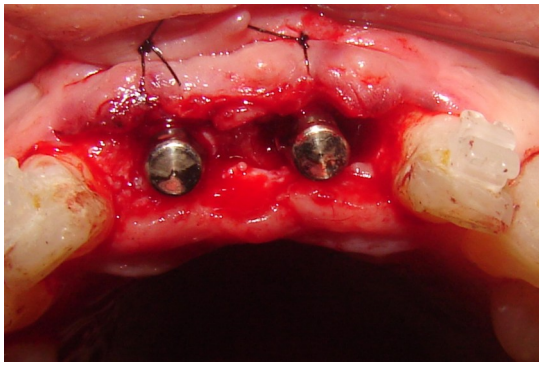

Fig 20. *Installation of morse taper implants.*

Fig 21. *Temporary crowns and implants with immediate loading.*

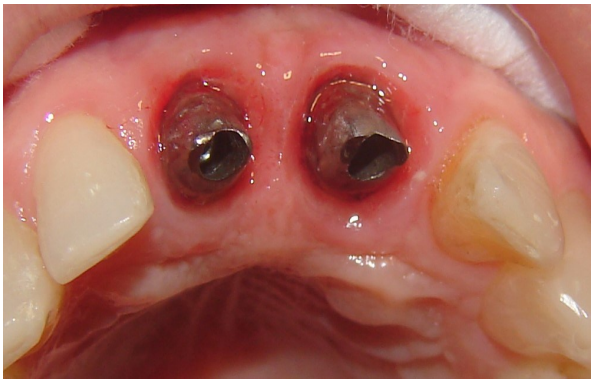

Fig 22. *Final gingival profile.*

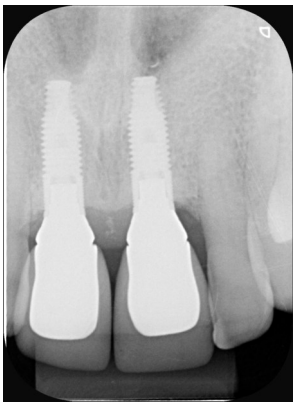

Fig 23. *Control radiograph after 10 years.*

Discussion

Treatment with implants depends on knowledge of the relationship between peri-implant tissue profiles as well as an accurate diagnosis, followed by a treatment plan and possible additional procedures required for treatment. Bone healing, and a post-extraction healing period of up to one year was recommended in the late 1980s prior to implant installation [17,18,20] However, resorption of the buccal alveolar bone wall may result in the collapse of a portion significant loss of the ridge, which may compromise the outcome of the treatment[9] To overcome these problems, tooth extraction followed by immediate implantation has been proposed as a reliable method to preserve the remaining bone structures and reduce the overall treatment time[7]. Due to the anatomical nature of the bone in the anterior region, called thin buccal plate, in most cases the placement of immediate implants is indicated, associated with the need to use grafting materials to preserve the structures of soft and hard tissues[11]. It is important to highlight that in some situations the scientific literature has demonstrated that small remaining defects in the buccal bone wall in fresh sockets, such as fenestrations and simple dehiscences, would not compromise the aesthetic result in anterior teeth, as long as the implant was within the horizontal bone perimeter. [20-22] However, careful planning with a detailed assessment of the conditions of bone height, buccal bone wall and interproximal contact point of the crown of the compromised tooth element through periodontal probing are essential for the diagnosis and development of a treatment plan. predictable[9].

Currently, immediate implants are preferred as the first choice procedure for replacing compromised elements in areas of critical aesthetics[1-8]. In this context, orthodontic extrusion of compromised elements may represent a non-surgical treatment approach to provide sufficient strength and soft tissue structures, thus facilitating implant placement with a predictable result [3,5,9].

On the other hand, orthodontic extrusion, in addition to being time-consuming, requires an experienced team, and is only preferably applicable with fixed appliances with the application of a light and constant extrusive force not exceeding 2 mm per month.[23,24]

Although “excessive extrusion” is a recommended procedure, stabilization for at least two to three months has to be implemented to prevent any relapse and allow reorganization of the soft and hard tissue complex before implant placement can occur.

Conclusions

Based on the scientific literature presented and the clinical experience of the authors, we can conclude that orthodontic extrusion of compromised elements is a viable technique with good predictability, as demonstrated in these clinical reports. Despite depending on an integrated team for its application, preferably composed of an orthodontic specialist, as well as a longer treatment time, the advantages and benefits for preserving the remaining structures of the implant site can be, in some situations, extremely important in the obtaining successful implants in areas of critical aesthetics.

Conflict of Interest

The authors declare no conflict of interest.

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