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Case Report

SOCKET PRESERVATION AND DELAYED IMPLANT PLACEMENT IN THE POSTERIOR MAXILLA

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ABSTRACT

This report describes the rehabilitation of an upper molar with socket preservation and delayed implant placement. A 62-year-old man with a 2.6 cracked tooth was treated with alveolar ridge preservation (ARP), and after 4 months, a single implant was positioned to restore function and aesthetics. The ARP was performed with xenograft bone substitute material and a collagenic membrane. The implant was positioned with an insertion torque of 30 Ncm and restored with a metal-ceramic single crown after 3 months. At 1 year of follow-up, marginal bone levels were acceptable, and the patient had function restored. ARP is a valid treatment option when post-extractive implant placement could be difficult. Several factors may influence the socket anatomy, adversely affecting primary implant stability. ARP requires a two-stage surgery approach to rehabilitate missing teeth with dental implants.

KEYWORDS: *socket, bone, fixture, regeneration*

INTRODUCTION

Dental implants are widely used to rehabilitate missing teeth, from single-tooth replacement to complete arch rehabilitation (1, 2). Different causes can lead to teeth extraction, such as periodontal disease, trauma, periapical lesions, or other pathological scenarios (3). Once the tooth has been extracted, the alveolar socket undergoes a remodelling process that ends with bone resorption (4). A study by Van der Weijden reported that alveolar socket reduction is approximately 3.87 mm in width and 1.67 mm in height in the first 3 months of healing (5). Moreover, the primary roots are often covered by a thin layer of buccal bone that can be damaged during the extraction, resulting in a horizontal defect that must be corrected before or during the implant placement. In these terms, the post-extractive sockets' alveolar ridge preservation (ARP) during extraction plays a crucial role in achieving optimal implant placement and stability during years (6, 7). In recent years, bone regeneration has been widely investigated, and using bone substitute material (BSM) instead of bone block led to more predictable and valuable techniques that clinicians can use (8). BSM is a scaffold for new bone cells

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resulting from blood clot stabilization. BSM can be divided into 4 groups: autograft (from the same patient), allograft (from the same species), xenograft (from another species) and alloplastic (synthetic material). In addition, barrier membranes can be used to avoid epithelium cell repopulation and to give bone cells time and space to grow and form new bone (9). This report describes the rehabilitation of an upper molar with socket preservation and delayed implant placement.

CASE REPORT

A 62-year-old man complained about a failing metal-ceramic fixed prosthesis on tooth 2.6. At the clinical observation, the tooth showed a root canal treatment attempt without filling and a line crack between the roots (Fig. 1). The periapical X-ray showed signs of periapical lesions around the distobuccal and palatal roots (Fig. 2).

In accordance with the patient, the treatment plan was to extract the tooth and perform an ARP with BSM to prevent bone resorption. After antibiotic prophylaxis and anaesthesia, the tooth was gently removed, taking care not to damage the alveolar socket (Fig. 3). Mechanical debridement of granulation tissue was performed, and hydrogen peroxide was used to clean the socket. Xenograft BSM (BioOss, Geisthlic) was inserted into the post-extractive socket (Fig. 4). Care was taken not to pack the BSM at the bottom of the socket in order not to obstruct the blood clot. A dermal matrix collagen membrane (BioGide, Geistlich) was positioned onto the BSM graft and stabilized utilizing a single horizontal crossed mattress suture (Vycryl 4/0) (Fig. 5-6).

After 4 months, an open flap without vertical incision prosthetically driven surgery was performed, and a transmucosal implant (Standard Plus WideNeck 4,8 Ø x 10 mm, Straumann) was inserted following the manufacturer's indication (Fig. 7-8-9-10).

The insertion torque was 30 Ncm, and transgingival healing was obtained employing a 3 mm height healing cap. Single interrupted sutures were used to obtain wound closure around the implant. After the healing period of 3 months, osseointegration of the implant was checked by screwing the healing cap up to 35 Ncm. The healing cap was removed, and a closed tray impression was taken using polyvinylsiloxane material. A metal-ceramic restoration was realized and cemented onto a solid 5.5 mm height solid abutment. The patient was involved in a long-term maintenance protocol with professional hygiene and occlusion checks every 6 months. After 1 year of follow-up, the periapical x-ray showed good status of the peri-implant bone and no signs of loss of marginal bone (Fig. 11-12).

Fig. 1. *Clinical observation of tooth 2.6*

Fig. 2. *Periapical X-Ray of tooth 2.6.*

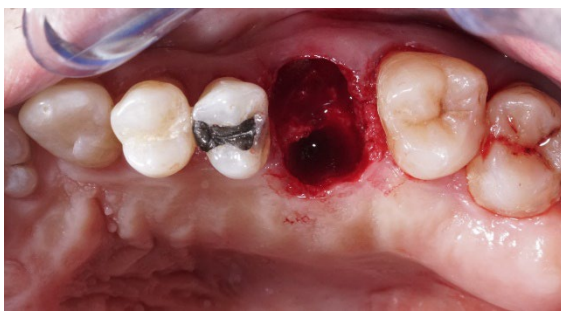

Fig. 3. *Extraction socket*

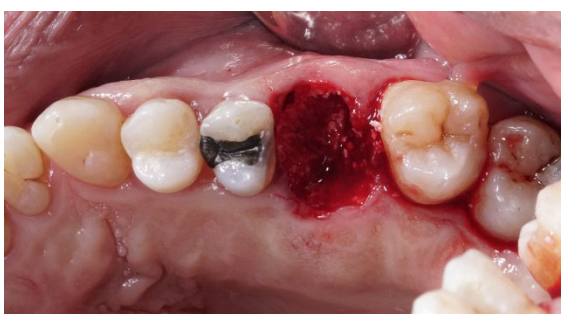

Fig. 4. *BSM graft inserted into the extraction socket.*

DISCUSSION

Tooth extraction always causes a cascade of histologic events that lead to the resorption of the alveolar process. The dynamics of resorption are the same for both jaws and are significantly greater on the buccal wall than on the palatal or lingual sides (10). As a result, the greater reduction is in terms of width and not in height. Together with xenograft BSM, ARPs were reported to regenerate approximately 12.5% to 24% of bone values after 4/6

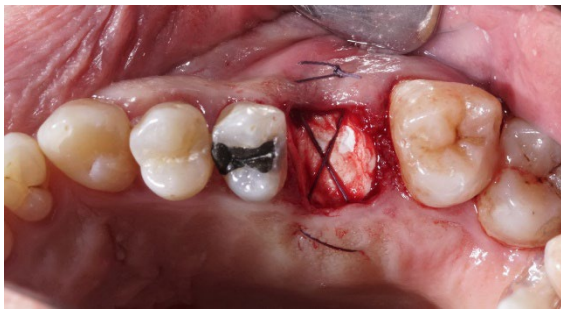

Fig. 5. *Membrane stabilized by horizontal crossed mattress suture.*

Fig. 6. *Periapical X-Ray of socket filling with BSM graft.*

Fig. 7. *Periapical X-Ray after the healing period of ARP.*

Fig. 8. *Tooth supported template to prosthetically driven placement of the implant.*

Fig. 9. *Implant placed*

Fig. 10. *Transgingival healing of the implant.*

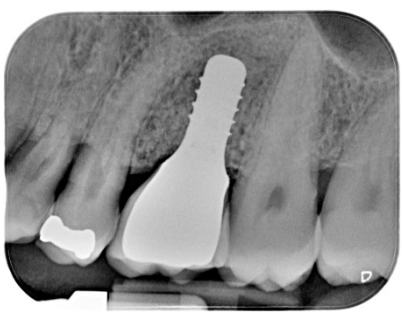

Fig. 11. *Periapical X-Ray at 1 year of follow-up.*

Fig. 12. *Metal-ceramic restoration at 1-year-follow-up.*

months (11). However, it must be pointed out that the final goal of ARP is not bone regeneration but bone preservation to place the implant. In these terms, an osteoconductive material positioned into a fresh extraction socket with a collagen membrane on top allows the blood cells to be stable and protected by epithelium cells (12). This concept is at the base of Guided Bone Regeneration (GBR), in which a barrier can stop the mucosa's epithelial cells from migrating into the socket, voiding interferences with the healing process (13). A systematic review by Willenbacher reported that autografts and xenografts showed promising results in preventing horizontal resorption (12). However, alloplastic material seems the best to prevent vertical shrinkage. Moreover, the horizontal keeping of bone significantly reduces the need for additional augmentation during implant positioning, as reported in the meta-analysis (14).

CONCLUSIONS

ARP is a non-invasive treatment that can be used by every clinician after tooth extraction. The possibility of using xenografts or alloplastic BSM facilitates the whole procedure without an autologous bone graft. The technique can be a valid clinical alternative to post-extractive implant placement, especially in the posterior sites when the drill pathway must be at the centre of the septum. The post-extraction implant placement can often be challenging because of septum fracture or periapical infection. Performing an ARP could prevent bone resorption and facilitate implant placement after healing.

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