Socket Preservation by Bone Grafting

Position Statement

Introduction and Background

Routine bone grafting of alveolar sockets after the extraction of teeth has been a controversial subject which relates to a multitude of factors recently reported in the literature. Prior to the introduction of various bone grafting materials and membranes, the socket historically was allowed to heal by secondary intention. Healing by secondary intention is defined as a union by closure of a wound with granulations. This method of wound closure has been the main course of post operative management of the socket.

Bone grafting of extraction sockets has gained in popularity over the last decade as demand for reconstruction of the maxillary or mandibular alveolus has increased. There are several reasons suggested for socket preservation by bone grafting whether performed as an immediate or delayed procedure. Reasons include, but are not limited to, an improved esthetic appearance (especially of the anterior alveolar ridge), conservation/preservation of remaining alveolar bone for reconstruction, decrease in healing time with less post-operative complications and the ability to reconstruct the alveolus sooner by dental implant. However, it must be noted that there are few implant studies that specifically address implant longevity as an outcome measure with grafting vs. natural healing. As a result, bone quantity is used as a proxy measure for implant success. Additional rationale for the necessity of socket preservation may also include pathologic loss of alveolar bone such as occurs with an impacted tooth to eliminate a bony defect.

It has been well documented in the literature that subsequent to extraction of a tooth, the alveolus loses both bone volume and height. Dependent upon the dimensions of the extraction site and remaining alveolar walls, the majority of bone loss occurs in a horizontal and vertical dimension. Studies have shown that as much as 40% of alveolar height and 60% of alveolar width is lost within the first 6 months following extraction of a tooth. The alveolus appears to lose most volume from the buccal or labial aspects. Loss of ridge height creates prosthetic instability as the crest of the ridge approaches muscle attachments and mobile mucosa. This process becomes especially noticeable in the anterior region where labial resorption may leave an undesirable esthetic situation for tooth replacement whether by conventional means or by dental implant body placement. Many articles report the prevention of ridge resorption as predictable, convenient, and available at a reasonable cost.

There are many studies in the literature that investigate the efficacy of various bone graft materials used for socket preservation. In his paper “Extraction Site Reconstruction for Alveolar Ridge Preservation. Part 1: Rationale and Materials Selection”, Bartee states that non-resorbable materials have been reported as not suitable for use in sockets that will eventually later receive a dental implant body. The most frequently requested reconstructive procedure for replacement of a missing tooth is by dental implant body. Current thinking purports that adequate bone volume is imperative for the successful osseo-integration of the dental implant body. This is certainly a true statement when describing placement of a dental implant body within native bone where there is adequate bone adaptation to the dental implant body. However, it appears that when analyzing the success of osseo-integration as it relates to bone grafting materials, many research articles have not reported the extent of the apical portion of the implant body which is typically placed into native cortical bone that subsequently improves stability.

There has been no correlation in the literature that socket grafting materials (biomaterials or bone) improve or increase the longevity of successful placement of the dental implant body. One such paper, “Bone Formation Following Implantation of Bone Biomaterials Into Extraction Sites” by Liene et al. examined post operative healing of the socket using various biomaterials including measurement of the insertion torque during implant placement. According to the paper, “Because most extraction sockets were deeper than 1 cm, and the implants placed were 13 to 15 mm, the last third of the implant could be placed in native bone. The presence of native bone at the tip of the implant may affect the torque measurements during the last part of the implant insertion.” An additional conclusion would be that the stability and success of the dental implant is quite often the result of adequate placement into apical cortical bone as well as adequate adaptation of the socket walls.

Position Statement

The purpose of this position statement is not to examine or question the various types of grafting materials used in the extraction site for socket preservation, but rather to address the efficacy of the procedure itself as it relates to certain diagnoses and procedures. Additional bone graft procedures such as augmentation of the alveolar ridges (typically considered a major bone grafting technique) and sinus lift augmentation may be the subject of another position statement.

Certainly research demonstrates a positive benefit of socket grafting to preserve the structural integrity and volume of the dental alveolar ridge. For purposes of prosthetic reconstruction, (whether by conventional means or with dental implants), socket preservation may serve to improve the esthetic and functional outcomes under certain clinical circumstances especially in the anterior ridge where bone resorption is most noticeable. Research is limited related to grafting of socket defects where pathologic bone loss has been diagnosed as a result of an impacted tooth. However, where the defect is clinically significant and has the potential to adversely affect the remaining adjacent tooth/teeth, socket preservation may be an appropriate procedure.

As noted, there is no literature currently available that supports the assertion that socket preservation by bone graft improves the long term outcome of dental implant body placement. However, the literature does strongly support the socket preservation procedure for esthetic and dimensional maintenance of the alveolar ridge. The literature also makes the point that bone quality studies are not well documented and one cannot make the assumption that it is equal in both scenarios (i.e. bone grafted versus natural healing). It should
be noted that bone quality, quantity, and composition are important factors that influence implant longevity and therefore merit additional study.

The AADC Positions Committee therefore recognizes the value of socket preservation by bone graft for esthetic and dimensional maintenance of the alveolar ridge. However, it is important to note that current scientific evidence does not support routine use of the procedure. As such, the clinical indications and applications for socket preservation must be carefully evaluated on a case by case basis.

References

9. Statement by the American Association of Oral and Maxillofacial Surgeons Concerning the Management of Selected Clinical Conditions and Associated Clinical Procedures- Bone Grafting After Removal of Impacted Third Molars; March 2008

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