

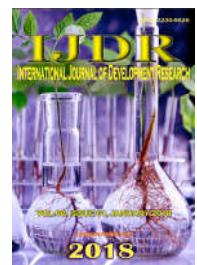


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SOCKET-SHIELD MODIFIED TECHNIQUE: RIDGE PRESERVATION FROM A CASE REPORT

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ABSTRACT

The buccal lamella is compromised by the extraction, to such an extent that this part of alveolar bone is insufficiently nourished, leading to its total or partial resorption. In order to overcome the negative consequences of tooth extraction various methods have been described in the literature such as hard and soft tissue augmentation following extraction with or without immediate implant placement. Socket shield technique seems to be a good alternative for immediate implant placement. This technique aimed first to preserve the buccal plate of bone and prevent post extraction resorption with leaving the buccal aspect of the root intact. Socket shield technique has demonstrated the potential in preventing buccal bone from resorption in animal and clinical studies. Since, some authors suggested that it may even be possible to do a modified socket shield technique without any of material requirements (collagen cone/membrane). Our article describes a case report of a young patient with fractured right central. This presentation is intended to illustrate a modified socket shield technique, with one single surgical time using individual designed healing abutment to avoid lamellar bone resorption and preserve soft tissue contours. The possibilities and limitations are presented and discussed.

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INTRODUCTION

The buccal alveolar bone is primarily vascularized by the periodontal membrane of the tooth. Therefore, the buccal lamella is compromised by the extraction, to such an extent that this part of alveolar bone is insufficiently nourished, leading to its total or partial resorption (Araújo, 2005; Cardaropoli, 2003; Rothamel, 2007). After tooth extraction, a remodeling reaction as part of the healing process, involving various degrees of alveolar bone resorption, affect the buccal lamella (Glockner et al., 2014).

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Many treatment approaches have been introduced and advocated to overcome the negative consequences of tooth extraction, such as immediate implants (Cardaropoli, 2003; Buser, 2000; Schropp, 2003) graft materials (Botticelli et al., 2004; Chen et al., 2004; Hämmeler et al., 2012; Nevins, 2006) and membranes (Araújo, 2005; Prato, 2004), however no technique of bone preservation or entire regeneration of the extraction socket has been documented (Buser, 2017). Socket shield technique first introduced in 2010 by Hürzeler, aims to avoid tissue alterations of the ridge after tooth extraction (Hürzeler, 2010). It was suggested that instead of extracting the whole tooth, the buccal fragment of root intact could be left and at the same time an immediate implant is placed on the lingual aspect of that fragment so that the tissues which remain

in contact with the buccal fragment retain their vitality and prevent the ridge from collapsing (Hürzeler, 2010). This would lead to an optimal stable esthetic result after the final delivery of the restoration (Cherel, 2014; Wadhwani, 2015). This technique can prove to be very helpful for implantologists when planning implants in aesthetic region. The case presentation detailed below is intended to illustrate a modified socket shield technique, with one single surgical time using individual designed healing abutment to avoid lamellar bone resorption and preserve soft tissue contours. The possibilities and limitations are presented and discussed.

Case report

A 28-year-old male patient, non-smoker, in good general condition, with no systemic illness and not on regular medication, consults in the Outpatients and Implantology Department in Oral Medicine and Surgery at the Faculty of Dental Medicine, Monastir, Tunisia to restore central right incisor fractured. Extra-oral findings show that the patient's facial features were symmetrical with deep smile lines. On inspection and palpation, no abnormalities were detected. Dental history reveal a schoolyard fall resulted in extrusion of the 21 which was replaced by an implant (Osstem 4/10) and in necrosis with consecutive root canal treatment of tooth 11 which still dyschromic (Fig.1).



Fig.1. Clinical frontal view showing the dyschromic right incisor



Fig.2. Clinical occlusal view showing the root of the central right tooth fractured with gingivae inflammation and partial migration of soft tissue covering the border of the remaining root

Despite the crown of this tooth was fractured few months later and the remaining root cannot be used to realize fixed reconstruction (Fig.2)

The preoperative periapical radiograph shows no periapical pathologies (Fig.3). Various treatment options were discussed and implant supported fixed restoration was the treatment of choice for replacing the failing central incisor. Cone beam computed tomography scan was done and it depicted a thin labial cortical bone overlying the right central incisor. Immediate implant placement with 'Socket shield technique' was planned for this case. After excision of periodontal soft tissue covering the border of the remaining root (Fig.4), the tooth was sectioned vertically in mesiodistal direction using long tapered fissure diamond bur (Fig.5). Conservative extraction of the palatal root fragment was done with luxators and forceps. This was followed by osteotomy preparation for implant placement (Fig.6). Debridement of granulation tissue was done from the previous apicoectomy site and implant was placed without bone graft materials (Fig.7). Provisional abutment with fluid resin injection (polymerized and polished) was made as an individual designed healing abutment to protect the GAP, stabilize the blood clot and conserve the gingivae profile (Fig.8,9). No sutures were placed. Postoperative X-ray control was made (Fig.10). A soft tissue conditioner lined removable prosthesis was given to the patient. During follow up the soft tissue showed a favorable healing with contours conservation (Fig.11). Definitive porcelain fused to metal crown was placed after 4 months of surgical phase (Fig.12,13,14,15). Currently patient is under active follow-up.

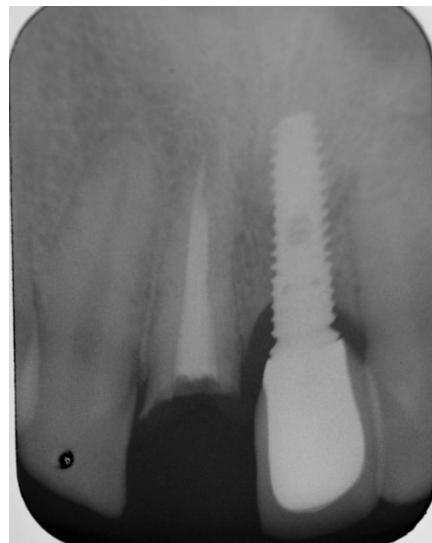


Fig.3. Preoperative periapical radiograph illustrating no periapical pathologies regarding the 11 root



Fig.4. Clinical occlusal view after excision of periodontal soft tissue covering the border of the remaining root



Fig. 5. Clinical occlusal view showing vertical mesiodistal section of the root using long tapered fissure diamond bur



Fig.9. Clinical frontal view showing the individual designed healing abutment supporting soft tissue



Fig. 6. Clinical occlusal view after conservative extraction of the palatal fragment and predrill for implant site preparation

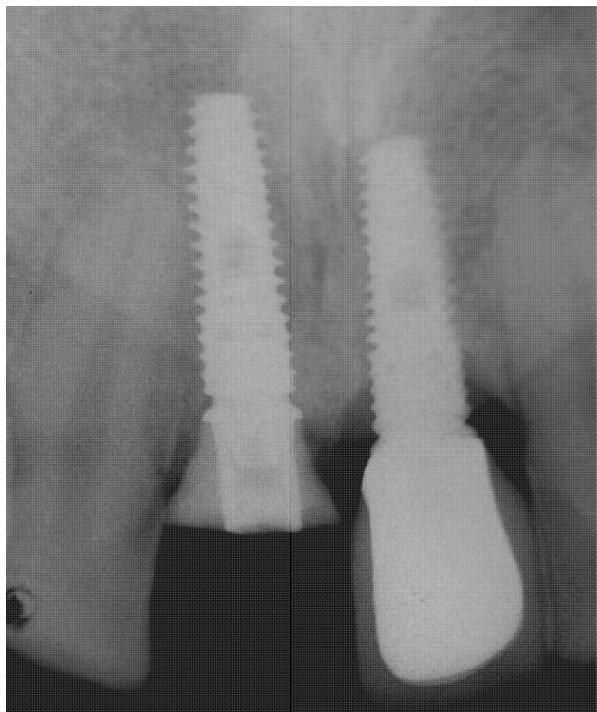


Fig.10. Postoperative periapical radiograph control showing implant position



Fig.7. Clinical occlusal view after implant placement in a palatal position showing the GAP left between the buccal part of the root left and the implant



Fig.8. Clinical occlusal view after confection of provisory abutment with fluid resin injection as an individual designed healing abutment



Fig.11. Clinical occlusal view after healing period of 7 days illustrating a favorable soft tissue healing supported by the designed abutment

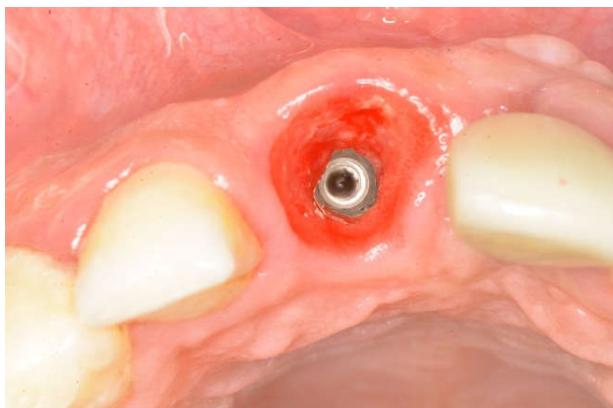


Fig.12. Clinical occlusal view after 4 months healing illustrating a soft tissue contours conservation



Fig.13. Clinical frontal view after prosthetic abutment connection



Fig.14. Clinical frontal view after definitive crown placement

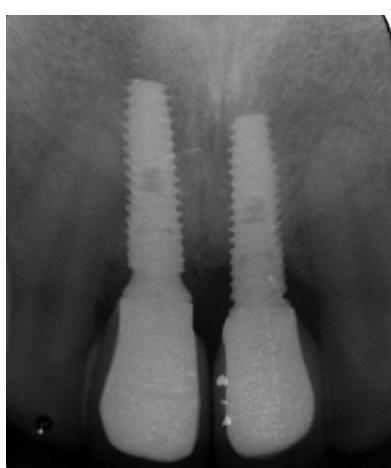


Fig.15. Periapical radiograph control after definitive crown placement

DISCUSSION

True to the motto “when we take something out, we should put something back in”(Ashman, 1995), studies have been carried out where fresh extraction sockets were filled and covered with various bone substitutes and membranes (Fiorellini, 2003). In a review paper published in 2017, Buser affirmed that immediate implant placement can be used in ideal clinical conditions to offer for the patient a low morbidity, short treatment period and the possibility of an immediate provisional prosthesis being delivered on the day of extraction (Buser, 2017). The most important requirements are a fully intact facial bone wall with a thick wall phenotype (> 1 mm) and a thick gingival biotype (Buser, 2017). When those conditions are present, the risk for recession of the facial mucosa and or facial flattening of the soft tissue profile at the neck of the implant prosthesis could not be eliminated (Buser, 2017). However, in front of facial bone wall recession or a thickness wall phenotype with thickness gingival biotype, authors preconize to differ implantation, and use socket preservation technics (Araújo, 2005; Cardaropoli, 2003; (Buser, 2017; Araújo, 2005). Socket shield technique seems to be a good alternative for immediate implant placement. It was first described in 2010, aiming to preserve the buccal plate of bone and prevent post extraction resorption with leaving the buccal aspect of the root intact (Hürzeler, 2010).

Recently, there have been publications regarding socket preservation suggesting they have the ability to maintain the ridge dimension to a certain amount (Cherel, 2014; Wadhwanı, 2015; Bäumer, 2015).Clinical studies have suggested that leaving remaining roots of hopeless teeth in their sockets may prevent or decrease tissue alterations and bone resorption after tooth extraction; this was documented by numerous publications (Hürzeler, 2010; Davarpanah, 2009; Parlar, 2005; Salama, 2007; Von Arx, 2013). Other studies reported that for de-crowned root fragments not only adequate bone volume preservation but also vertical bone growth in a coronal direction (Glockner *et al.*, 2014; Andersson, 2003; Malmgren, 1984). Some modified techniques were described as a solution for particular situation. Some authors suggested that it may even be possible to do a modified socket shield technique without any of material requirements (collagen cone/membrane) (Glockner, 2014). Histological studies conducted have shown new bone formation in the small gap between implant in contact with the tooth fragment and the tooth fragment (Bäumer, 2015).Our case report was in accordance with those studies.

A new pilot study has shown the potential of a modified shield design referring to vertical fracture lines in buccolingual direction in preserving buccal tissues (Bäumer, 2015). In this case report, it was shown that socket shield technique with immediate implant placement using provisory abutment with fluid resin as an individual healing abutment could preserve the buccal cortical plate, and healthy peri-implant tissue. Though provisory crown could be used but it is still in its infancy despite with such promising results it will soon be incorporated. However, the presented partial extraction is technique-sensitive and associated with the risk of displacement of the buccal root fragment, or even the buccal lamellar bone (Glockner *et al.*, 2014). The buccal shield should be thinned in its horizontal dimension and the socket left should be attempted to achieve an implant position where all boundaries are formed by bone.

Future controlled studies should test, whether the root fragments should be removed or, if persisting, may lead to long-term remodeling or resorption effects.

Conclusion

In order to overcome the negative consequences of tooth extraction various methods have been described in the literature such as hard and soft tissue augmentation following extraction with or without immediate implant placement. Ideally, a method for the prevention of alveolar ridge resorption should be cost-effective and minimally invasive. Guided bone regeneration procedures are cost-intensive and technique-sensitive. In contrast, the presented cost-effective with short treatment period but still technique-sensitive. In this case report, it was shown that socket shield technique with immediate implant placement preserves the buccal cortical plate, and healthy peri-implant tissue has been observed. Though this technique is still in its infancy but with such promising results it will soon be incorporated as a routine procedure in ridge preservation.

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