Socket preservation in the daily practice: A clinical case report

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Soft tissue contour depends on the underlying bone anatomy, following tooth extraction, sockets undergo a remodeling process that influences the implant rehabilitation treatment of the edentulous areas. Socket preservation procedure following tooth extraction will reduce the need for any further ridge augmentation technique prior to implant placement and will conserve the existing bone. The aim is to preserve the original bone dimensional contours by limiting the normal post extraction resorptive process.

The overall goal of this article is to provide the dental professional with valid tools in order to help them make a conscious decision considering the indications of this therapy and dependent on each clinical case.

Keywords: Extraction, socket preservation, implant, resorption process.

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Nowadays the outcome of implant surgery is measured by the long-term esthetic and functional success and not by the survival rate. A correlation exists between the hard and soft tissues in order to assure esthetic outcomes in implant surgery. Significant changes in bone volume and morphology following tooth extraction, can make implant rehabilitation very difficult, as the time from extraction to implant placement increases.

Bone substitute in alveolar ridge preservation and prevention of additional bone grafting is highly supported and has a wide range of advantages. The socket preservation technique allows the placement of implants in sites that was considered compromised in the past. Following the conservative extraction (Figure 1,2), a bone filler is placed in the empty socket with a cross or non-cross linked membrane (Figure 3) and closed partially(Figure 4) or totally by a flap or by a forceps technique (Figure 9), the extraction socket is grafted with an osteoconductive bone graft (Figure 10, 11). A resorbable collagen membrane was placed on the buccal aspect of the extraction socket and sutured to the palatal flap to attempt a primary closure, with an exposed membrane left on the occlusal aspect of the extraction socket.

A Temporary bridge was placed to guide the healing process and conserve the esthetic in the anterior region (Figure 12). After six months surgical re-entry during implant placement showed a good bony healing, that allowed the placement of a regular platform implant within the bone envelope (Figure 13), and achieved a good primary stability that allowed the placement of single piece, direct-to-fixture provisionally screw-retained restoration on site 21 in order to guide the healing process (Figure 14,15,16).

A period of three months elapsed to permit osseointegration, afterwards the patient present for final impression (Figure 17,18), it was noted that the long axis of the implant correlated to the central fossa of the expected final restoration (Figure 19). The final restoration showed an ideal esthetic restoration with healthy surrounding soft tissues.

Clinical Case: A 49-year-old female with a noncontributory medical history, presented to our clinic with a mobile tooth 21 and an apical resorption, the chief complaint was pressure in the upper anterior left area of the central incisor. Clinical examination showed tooth 21 mobile with gray coloration. Periapical radiograph examination revealed an apical resorption with an incomplete endodontic treatment (Figure 8). The tooth was deemed hopeless and referred for extraction with socket preservation for future dental implant placement. After tooth was carefully removed with forceps technique (Figure 9), the extraction site was grafted with an osteoconductive bone graft (Figure 10, 11). A resorbable collagen membrane was placed on the buccal aspect of the extraction socket and sutured to the palatal flap to attempt a primary closure, with an exposed membrane left on the occlusal aspect of the extraction socket.

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Discussion: The failure to preserving the anatomy of hard and soft tissues will result in esthetic failures and compromises the final results. Araujo mentioned in a paper published in 2009, the use of xenograft in socket preservation techniques will delay the socket healing but will help at the same time to conserve the anatomy. Xenograft are considered the most used bone fillers in the socket preservation procedures due to their osteoconductive matrix framework which enhances the growth of new bone around it, as their name suggests. Following tooth extraction the buccal bone plate will undergo some modifications due to bone remodeling. In order to reduce the bone loss, several surgical techniques have been proposed. Nowadays it is still possible to minimize osseous deformities problems by carrying out the ridge preservation techniques in extraction sockets and using bone fillers materials with barrier membranes. Today the advanced wide range of bone grafting materials and collagen membranes guides us into taking in charge many compromised cases.

It was noted that the resorption of bone ridge is faster during the first six months following extraction, therefore a conservative approach remains necessary. Many measures should be taken into consideration when conducting the socket preservation surgery such as: reducing the extraction trauma and limiting the flap elevation. It was found histologically that bone formation occurs over the surface of the implanted osteoconductive graft fillers. This article goes through the technical basis for socket preservation procedure and exposes its importance as an available treatment in order to prevent ridge atrophy and optimize esthetics in the anterior maxillary area.

Figure 1: Preoperative situation, note the unaligned incisive edge of tooth 21 with the grey cervical lining. Figure 2: Clinical view showing a complete horizontal fracture of the crown of tooth 21. Figure 3: After conservative extraction of tooth 21, collagen membrane is placed inside the bony envelope. Note the intact socket bone walls.

Figure 4: Xenograft (Bio os®) is placed inside the socket and covered by a collagen membrane sutured to the palatal flap and intentionally left exposed so as not to create a mucosal defect from flap advancement.

Figure 5: Temporary Maryland Bridge in place to guide the healing process of socket 21. Figure 6: Three weeks postoperatively.
The rate of residual ridge resorption is related to the time extended since the tooth was removed.

Many factors such as trauma can cause loss of alveolar bone, since many extractions are done with no regard for maintaining the alveolar bone volume. With time bone resorption will evolve up to 2 mm in vertical and 4 mm in horizontal directions in the first year following the extraction. An article published by Araujo in 2006, showed bone resorption following tooth extraction. The journal of Prosthodontics 1967;17(1):21-27.

It is demonstrated that flap elevation will disturb the thin cellular layer of cells in peristomeum which causes more resorption than conservative flapless technique, this is why it is recommended in socket preservation surgeries in order to enhance healing and lower or stabilize bone resorption. On the other hand bone fillers may interfere with the earliest stages of alveolar bone healing and it may need several years to be absorbed, still it can lack resorption.

It was found that implants placed into grafted sockets expressed a clinical performance similar to implants placed into non-grafted sites in terms of survival and marginal bone loss. On the other hand, grafted sites made the placement of larger implants easier and did not required augmen-
tation procedures compared to naturally healed sites.

Another article published by Araujo in 2009, demonstrated that the placement of a biomaterial in an extraction socket will enhance bone remodeling and compensate the marginal ridge resorption.

As shown in the clinical case, the socket preservation technique led to an esthetic success for several reasons, the absence of gray hue in the free gingiva with the preser-
vation of the interproximal bone between tooth 11 and implant 21. The dimension of the preserved bone lead us to place a narrow neck implant in ideal position, the resulting occlusal forces did not cause any overload and conserved an excellent prog-
nosis. It was noted that ridge resorption in the mandible is more than the maxilla. Today commonly used method for ridge preservation procedure is a bone graft ma-
terial placed in the extraction socket and covered by a cross or non-cross linked membrane followed by complete or partial flap closure. The decision to use socket preservation technique should be made on a case-by-case basis. Surgeons should fa-
miliarize with the wide array of techniques and materials used in order to optimize and preserve the anatomy of bone and soft tissues. The following article offers informations that can help clinicians to imple-
ment the socket preservation technique in their daily practice. In conclusion the socket pre-
servation technique seems to show important results concerning bone volume conservation and favorable architecture of the alveolar ridge in order to obtain ideal functional and esthetic prosthesis after im-
plant rehabilitation.

References:
- Araujo M, Linder E. Effect of a xenograft on ear-
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- Zhang X, Bluhm M, Schallhorn S. Analysis of the socket bone wall di-
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Conclusion:

Loss of teeth due to caries or traumas, often result in hard and soft tissue collapse, therefore the preservation of bone vol-
ume is of major importance in order to in-
sure the proper implant and esthetic reha-
bilitations. In order to insure the success of implant therapies, a sufficient volume of healthy bone at recipient site at the time of implant placement is mandatory. Today the commonly used method for ridge preservation procedure is a bone graft ma-
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Figure 8: Periapical radiograph showing the mesial apex of tooth 21. Figure 9: Clinical view after extraction of tooth 21, note the resorbed apex.

Figure 10: Intraoral view of the socket of tooth 21 after been filled with porous bovine bone minerals.

Figure 11 and a single piece, direct-to-fixture provisional screw-retained restoration on site 21 to guide the healing process.

Figure 12: Temporary crowns placed on tooth 11 and a single piece, direct-to-fixture provisional screw-retained restoration on site 21 to guide the healing process.

Figure 13: Clinical presentation of the final esthetic result withFig. 12

Figure 14: Temporary crowns placed on tooth 11 and a single piece, direct-to-fixture provisional screw-retained restoration on site 21 to guide the healing process.

Figure 15: Clinical view showing the healthy soft tissue surrounding the temporary crowns.

Figure 16: Ideal histotype of the surrounding soft tissue ready for impres-
sion. Figure 17, 18: Impression on the head of the implant simulating the surrounding soft tissues. Figure 19: Clinical presentation of the final esthetic result with the healthy surrounding soft tissues. The clinical crowns conserved the gingival architecture and met the patient's esthetic demands.