

Shield of Protection-Partial Extraction Therapy & Immediate Implant Placement: A Case Report

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ABSTRACT

Background: *In the Socket shield technique in immediate implant placement sites, the labial fragment of the root is preserved in the Socket to prevent the labial cortical plate from resorption. This helps to achieve aesthetically pleasing results by maintaining the harmony between the pink and white zones.* This case report presents a 19-year-old female patient with a fractured maxillary right central incisor indicated for extraction, to be replaced with an immediate implant. On examining the Cone-beam computed tomography, labial dehiscence was noticed. Hence, a 2 mm labial fragment of the root was left intact, and the implant was placed palatal to the tooth fragment, i.e. the root was preserved to serve the labial plate using the socket shield technique. A 3-month follow-up shows proper healing and healthy peri-implant tissue. The socket shield technique is a good alternative as it preserves the hard and soft tissues in immediate implant placement cases, especially in aesthetic areas.

Keywords: Implant, partial extraction therapy, socket shield.

INTRODUCTION

One of the problems encountered during the placement of immediate implants in the anterior maxillary area is the presence of thin labial bone, which is prone to fracture either during osteotomy preparation or during implant placement. Preservation of labial two-third of the root in the Socket is of advantage so that the periodontium along with the labial bone remains intact. The loss of the periodontal ligament and bundle bone plays a major role in influencing the resorption process resulting in subsequent peri-implant soft-tissue recession and esthetic deterioration. As the periodontal ligament and subsequently the bundle bone will be lost, the labial bone plate and the covering soft tissues will be thinned out and even reduced in height. In the premaxillary region, the coronal part of the labial lamella often consists solely of bundle bone, and therefore, its loss will not only lead to a thinning out but to complete

resorption of the labial bone. Initially, the preservation of roots was propagated for alveolar bone preservation in the context of treatment solutions with complete dentures¹. In many cases, it has been used as a successful measure to maintain the denture supporting tissue. Recently root submergence has also been used as a method to preserve the alveolar ridge in pontic sites under fixed partial dentures (Salama et al. 2007). The principle of root retention is maintenance of the periodontal attachments, thereby ultimately maintaining the bone.²

A technique called “socket shield” that makes use of the above principle has been made up to keep the periodontium in the marginal area on the buccal or labial side of the implant by partial root retention (Hurzel et al. 2010). The previous clinical and preclinical studies have well documented the

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histological and volumetric stability of the labial periodontal structures using the Socket Shield concept. The results of these studies have shown good evidence on the clinical applications of the Socket Shield technique. Based on these positive first results, the next step was now to (i) Gain more insights regarding the safety of the socket shield technique regarding biological implant-related long-term complications and observe the clinical appearance of the peri-implant soft and hard tissues. (ii) Evaluate the resulting esthetic outcomes.³

So the present case report points to prove the esthetic and mechanical advantage of socket shield in preserving the labial bone architecture during anterior implant placement as well as the clinical performance after long term follow up.

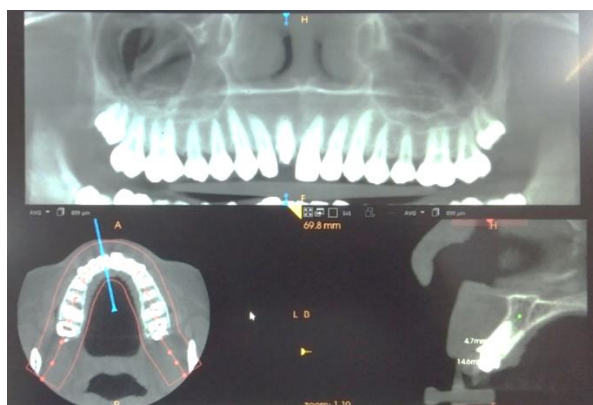


Fig 1: Radiograph showing the thin labial cortical plate over # 11.

CASE REPORT

The patient was a 19-year-old female who came to the dental hospital looking for possible treatment options for her fractured central incisor (owing to trauma one year back). Her past dental history included a root canal treatment done in relation to the fractured central incisor seven months back, which has failed and with no relevant medical history. Clinical examination showed en-masse fracture of the tooth & root canal treated tooth with healthy gingival and periodontal tissue; i.e., the tooth was fractured post endodontic restoration.

After proper clinical & radiographic examination, an implant-retained crown was planned in relation to 11. (Fig;1,2). According to the CBCT finding, a 3.3-mm diameter and 13-mm length of the implant was

selected for the placement to get proper primary stability. While examining, the CBCT showed the presence of a thin cortical plate labially, which had greater chances of getting fractured during the extraction, and therefore "The Socket Shield Procedure" was planned to preserve this labial fragment of the tooth.



Fig 2a: Frontal View.



Fig 2b: Right lateral view.



Fig 2c: Left lateral view.



Fig 2d: Maxillary view.



Fig 2e: Mandibular view.

Fig 2: Clinical preoperative photographs.

PROCEDURE

- 1) Preoperative medication was given i.e., antibiotic Amoxicillin 500mg (Cap Camox) and Diclofenac prolonged release 100mg (Tab Voveran SR) 1 hour before surgery and mouth rinsing with 0.12% chlorhexidine (Clohex).
- 2) The area to be treated was anaesthetized by giving infiltration with Lignocaine and Adrenaline IP (2% Lignox).
- 3) Tooth 11 was decoronated till the crest of the bone with a round coarse-grained diamond bur, and a straight diamond bur was used to remove the gutta-percha cones from the root (Fig;3a and 3b).
- 4) Sectioning of the root was done till apical two-third with the help of tapered diamond bur mesiodistally in parallel to the long axis of tooth direction (Fig; 4). The direction of the bur was changed to an oblique direction toward the buccal surface to detach the labial fragment from the palatal surface.



Fig 3a: Removing gutta-percha from the canal.



Fig 3b: Clear canal space.

5) The palatal portion was extracted atraumatically with the help of tweezers or forceps (Fig;5) and the remaining buccal fragment was trimmed by leaving only 1.5-2 mm as a shield. The osteotomy was started with an initial drill to form a ditch, and then the sequence of the pilot drill, 2.8-mm drill, and 3.2-mm drill was used to enlarge or prepare the osteotomy site.



Fig 4: Mesiodistal sectioning of the root.



Fig 5: Extracted palatal portion.

6) The 3.3 * 13.0 mm (Argon K3proTM Rapid, Germany) implant was placed. The primary stability of 35 N-cm was achieved with torque wrench, followed by the placement of cover screw. (Fig; 6 a,b,c).

7) The flap closure was done using 3-0 silk suture with simple interrupted suturing technique ensuring proper approximation of the flaps, and simple interrupted suturing was done achieving hemostasis.



Fig 6a: K3pro™ implant in the Socket.



Fig 6b: Cover screw in place.



Fig 6c: Radiograph showing implant placement.

8) Postoperative antibiotics (Cap Camox 500mg and Tab Zerodol P 425mg) were prescribed, and the instructions were given.

9) The patient was recalled after one 1week for suture removal. The edentulous area was temporarily restored with essix retainers (Fig:7).



Fig 7: Temporary essix retainer.

10) After 3 months, second stage surgery was done.

11) The area was anaesthetized, and a full-thickness flap was reflected, the cover screw was replaced with gingival former (Fig; 8 a,b), and the patient was recalled after 10days. A pickup type of impression technique was made using the abutment and plastic pickup coping in place (Fig; 9).



Fig 8a: Second stage surgery.



Fig 8b: Radiograph showing gingival former.



Fig 9: Impression with transfer coping.



Fig 10: Postoperative clinical photographs and radiograph.

DISCUSSION

There are only a few case reports that show variable data regarding bone loss. One of the various methods used in order to avoid bone loss is the so-called "Socket-Shield Technique".

In a retrospective study conducted by Dr Marc Hürzler and Dr Otto Zuhr, where the socket shield technique was used for immediate implant placement where the clinical, radiographic and volumetric data was evaluated after 5 years, comparison of the results gained before and after immediate implant placement by socket shield technique. The results showed that peri-implant probing revealed healthy conditions. The comparison of radiographic images showed physiologic bone remodelling at the implant shoulders. Mean tissue loss on the facial side in oro-facial direction was -0.21 ± 0.18 mm. The average recession at implants was -0.33 ± 0.23 mm, and at neighbouring teeth, -0.38 ± 0.27 mm. Mean loss of the marginal bone level at the implant shoulder amounted to 0.33 ± 0.43 mm at the mesial and 0.17 ± 0.36 mm at the distal aspect of the implants. A mean pink esthetic score of 10 was recorded (according to PES by ICAI. A score of 10 means the complete presence of mesial and distal papilla, and no discrepancy of curvature and level of facial mucosa & no discrepancy of root convexity/soft tissue colour and texture). Volumetric analysis showed a low degree of contour changes from extraction and implant placement to the follow-ups.

Mucosal recession at the implant restoration was comparable to that of the neighbouring teeth. The result from the clinical assessment of aesthetics showed the predominant natural appearance of socket-shield treated teeth. This study, therefore,

concluded that the socket shield technique offers reduced invasiveness at the time of surgery and high esthetic outcomes with effective preservation of facial tissue contours. This technique should be used in routine clinical practice after higher-level evidence in the form of prospective clinical trials is available.⁴ The need for further clinical trials was highly demanded in the conclusion of this study. Therefore the anterior esthetic zone in the present case report has employed socket shield technique in regard to its esthetical superiority as concluded by the literature & also as a means of additional clinical support to the socket shield procedure.

In another prospective study conducted by Abadzhev et al, a comparison was made between the conventional implant placement and implant placement using the socket shield method, in which 25 patients with 26 implants both placed in esthetic (anterior maxilla) region, one in the conventional method and other implant using socket shield technique. The result from the radiological examination immediately after implantation and every 6 months during the next 2 years show a considerable bone loss in conventional implantation of up to 12% in the first two years, which is equal to up to 5mm. Contrary to this, in socket-shield technique during 2 years follow up bone loss is 2% which is equal to 0.8mm. The socket shield technique offers reduced invasiveness at the time of surgery and high esthetic outcomes with effective preservation of facial tissue contours.⁵ To enhance the esthetics as well as to prevent bone loss, this technique was employed for the present case. The anterior region is always in demand for esthetics, and employing this socket shield technique in the present case can thus be justified.

Gharpure et al.'s review on the Socket shield has concluded that the Socket is used as a guide for the determination of parallelism and alignment of the implant to be placed. It reduces the treatment time and facilitates the position of the final restoration, and minimizes the need for severely angled abutments⁶. It can therefore be said that the initial or natural position of the existing tooth can be incorporated into the implant and its prosthetics unless the tooth is severely tilted. This intern offers a superior advantage and ease of determining the position of the implant to be placed as the socket guides the placement.

A study performed in beagle dogs by Hurzler et al., which has retained the buccal fragment of the tooth confirms that buccal root retention in conjunction with immediate implant placement is able to achieve osseointegration without any inflammatory or resorptional response.⁷ Therefore, in support to this statement, in the present study, the labial fragment of the tooth was left intact and immediate implant was placed. As it is clearly evident in the follow-up radiographs that there was proper osseointegration achieved with no inflammatory or resorptional response.

In a case report by Payal Rajendhar et al., it is notified that the Socket shield technique is gaining popularity among clinicians across the world. The technique is very promising for the preservation of hard and soft tissues in cases of post-extraction immediate implant placement. There is a proposed classification in article⁵ that will enable the clinicians to design the shield according to the clinical scenario and to achieve the best possible esthetics even in immediate implant cases⁸.

Fickl Stefan et al. evaluated the peri-implant bone level with platform switched abutments and concluded that the socket shield treatment modalities have the advantage of ultimate esthetic outcome imitating the natural emergence profile, preserving the soft and hard tissue volume, lack of bone loss, additional material cost, no co-morbidity, single surgery, applicable in sites with endodontic apical pathology⁹. In the present case, as there was no periapical pathology (RC treated twice), this single surgery of immediate placement has not only given a good esthetic profile, and osseointegration achieved but also improved patient satisfaction.

Chen C et al., in their case report publication using socket shield technique, has concluded that this technique not only helps preserve the labial bone but also prevents bone resorptions post-extraction. The buccal shield gives an outline as to placing the implants rightly. Any damage that is seen by other techniques such as tissue alteration, fibrous tissue formations etc., can be avoided at its best. An absolute integration of bones is possible to achieve. Additionally, it is cost-effective and least invasive. The tools required as optimum, and lastly, it gives a very aesthetic outcome¹⁰.

Gluckmann et al. has concluded that the Socket shield technique offers a promising solution to the difficulties encountered when managing the post-extraction tissues. At present, the technique is highly promising and holds significant potential for the field of aesthetic and restorative implant dentistry¹¹. The demand for esthetics is always on the high. Therefore restoring the natural esthetics becomes easy with the use of the socket shield technique which already directs the angulation of the implant to be placed and also achieves conservation of the architecture of the labial bone, which again contributes to esthetics and health.

Baumer et al. in his pilot study on first histological, clinical and volumetric observations using socket shield technique, has suggested that; Within the limitations of an animal pilot study, the case reports indicate that socket shield may also be used without severe adverse events and that the aspired effect of labial bone maintenance might also be achieved in human tissues.¹² This labial bone maintenance was proved in the present case study where there was proper preservation of the labial plate as well as appreciable bone formation dictating a good prognosis of the implant.

Therefore, it may be speculated that there are many chances for this technique in having the potential to avoid the marked resorption of the buccal bone plate after the tooth extraction.

CONCLUSION

The technique is very promising for the preservation of hard and soft tissues in cases of immediate implant placement, especially in the region of the anterior maxilla. It can be used in routine clinical practice only after higher-level evidence in the form of prospective clinical trials is available.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. P. Rajendra Kumar, U. Kher. Socket the shield: Procedure, Case report & classification. J Indian Soc Periodontal. 2018; 22(3): 266 – 272.

2. Choi. S, Yeo, I-S, Kim, S.H., Lee, J.B., Cheong, C.W, & Han, J.S. A root submergence technique for pontic site development in fixed dental prostheses in the maxillary anterior esthetic zone. *J Periodontal Implant Sci.* 2015; 45(4): 152 – 155.
3. Bäumer D, Zuhr O, Rebele S, & Hürzeler M. Socket Shield Technique for immediate implant placement - clinical, radiographic and volumetric data after 5 years. *Clinical Oral Implants Research.* 2017; 28(11): 1450 – 1458.
4. D.Bäumer, O.Zuhr, S.Rebele and M.Hürzeler, Socket shield technique for immediate implant placement - clinical, radiographic and volumetric data after 5 years,” *Clinical Oral Implants Research.* 2017; 28(11): 1450 – 1458.
5. M. Abadzhiev, P. Nenkov, and P. Velcheva, “Conventional immediate implant placement and immediate placement with socket-shield technique – which is better,” *International Journal of Clinical Medicine Research.* 2014; 1(5): 176 – 180.
6. Gharpure AS, Bhatavadekar NB. Current evidence on socket shield technique. A systematic review. *J Oral Implantology.* Oct 2017; 43(5): 395 – 403.
7. Hurzeler MB, Zuhr O, Schupbach P, Rebele SF, Emmanouilidis N, Fickl S. The socket-shield technique: a proof-of-principle report. *Journal of Clinical Periodontology;* 2010; 37: 855 – 862.
8. Payal Rajendhar Kumar, Udatta Kher. Shield the Socket:Procedure, Case report and classification. *J Indian Soc Periodontol,* May – June 2018; 22(3): 266 – 272.
9. Fickl Stefan, Zuhr Otto, Jamal M Sten, Markus B Hurzeler.Peri-implant bone level around implants with platform-switched abutments. *Int J Oral Maxillofac Implants.* 2010; 25: 577-581.
10. Chen C L, Pan Y H. Shield Technique for Ridge Preservation:A Case Report.*J.Prosthodont,Implantology;* 2013; 2(2):6-21
11. Gluckman H, Du Toit J, Salama M. The socketshield technique to support the buccofacial tissues at immediate implant placement. *International dentistry -African edition.* 2015;5(3).
12. D. Bäumer, O. Zuhr, S. Rebele, D. Schneider, P. Schupbach, and M. Hürzeler, “The socket-shield technique: first histological, clinical, and volumetrical observations after separation of the buccal tooth segment – a pilot study,” *Clinical Implant Dentistry and Related Research,* vol. 17, no. 1, pp. 71–82, 2015.