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Case Series

Socket shield technique with immediate and delayed loading method: Case reports

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ABSTRACT

Immediate implant placement is becoming a routine procedure in esthetic dentistry. The need for placing implant immediately post extraction helps reduce the alveolar ridge resorption and also maintain good soft tissue contours post placing the implant and during rehabilitation. However, a cause of concern occurs when the buccal cortical plate is thin, especially in the upper anterior region. This poses a direct implication in the maintenance of primary stability and buccal contour of both hard and soft tissues, thus compromising esthetics.

Socket shield technique is a recent advancement in placing immediate implant post extraction. The maintenance of buccal root section helps retain both the compromised buccal cortical plate and soft tissue contour thus providing a better esthetic profile. In view of the same, two patients were provided immediate implants with socket shield technique; one with immediate loading of implant and other with delayed loading method and post operative radiographic analysis was carried out to evaluate bone density around the implant.

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1. Introduction

Tooth extraction causes increased resorption and remodelling of the soft and hard tissues. This remodelling poses a challenge for the esthetic and prosthetic rehabilitation due to the compromised vertical and horizontal dimensions of the hard and soft tissues. It requires training and clinical skills to augment the same prior to implant placement in the anterior region.

This increased demand lead to the alternative of immediate implants where in implants were placed immediately post extraction of the teeth.¹ However, placing immediate implants doesn't prevent the resorption of buccal bundle bone. Presence of thin buccal bundle bone, resorption of buccal bone leads to reduced horizontal and

vertical bone dimensions, thus compromising the implant stability and esthetics.² The socket shield technique (SST) was described about 10 years back by Hurzeler, wherein buccal coronal fragment of the root was deliberately left whilst extracting the teeth and subsequently placing an immediate implant. This method is popularly known as Root Membrane Technique (RMT).³ In this technique, the buccal section of the root is retained to prevent resorption and remodelling of the buccal hard tissues and maintain the soft tissue contours. The tooth planned for extraction with immediate implant placement is sectioned mesio-distally such as to separate the buccal and palatal halves which can be extracted atraumatically leaving the buccal section in situ. The implant is subsequently placed palatally and the remaining root section is contoured using long shank round burs. This facial section of the root retains its attachment with the buccal bundle bone and provides the ridge support

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for the implant buccally.

The aim of these case reports was to determine and compare the bone density using post placement of immediate implants with RMT with immediate loading and delayed loading methods.

2. Case Description: Case 1 (immediate loading technique)

A 24 year old male reported to the OPD with chief complaint of fractured front tooth. On clinical evaluation a fractured tooth # 21 was present with root fragment approximately 4mm width and radiographic evaluation showed minimal buccal bone, approximately 0.4-0.8 mm (Figure 1). Immediate implant placement with RMT was planned and patient was explained about the modality. Consent of the patient was taken for placing immediate implant with RMT and immediate loading method.

After phase I therapy involving scaling and Oral hygiene instructions and routine haematological investigations surgical phase was planned. For placing the implant immediately after extraction, a full thickness mucoperiosteal flap was raised to expose the root.

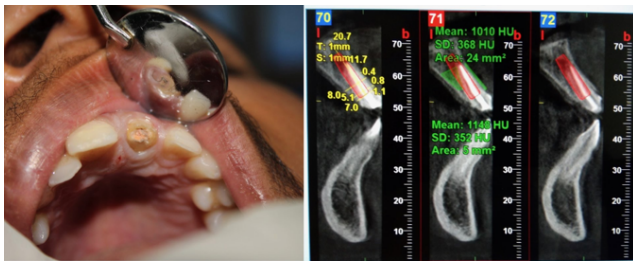


Fig. 1: Clinical presentation and radiological assessment



Fig. 2: Full thickness mucoperiosteal flap raised and extraction of the palatal root section retaining the buccal root section

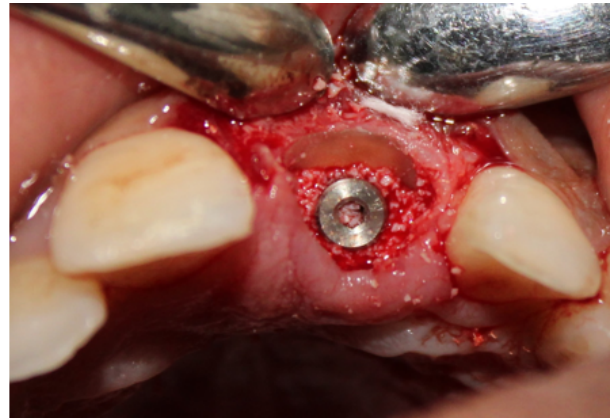


Fig. 3: Placement of implant



Fig. 4: Placement of the abutment for immediate impression making and loading protocols



Fig. 5: Temporisation with acrylic crown



Fig. 6: Permanent rehabilitation with ceramic crown

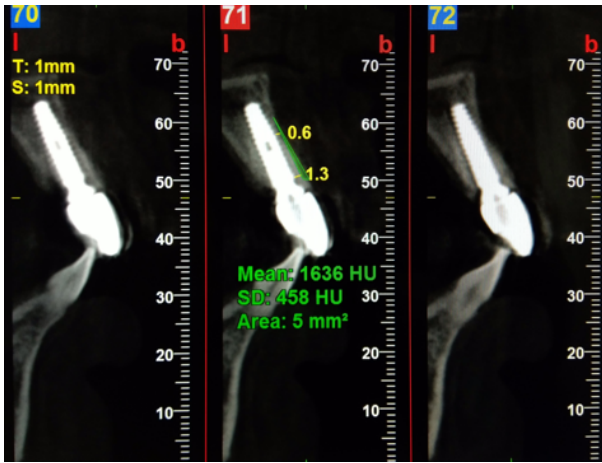


Fig. 7: Radiographic assessment 7 months post-operative

Using long shaft diamond cutting burs under profuse irrigation the root was sectioned mesio-distally into facial and palatal halves and the palatal half was extracted atraumatically using periostomes (Figure 2). The implant was placed in the palatal aspect of the facial half of the retained root piece and composite bone substitute (Hydroxyapatite and β -TCP) was placed in the socket space (Figure 3). The abutment was then fixed and sutures placed to close the flap (Figure 4). Impressions were made using silicon putty and light body material.

The abutment was removed and replaced with gingival former. Temporisation was done using acrylic crown (Figure 5). After a 03 days the final restoration was provided with ceramic crown (Figure 6). Post-operatively patient was reviewed every 2 months. A radiographic assessment was carried out at the end of 7 months post placement of the implant and immediate rehabilitation that showed bone density in the facial aspect of the implant around 1636 ± 458 HU (Figure 7).

3. Case Description: Case 2 (delayed loading technique)

A 25 year old male reported to the OPD with chief complaint of fractured front tooth. On clinical evaluation a fractured tooth # 21 was present with part of the facial root fragment present. Radiographic evaluation showed minimal buccal bone (Figure 8). An Immediate implant placement with RMT with delayed loading was planned. Patient was explained about the modality and consent of the patient was taken for the procedure.

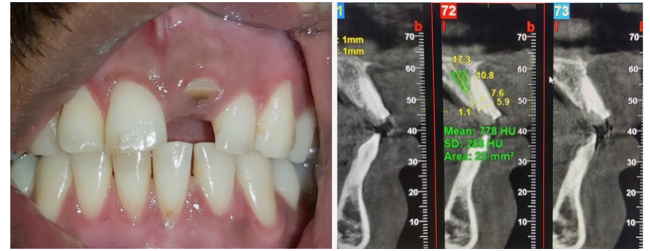


Fig. 8: Clinical presentation and Case 2 radiological assessment



Fig. 9: Permanent rehabilitation with ceramic crown and radiographic assessment 7 months post-operative

Post phase I therapy and routine haematological investigations surgical phase was planned. During the surgical phase of the treatment, a full thickness muco-periosteal flap was raised to expose the root. The root was sectioned mesio-distally into facial and palatal halves using long shaft diamond cutting burs under profuse irrigation and the palatal half was extracted atraumatically using periostomes. The implant was placed in the palatal aspect of the facial half of the retained root piece and composite bone substitute (Hydroxyapatite and β -TCP) was placed around the remainder of the socket space. Surgical phase till placement of implant was similar to that as described in previously. Sutures were placed post placement of healing screw.

Post-operatively patient was reviewed every 2 months. After 7 months of the surgical procedure prosthetic rehabilitation with ceramic crown was done and a radiographic assessment was carried out (Figure 9). The

radiographic assessment showed bone density in the facial aspect of the implant around 2508 ± 267 HU.

4. Discussion

The residual alveolar bone undergoes resorption following the removal of the tooth.¹ Preserving root have been an option to maintain and reduce resorption of the residual ridge post extraction of teeth.³ There are reports that the retention of roots both vital and endodontically treated helps preserve the alveolar ridge form.⁴ Retaining of roots around implants have shown periodontal and cementum regeneration over the implant surfaces.⁵ The innovative technique of placing implants in close contact with retained root was developed by Hurzeler in 2010 who coined the term socket shield technique to this method of immediate implant placement.³ Histological studied by Hurzeler showed cementum formation around the implants and few studies showed the development of fibrous capsules around the implants.⁶

The RMT or socket shield technique provides for the preservation of the buccal bone with a simple technique. The lingual cortex being more thick are less prone to resorption hence implants are placed lingual to the retained root fragment on the buccal side to prevent the resorption and remodelling of the buccal bone.⁷ The retained buccal root section prevents perforation of the soft tissue during the healing phase and also allows the retention of the facial soft tissue profile, contour and esthetics around the implants. By preserving the supra-crestal fibres permits better esthetics with the maintenance and preservation of the papilla.⁸ A recent human histological study confirmed and demonstrated osseointegration between implant surface and the root dentin surface of the retained root fragment.⁹ However, a recent prospective case series study showed mild resorption patterns of 0.7mm after 6 months using RMT for immediate implant placement.¹⁰

Most clinical research has been case reports and series evaluating the resorption of bone and levels of marginal bone around the implants post RMT. The consequence of immediate or delayed loading of the implants has not been assessed or compared whilst using RMT for immediate implant placement. This case report compared the radiological variation in the buccal bone densities of two cases treated using immediate implant with RMT or socket shield technique. Post operative evaluation of the bone densities buccal to the implant where the root fragment was retained was analysed using CBCT. On evaluation of it was found that delayed loading of the implant provided for the greater osseo-density around the implant in the buccal aspect as compared to immediate loading protocol. This can be attributed to the formation of the cementum around the implants in the area near the root fragment and increased bone formation with reduced osteoclastic activity as demonstrated by Hurzeler et al in 2010.³

5. Conclusion

Esthetics and ridge preservation is a major concern for many implantologists whilst managing anterior teeth extractions and immediate implant placement. Socket shield technique or RMT was an innovative protocol for retaining both the buccal bundle bone and soft tissue contour and esthetics around immediate implants. Loading protocols for the same has not been well established in such cases with relevant controlled trials. The above case reports can provide an insight into the loading protocols and help further establish the osseointegration of these immediate implants place using this novel technique.

Further controlled trials and radiological analysis is essential to establish this procedure as a standard for immediate implant placement in the anterior region.

6. Abbreviations

1. SST: Socket Shield Technique
2. RMT: Root Membrane Technique

7. Source of Funding

None.

8. Conflict of Interest

None.

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