

Does Immediate Reconstruction of Postextraction Lost Buccal Plate Reduce the Chances of Implant Surface Exposure after Crown Placement?

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ABSTRACT

Objective: To investigate if immediate reconstruction of fresh extraction sockets' lost buccal wall would reduce the possibilities of implant surface exposure and improve the treatment predictability. **Materials and Methods:** A retrospective chart review of Healthy patients harboring periodontally compromised anterior teeth that were planned for extraction and subsequent implant therapy were the target of our study. All the sockets included witnessed loss of the buccal bone plate. Seventy-two anterior sockets were grafted with xenogenic grafts to reconstruct such defects immediately after the extractions. 9 to 13 months later, the alveolar ridges were surgically exposed and implants were placed. **Results:** All the surgical sites did not show any labial plate thinning, dehiscence, or fenestration at the time of implant placement. Moreover, no gingival recession and implant metal show was noticed up to 39 months post crown placement. **Conclusion:** Immediate reconstructions of lost buccal plate in fresh extraction sockets reduces the chances of implant surface exposure up to two years post crown placement.

Keywords: Immediate Socket Reconstruction; Implant Exposure

1. Introduction

Dental implants have become one of the most popular treatment options for dental rehabilitation. However, dental implants placement is frequently challenged by soft tissue and alveolar bone deficiencies. Alveolar ridge deficiencies could be secondary to disuse atrophy, infections, trauma, or pathosis [1]. Alveolar bone deficiency pre implant placement is one of the most common challenges that surgeons encounter on their daily practice. Bartee [2] reported that following dental extraction, bone loss in the extraction socket takes place significantly during the first 6 months, with as much as 40% of the alveolar height and 60% of the width is lost [3,4]. This magnitude of post extraction alveolar bone loss is sufficient to compromise implants placement that can extremely compromise implants overall success. Labial bone plate thinning, dehiscence, or fenestrations are other examples of such compromise. This can be of deleterious effect if occurred at the anterior maxillary region (the esthetic zone or the smile zone). In order to avoid such complications, the practitioner should not underestimate the need of proper alveolar ridge preparation for future implant placement [1]. In order to optimize the socket width for future implant placement, the first step to un-

dergo is atraumatic dental extraction which is often more difficult to accomplish in endodontically treated teeth, ankylosed, and previously traumatized teeth [3]. The use of a thin periosteal elevator will help luxating the roots, however, care should be taken to maintain an intact buccal plate, the weakest amongst the socket walls [2, 3].

After the extraction is accomplished, buccal plate fracture, dehiscence or fenestration, in addition to the physiologic postextraction alveolar bone resorption are common reasons to compromise implant placement later on. Therefore, if implants were to be placed into such compromised alveolar bone, a previous bone grafting procedure is mandatory or else immediate implant surface exposure will occur and hence further surgical procedures will be needed to cover the implant threads such as simultaneous bone grafting procedure [3-6]. The aforementioned will add more cost, chair time, and overall treatment time that might be inconvenient to the patient and the operator. Therefore, we are investigating if grafting large osseous defects witnessed at the time of dental extraction would reduce the chances of implant surface exposure upon placement, avoid simultaneous bone grafting, and hence would improve the implant treatment plan predictability.

2. Materials and Methods

A retrospective chart review was conducted for cases underwent postextraction buccal plate immediate reconstruction and subsequent dental implant placement. Healthy patients that have the following inclusion criteria were considered: completed chart records, follow up of at least one year, and a reported buccal plate loss at the extraction time. Seventy-two anterior dental sites had undergone the same surgical treatment plan that was thoroughly discussed. Atraumatic extraction was performed using minimal gingival reflection, atraumatic luxation of the teeth, and forceps extraction. Precautions were taken to avoid compromising the buccal alveolar plate [2], however, more than 50% defected buccal alveolar plate was recorded. Next, periapical pathosis was ruled out by gentle probing and curetting the socket walls and apices. Next, larger flap was raised and augmentation of the sockets and ridges was done using Bovine Osseous Graft and resorbable bone guided membranes. Patients were kept on antibiotics for 7 days postoperatively and follow up visits commenced in 1, 3, 6 weeks respectively, and were uneventful. 10 - 14 months later, the implants were placed via crestal incisions and the planned implant sizes were placed.

3. Results

Upon implants placement, no labial plate dehiscence nor implant surface exposures were recorded. Therefore, no bone augmentation procedures were needed and all the surgical procedures were accomplished as planned (surgically and timely). All the flaps were favorably approximated with resorbable sutures and the prosthodontic workups started as planned, 8 - 12 weeks post implant placements. No implant failure, gingival recession, or delayed implant metal show was recorded up to 39 months of follow up visits.

4. Discussion

In the new era of dental implantology, improving the predictability of the implant treatment plan is necessary to the patients and the operator. This will help optimizing the over all patient-doctor relation and confidence.

A lot of articles discussed variable techniques in dealing with implant surface exposures at the time of implant placement (Immediate Implant Metal Show; IIMS). This problem can be treated by immediate grafting of the site using autogenous or non autogenous grafts. Moreover, implant metal show can be witnessed in few months after implant placement as a delayed implant shadow show (DISS) when the labial bone plate becomes thin or dehisced but is still covered with a relatively thin gingival flap. On the other hand, delayed implant actual show (DIAS) is witnessed when tissue loss occurs at both the

bone and gingival envelop.

DISS and DIAS management is critical and the methods of treatment are beyond the scope of this article. However, immediate reconstruction of lost buccal bone plate witnessed upon dental extraction can improve the predictability of implant placement later on.

The controversy of socket augmentation procedures and the variability in its techniques are gaining high load of discussion and research in the new era of implant dentistry, however, the story is more complicated with lost buccal plate. Among these variables is connecting the socket preservation (SP) procedures to the degree of labial plate loss. The degree of the labial plate loss at the time of dental extraction is a factor that is difficult to control and usually is witnessed, coincidentally, at the time of extraction. SP is a predictable procedure if the labial plate was found intact due to its major role as a strong supportive and localizing boundary to the graft material [7]. However; once the labial plate shows deficiency, SP becomes a more challenging technique due to the loss of the anterior socket boundary [8]. At our study we aimed to target cases of total loss of labial plate.

The aim of any SP procedure is to optimize the alveolar bone topography for subsequent implant placement. Moreover, it has been reported that SP can increase the alveolar bone height and width [9]. Iasella *et al.* [9] compared the socket dimensions in two groups; the first group planned to have their extraction sockets heals naturally, *i.e.* without any intervention, while the second group had undergone socket augmentation with freeze dried bone allograft with collagen membrane dressing. The results showed better alveolar bone width preservation in group 2 compared to group 1. Group 2 demonstrated alveolar width reduction mean of 1.2 mm, compared to 2.7 mm group 1. The alveolar crest height was increased in group 2 about 1.3 ± 2.0 mm, while the vertical height was decreased about 0.9 ± 1.6 mm in group 1. The authors concluded improved ridge height and width at the preservation socket group compared to the natural healing socket group.

The type of grafting materials is another broad area of research. Although, autogenous bone is considered to be the gold standard graft material for the maxillofacial bone reconstruction, the implant surgeon frequently encounters situation where he/she has to consider alternatives to autogenous bone [3]. It is of prime importance to explain to the patients all the applicable reconstructive options and the graft materials available. Several graft materials have been reported in the literature such as autogenous bone, allogenic materials, alloplastic, and xenografts [5].

The use of socket dressings is another area of research. Collagen membranes were preferred for graft dressing due to their multiple inherent advantages such as biore-

sorbability and haemostatic criteria by enhancing platelet aggregation and fibrin linkage, which aid in blood clot formation [7]. As well, collagen membranes stabilize the graft material and minimize non-osteogenic cells from entering the grafted site [7,10]. However; Iasella *et al.* [9] reported that the buccal soft tissue gingival flap showed decreased in thickness at the graft group compared to the natural healing group which gained about 0.5 mm of the flap thickness. The same results reported by Kirkland *et al.* [11], who used bioresorbable membranes for alveolar ridge and socket augmentation, that lead to slight reduction in the soft tissue thickness. Kirkland *et al.* claimed that this phenomena occurs secondary to the interference of the blood supply from the bone surface to the gingival flap, by the existence of the membrane in between. Hence, the flap's blood supply will be completely dependent on the flap-base as an axial origin. This finding might be of more significance when planning esthetic zone implants. Iasella and *et al.* [9] reported the significance of age in the socket healing process. Patients over 50 years showed greater bone resorption compared to patients under 50 years old.

BOG is a natural bovine bone derivative that lacks the organic components [12,13]. The granules may range from 0.25 to 1.0 mm in diameter [14]. In our case series, we noticed the presence of some residual particles upon alveolar exposure, however it did not interfere with the implant placement neither compromised the labial plate. Froum *et al.* [3] reported 13.5% BOG remaining particles on histomorphometric analysis of a core biopsy from grafted sockets while Artzi *et al.* [15] showed 30.8% of remaining particle and approximately 46% - 50% of osseous graft density. The porous density claims to facilitate subsequent angiogenesis and osteoconduction [13-16].

The aim of our report is to present the efficacy of immediate postextraction alveolar ridge augmentation using BOG when large labial plate defects are witnessed. For a study design purposes it is difficult to control all the variables to collect such treatment samples, hence, this explains the low sample number. However, within all the treatment samples we noticed favorable alveolar ridge topography to receive the planned dental implant sizes and 3 dimensional position. Periapical radiographs were taken before the implant placement surgeries that showed hyperdense socket area while fine-non resorbed scattered residual graft particles were noticed at the time of implant placement; however it did not interfere with the implant placement [16-18]. All implants showed primary stability without labial plate thinning, dehiscence or fenestration. Such labial plate observations are highly expected if an implant is placed into an anterior alveolar ridge that did not receive any form of SP at the time of dental extraction with witnessed large labial plate osse-

ous defect. Implant threads exposure can be classified as immediate metal show (diagnosed at the time of implant placement) or delayed (diagnosed as metal shadow show (MSS), due to exposed threads under a relatively thin gingival envelop, or metal actual show (MAS) due to gingival recession). We used to manage most cases of immediate metal show by immediately grafting of the exposed threads and a collagen membrane for dressing. MSS and MAS are considered more challenging complications to deal with of which describing the treatment strategies are out of the scope of this article. We think that the incidence of implant metal show can be avoided by the early reconstruction of lost buccal plate witnessed after extraction. The former can prepare the alveolar bone to receive the proper dental implant size, shape, and optimum implant angulations in the alveolar ridge that frequently might be compromised in such horizontal and vertical defect situations.

5. Conclusion

In our case series we focused on situations where buccal plate loss were reported at the time of dental extraction that managed by simultaneous grafting of the socket using xenogenic bone graft substitute. This technique was found to provide favorable long term esthetic results as no case of implant immediate metal show, delayed metal shadow show (DMSS) or delayed metal actual show (DMAS) were observed. However, further prospective studies might be needed to investigate this findings.

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