SOCKET SHIELD TECHNIQUE

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ABSTRACT
It is fairly common to remove a severely compromised tooth and provide rehabilitation by means of an implant. Resorption of alveolar bone subsequent to extraction resulting in loss of bone height and width is an untoward sequelae posing difficulty in implant placement. Some procedures have been advocated to achieve the required bone height and width, such as guided bone regeneration socket preservation by means of various graft materials and barrier membranes. The disadvantages of these techniques are some amount of ridge height loss and loss of buccal/facial, ridge contour. The socket shield technique is a new method where a buccal segment of root is retained as a shield which aids in retaining periodontal ligament on buccofacial aspect. The implant is placed (immediate placement) lingual to this shield. This helps in maintenance of alveolar ridge height and buccofacial contour thus providing superior esthetics. The present case report shows placement of an implant in upper anterior region using this technique.

KEYWORDS: Dental implant, Socket shielding, Alveolar bone

INTRODUCTION - Healing of extraction socket is characterized by bone formation within the socket and loss of the alveolar ridge width and height externally.1 In esthetic region, height & thickness of facial and interproximal bone walls are important for successful pink esthetic outcomes; marked by the color, shape, character of the marginal peri-implant mucosa, and the presence of interdental papilla.2 Ridge recession and collapse create unfavourable aesthetics in anterior maxilla. Compromised aesthetics may be masked by thick gingival biotype and a low lip-line. Risk for an aesthetic failure is far greater in patients with high lip-lines, very thin gingival biotype, multiple missing teeth, with extensive tissue deficit.3 Techniques such as immediate implant placement and ridge preservation procedures proposed to maintain the ridge dimension of extraction sockets could not completely preserve the coronal part of facial bone walls which were comprised almost entirely of bundle bone.

The principle of socket-shield (SS) technique is

1. Preparation of the root of a tooth indicated for extraction in such manner that the buccal / facial root section remains in-situ with its physiologic relation to the buccal plate intact.
2. The tooth root section’s periodontal attachment apparatus (periodontal ligament (PDL), attachment fibers, vascularization, root cementum, bundle bone, alveolar bone) remain vital and undamaged to prevents the expected post-extraction socket remodeling and to support the buccal / facial tissues.
3. The prepared tooth root section acts as a socket-shield and prevents the recession of tissues buccofacial to an immediately placed implant.
In 2010, Hürzeler et al. introduced the socket shield technique, in which a partial root fragment was retained around an immediately placed implant with the aim of avoiding tissue alterations after tooth extraction. Healthy periodontal ligament (tooth segment), minor volumetric change of the ridge contour, direct bone-to-implant contact makes this technique a feasible treatment option.\

**CASE REPORT**

A 30 year old male patient reported to the Department of Prosthodontics, Rama Dental College, Kanpur with the chief complaint of broken front tooth.

On intra-oral examination, it was observed that there was a fractured upper right lateral incisor (Figure :1) at cervical portion of the tooth which was previously endodontically treated. Clinical examination showed mild periodontitis with grade 1 calculus and stains. Several fixed partial restorations were observed. Periapical radiograph of the fractured lateral incisor showed incomplete obturation, ledge formation and root caries. Treatment options were discussed subsequently and implant-supported single crown was the choice for replacing the failing lateral incisor.

**CLINICAL PROCEDURE**

The root of the fractured tooth was sectioned into facial and palatal halves (Figure 3) followed by conservative extraction of the palatal root fragment using periotome and forceps (figure 4) leaving the buccal root segment intact (Figure 5). The remaining buccal root section was then reduced coronally to 1 mm above the alveolar crest, and thinned slightly to a concave contour by careful application in an apico-coronal and mesio-distal direction with a long shanked round diamond bur (Figure: 6).

An osteotomy was then sequentially prepared and a previously selected implant was inserted palatal to the socket shield. The apico-coronal position of the implant platform was situated 1 mm apical to the palatal marginal gingival. The gap between the shield and implant surface was left to enable blood clot formation.

**REVIEW OF LITERATURE**

Araújo and Lindhe in 2005, suggested that following tooth extraction, the blood vessels in periodontium to the thin bone walls are severed, thereby causing facial bone plate resorption. Thus it can be assumed that retaining a root may alter the occurrence of facial bone resorption.\

Salama et al. in 2007, recommended a root submergence technique in which a natural tooth root was maintained and the surrounding tissue could be preserved at the pontic site.

Davarpanah & Szmukler-Moncler in 2009, reported a series of five cases in which the implant osteotomy preparation and placement were through the ankylosed roots. The root fragments were deliberately left and did not seem to interfere with implant integration in the mid-term.

Joseph & Kitichai in 2013, reported an alternative approach in a case utilizing a retained proximal root fragment to maintain the inter-implant papilla.

Bäumer et al. in 2013 conducted a pilot study which concentrated on the histological, clinical, and volumetrical observation of the alveolar ridge and implant after applying this technique. Healthy periodontal ligament of the tooth segment, minor volumetric change of the ridge contour, and direct bone-to-implant contact manifested that this technique is a feasible treatment option.

**CONCLUSION**

This case report confirmed that retaining a root fragment adjacent to the buccal crestal bone and placing an implant engaged to the palatal socket wall immediately after extraction are able to maintain the contour of the ridge. The implant can achieve osseointegration without any inflammation at peri-implant tissue. While histological examination is needed to verify the preservation of buccal bone plate and tissue regenerated between the shield and implant, the clinical outcome demonstrated the potential of socket shield technique to avoid noticeable alteration of ridge shape after tooth extraction.
Figure 1 - Fractured right lateral incisor

Figure 2 - Periapical view of maxillary right lateral incisor

Figure 3 - Longitudinally sectioned root of tooth #12

Figure 4 - Extracted palatal root segment

Figure 5 - Remaining buccal root section

Figure 6 - Prepared buccal root segment with orientation drill in the socket

REFERENCES


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