Socket Preservation Using a Small Particulate Xenograft: A Case Report

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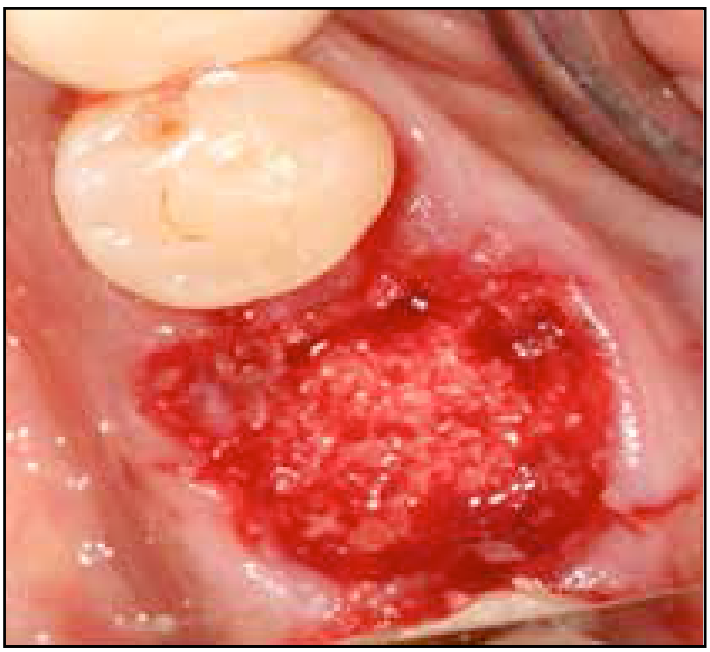
Abstract



Soon after tooth extraction a cascade of bone remodeling starts which result in bone resorption. Procedures such Socket Seal Surgery can be employed to preserve future implant site. There are various grafts which can used for the same purpose. The best method to observe a graft's healing is surgical re-entry and or histopathology. The aim of this Case Report is to document the use of Smartbone® xenograft for socket preservation. After 5 months of healing, histopathological core sampling revealed good osteoconduction of the graft.

KEY WORDS: Socket preservation, bone graft, xenograft

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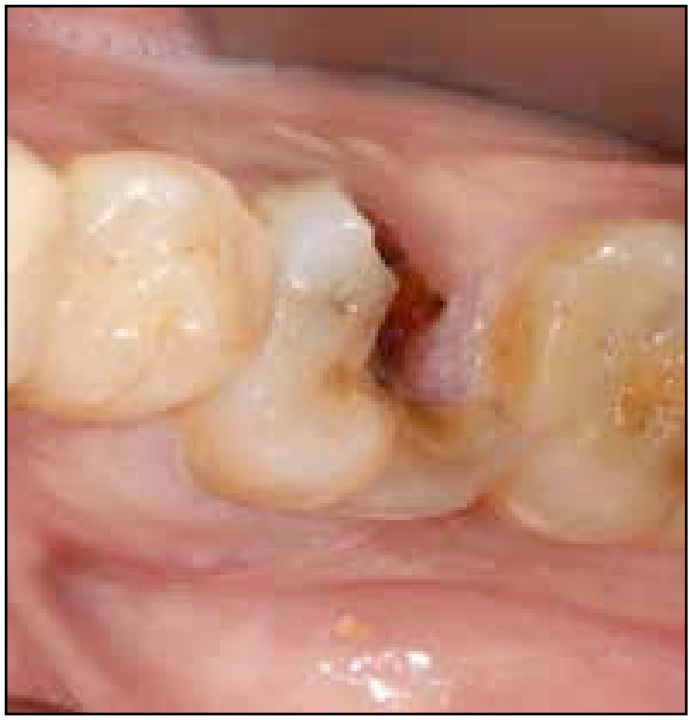

Figure 1: Intra oral view of non-restorable lower molar.

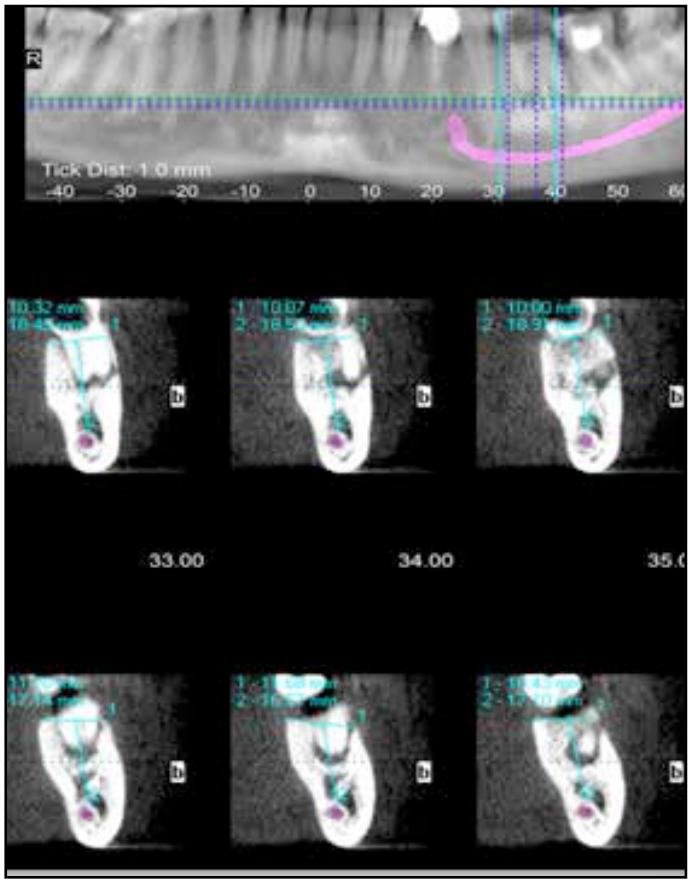

Figure 2: Denta scan of the grossly destructed lower molar.

INTRODUCTION

Implant treatment has become the prime requisite for missing tooth replacement, however good bone quality is paramount for its placement.[1] Soon after tooth extraction, bone resorption takes place and the bone loses bucco-palatal and mesio-distal dimensions required for implant placement.[2,3] If the tooth extraction is done in the posterior maxilla, the sinus may expand, leaving a thin bone height for implants where placement is only possible after sinus augmentation procedures. In such cases either immediate implant placement or socket seal surgery (SSS) can be done to protect bone's integrity for implant placement. SSS can be successfully employed for the preservation of the alveolar process after tooth extraction. The literature also confirms that early bone loss can be significantly reduced with socket grafting.[4,5] The advantage is that any graft material can be used for SSS, however only few of the materials have shown superior regeneration capability as compared to the others. Smartbone® bone substitute is one such graft material. It is a xenograft, which is based on technology which uses regenerative medicine to replace the damaged bone and then heal it.

METHOD AND MATERIALS

A 50 year old female reported to the dental office with non-restorable lower first molar. The patient was healthy and had no significant medical history. After a thorough check-up she

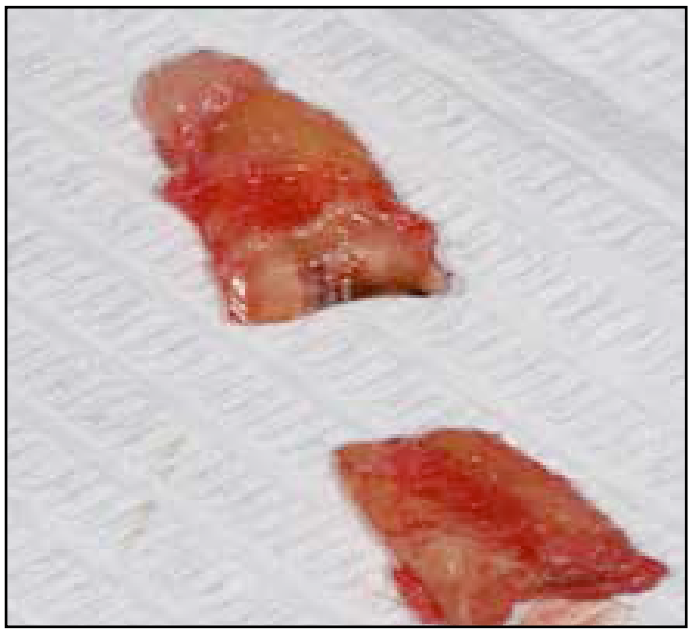

Figure 3: Extracted tooth.

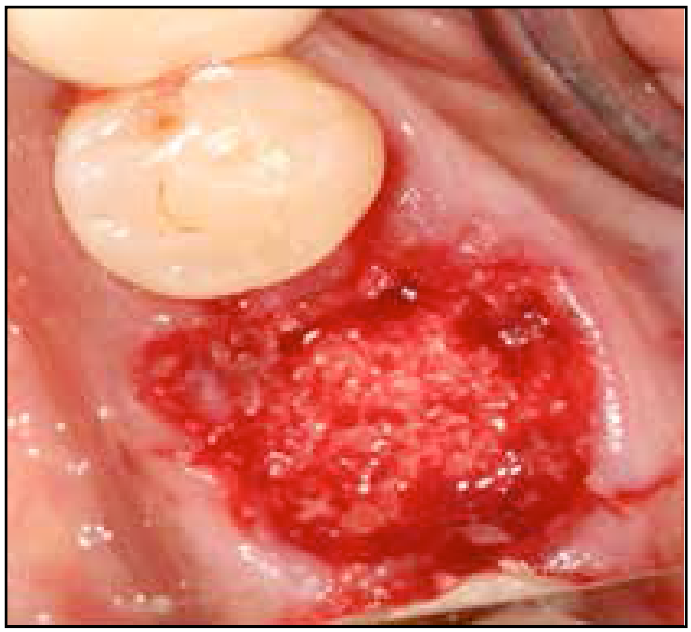

Figure 4: SSS with DBBM Smartbone.

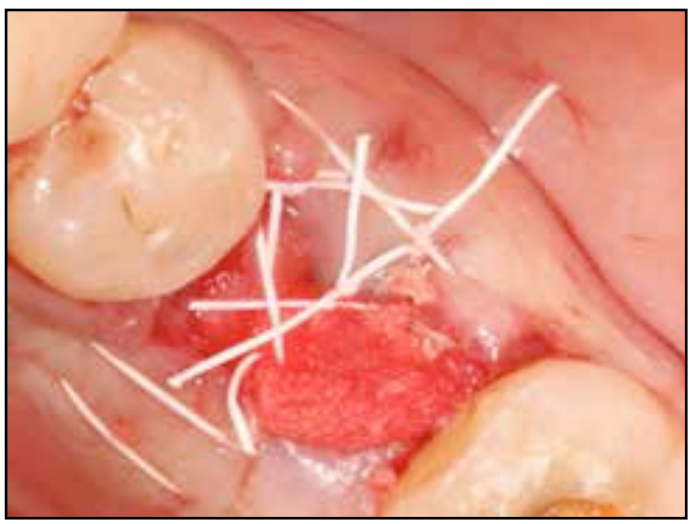

Figure 5: Socket closed with collagen plug and sutures.

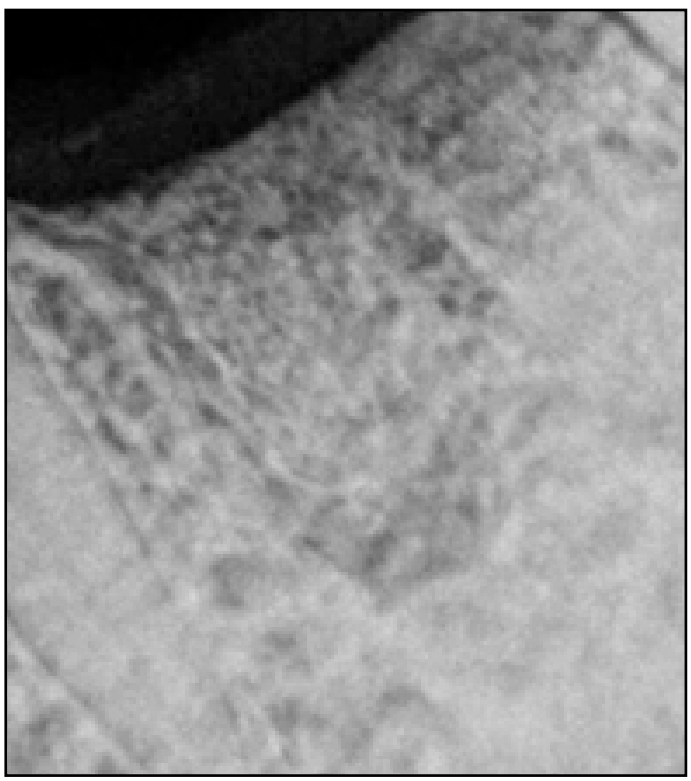

Figure 6: IOPA immediate post-op.

was advised a socket bone graft with delayed implant placement as the tooth was very wide and the periapical infection too deferred immediate implant placement (Figures 1and 2). Under the patient's consent, tooth was extracted as atraumatically as possible (Figure 3) and the socket was curettaged with a

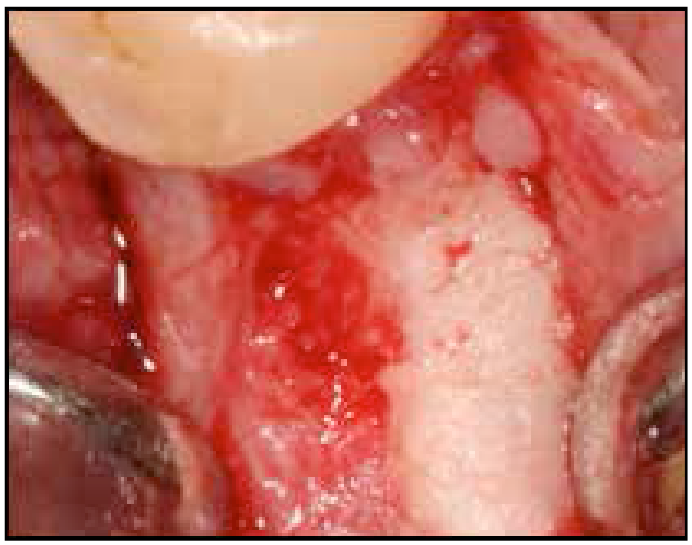

Figure 7: Well vascularised graft after 5 months.

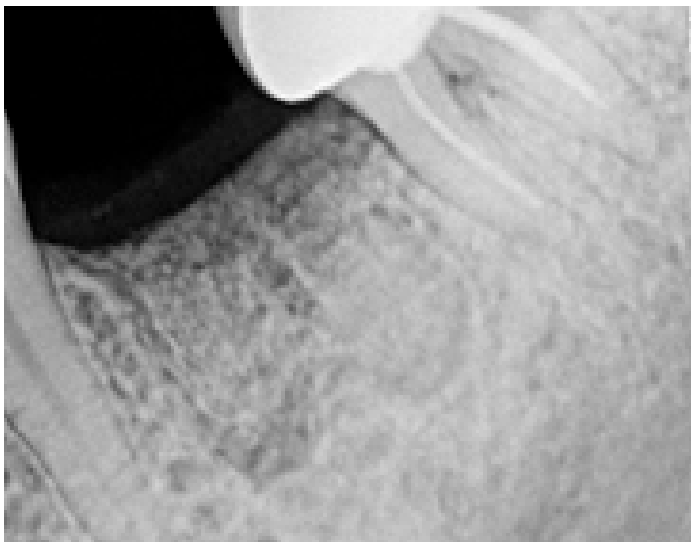

Figure 8: IOPA at 5 months.

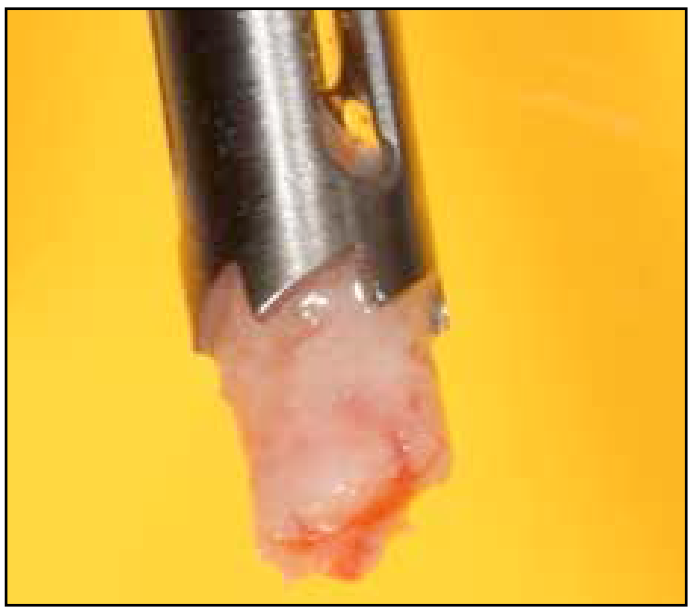

Figure 9: Bone sample taken with a Trephine for Histopathology.

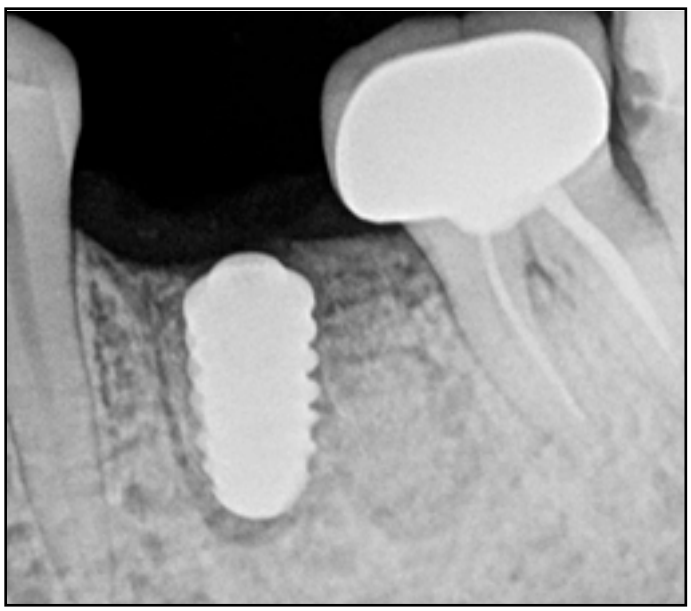

Figure 10: Four months post op implant IOPA.

Buck file (Hu Friedy, USA). Once the site was clean of infection, socket seal surgery was performed with small bone DBBM (Smartbone, Switzerland) (Figure 4). After complete fill of the socket was achieved, the grafted socket was closed with a resorbable Collagen Plug (RCP, Ace Surgicals, USA) and 3-0 cytoplast sutures (Ostegenics, USA) (Figures 5 and 6).

After 5 months of SSS, the site was re-entered to observe healing clinically and histologically. Clinically the graft was seen well vascularised and IOPA revealed a well inte-

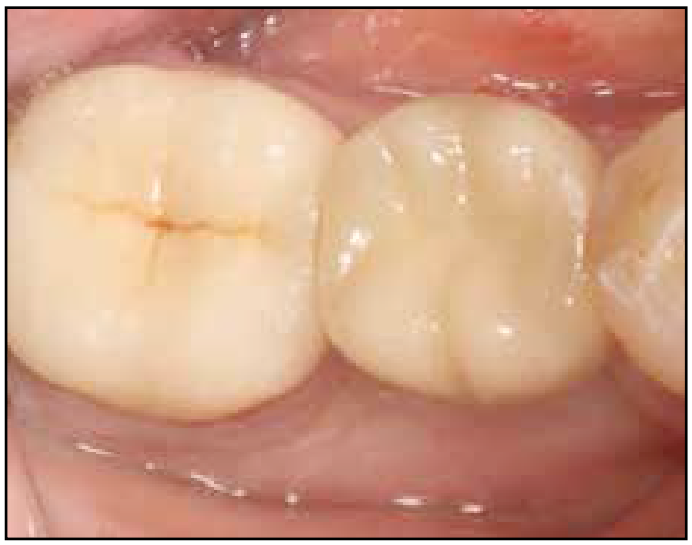

Figure 11: Final prosthesis.

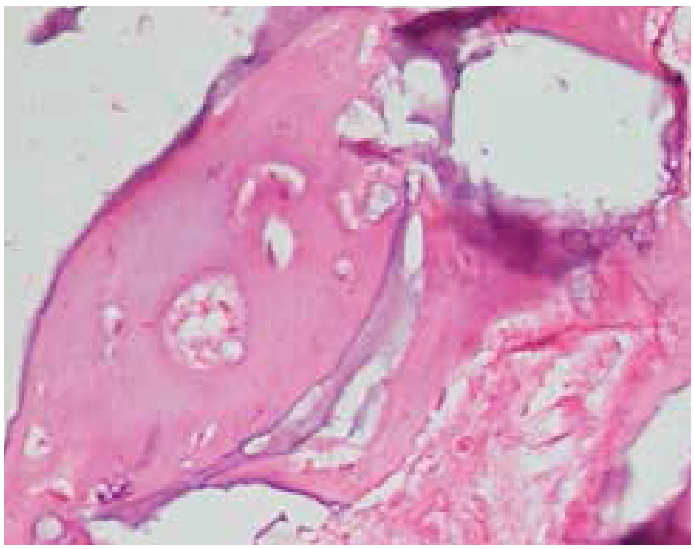

Figure 12: Histopathology of the site after 5 months.

grated graft with surrounding host bone (Figures 7 and 8). Bone sample for histopathology was taken with the help of a trephine of inner diameter 2.8 mm outer diameter 3mm (Koine, Italy) (Figure 9). The core was harvested from the centre of the site where the implant placement and future restoration was planned. At the same time after taking the bone sample, an implant 5/11.5 Top Dm (Bioner, Barcelona) was inserted at 50 Ncm (Figure 10). 4 month post-op implant placement healing has been uneventful (Figure 11).

RESULTS

The biopsied cores were studied histopathologically after decalcifying in mild decalcifying agent and processing it using routine procedures. 4 micron thick sections were taken and stained with Hematoxylin and eosin stain and observed under the research microscope for histopathological examination. The histopathological examination revealed areas of graft material progressively resulting in formation of new vital bone (Figure 12). There is coexistence of the graft material and newly formed bone. Growth lines were also seen indicating good osteoconduction. Osteoblasts are seen to be lining the bone along with presence of osteocytes within the bony lacunae indicating viable bone. The bone is seen to be in various stages of osteogenesis and presence mature surrounding connective tissue with good vascularity indicates good osteoconduction.

DISCUSSION

Socket preservation is a favorable treatment modality which enables the socket to heal without loss of bone and change in the ridge dimension. This helps in preserving the ridge, bony contours and soft tissues for implant placement.[1] Autogenous bone graft material is the material of choice when it come to bone grafting and still, in spite of various bone grafts, remains the gold standard. However, there are complications and disadvantages, out of which giving patient a second surgical site becomes cumbersome. Also for small purposes such as

socket seal surgery, giving patient a second surgical site is not the right choice of treatment. Thus, authors used Smartbone® which is a xenograft and is based on technology which uses regenerative medicine to replace the damaged bone and then heal it. Combination of a bovine bone matrix (basically cancellous bones), a biodegradable polymer and specific cell nutrients. Cell nutrients being used are immobilized biomolecules possessing the RGD-sequence (Arg-Gly-Asp), which promotes cell adhesion and hence formation of a new bone. To further prove these aforementioned results, surgical re entry was done. Out of all the methods available to evaluate regeneration, surgical re-entry into previously surgically treated site is the gold standard.[6] It provides the clinician with the advantage of directly viewing the healing. At the same time bone sample for histological examination was also obtained which is the most reliable method to evaluate the progress of regeneration[7]. These methods though remain gold standard have disadvantages also such as, time consuming, causes patient discomfort and have ethical issue. But for implant placement the site had to be reopened and implant bed had to be prepared, thus the bone core taken was from the portion where implant had to be placed. Histological examination showed growth lines indicating good osteoconduction. Osteoblasts were seen to be lining the bone along with presence of osteocytes within the bony lacunae indicating viable bone. The bone was observed to be in various stages of osteogenesis and presence mature surrounding connective tissue with good vascularity indicates good osteoconduction.

CONCLUSION

This case report demonstrates proof of principle that the Smartbone® bone graft is a viable choice for bone grafting purposes. Histologically, this graft appears to heal in a manner that facilitates the placement of dental implants.

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Disclosure
The authors report no conflicts of interest with anything mentioned in this article.

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