Management of a Complication after “L” Shaped Bone Graft in Order to Achieve Vertical and Horizontal Bone Augmentation on Anterior Maxilla before Implant Placement: a Case Report

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Abstract

Bone defects are often repaired by usingramus or symphysis block grafting techniques. The symphysis area provide easy access and well bone supply for grafting procedures in oral surgery. Despite of the high success ratio of this method, complications can occur involving hard and soft tissues. In this case, the alveolar ridge augmentation was done using block autograft, and an implant was placed after the intregration of the graft. 33 years old male patient referred to our clinic for the rehabilitation of a single tooth deficiency on anterior maxilla. The radiographic and clinical examination of the relevant region showed a vertical and horizontal bone defect. For this reason we decided to repair this defect with mandibular symphyseal graft. Two weeks after grafting procedure dehiscence occured. Low-level laser therapy (LLLT), platelet rich fibrin (PRF) and palatinal pediculated flap (PPF) techniques were used to manage complication. In this case report, there is described a complication management after grafting procedure in oral surgery.

Keywords: Oral Surgery; Low Level Laser Therapy; Dental Implant; PRF

Introduction

Dental implant therapy is one of the most popular method used in the rehabilitation of edentulous jaws. The ideal placement of dental implants depends on the presence of adequate bone volume and quality at the edentulous area. Alveolar bone resorption, because of tooth infection, extraction, trauma, and pathology can prevent implant placement in suitable positions and angulations [1]. In case of inadequate bone volume, various techniques can be used to increase alveolar bone height and wideness. The morphology of a bony inadequacy is an important factor when choosing an augmentation method [2]. A combination of horizontal and vertical bone loss offer the lowest predictability for surgical correction [1]. Several augmentation methods such as; guided bone regeneration (GBR), bone split osteotomy, inlay or onlay bone grafting procedures have been defined in the literature. Autogenous bone graft shows minimal resorption, enhanced revascularization and better integration at the recipient site. Autogenous block grafts generally harvested from the mandibular symphysis or ramus area. The block should be contoured to better adapt to the recipient site and fixed to the recipient site using fixation screws.

Potential complications, including soft and hard tissue, can effect treatment period [3]. Mucosal dehiscence and premature exposure of the autogenous bone graft are the most casual causes of graft failures [4]. The lack of soft tissue to cover the graft and insufficient blood supply are main reasons for unsuccessful vertical bone augmentation.

Procedures [5]. Platelet-rich fibrin and low-level laser therapy are very useful clinical applications to provide excellent wound healing after both soft and hard tissue operations [6,7]. Kara et al (2013) investigated the effect of low level laser therapy (LLLT) in rabbit oral mucosa after soft tissue graft operations. They found that wound healing was better in the LLLT applied rabbit also compared to the untreated rabbit oral mucosa[8].

In this case, augmentation of the anterior maxilla with autogenous bone graft was reported. Complication after grafting procedure related to soft tissue and management of this complication was explained in this case report.

Case Report

A 33-year-old, healthy, nonsmoking man referred to Izmir Katip Celebi University Faculty of Dentistry Department of Oral and Maxillofacial Surgery with mobile maxillary right central incisor. After clinical and radiographic evaluation, three dimensionalbone loss was detected around vertically root fracture of endodontically treated incisor tooth (Figure1,2). Tooth extraction and implant supported crown prosthesis was certain treatment

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plan for rehabilitation. However alveolar defect was troublesome in providing aesthetic. “L” shaped autogenous block graft was decided to use for augmentation defect area in horizontal and vertical dimension in one surgery before implant placement.

Graft Harvesting

The graft was then harvested from the symphysis are with piezosurgery (NSK Variosurg NE214, Kanuma, Japan) and bone chisel (KLS Martin catalog number: 23-136-04, Tuttingen, Germany). The donor site was filled with resorbable sponge. The graft was shaped like “L” with piezosurgery and refined to fit into the defect (Figure 3a,3b). The recipient site was prepared to improve bone-to-graft contact. The basal bone was also perforated with a small round bur (Meisinger catalog number:500 104 001 001-007, Hansemannstr, Germany) for bleeding. All sharp edges were rounded. The graft was fixed to the recipient site with only one self tapping 1,5x13 mm micro titanium screw (KLS Martin catalog number: 26-675-13, Tuttlingen, Germany) (Figure 4). Deficiencies at the edge of the graft were filled bone particulates which were harvested from the donor site.

Evaluation of graft healing

Two weeks after the operation a 8x3 mm dehiscence occurred on recipient site because of necrosis keratinized mucosa which covered the graft (Figure 5). There was no infection and suppuration. After this complication double layer platelet rich fibrin (PRF) membrane was applied to dehiscence and palatinal pediculated flap (PPF) was rotated over PRF membrane (Figure 6). In order to preserve...
PPF essix plaque was fabricated after operation. To prepare PRF, 20 ml venous blood was collected from the patient’s arm by a nurse and transferred into the two glass-coated plastic tubes (BD vacutainer catalog number: 367895, New Jersey, USA) to a centrifuge device (EBA 20 Hettich, Tuttingen, Germany). Centrifugation process was performed for 10 min at 3000 rpm according to Choukroun et al [9].

ND-YAG laser (FOTONA Stegma, Ljubljana, Slovenia; 0.75 W, Continuous wave mode) was used to stimulate healing of the operation area (5 séance, 60 second). In the control after 10 days there wasn’t detected any perforation area (Figure 7). After 2 months of healing, the dental implant (Biomet 3I, USA) was inserted without stent using for directing the implant (Figure 8). After the osseointegration period of 3 months healing caps was placed by using ND-YAG laser.

After the healing process, the implant impression was taken using a conventional method. Subsequently the models were scanned with scan body (tiBase Set, Sirona Gmbh, Bensheim, Germany) by using cerec omnicam (Sirona Gmbh, Bensheim, Germany). Digital impressions were then used to design the definitive CAD/CAM-fabricated fixed dental prosthesis.

The patient has been using implant supported crown prosthesis without any complication for 24 months (Figure 9).

Discussion
In this case we mentioned “L” graft which is an advantageous procedure used to augment alveolar bone in vertical and horizontal dimension in the same surgery. In addition we would like to describe what kind of problems we can encounter and how to solve them.

Hassan reported autogenous “L” graft technique to enhance alveolar bone in vertical and horizontal dimension at the same surgery. He harvested autogenous “L” bone graft near the posterior mandibular lower border [5]. It is a reasonable idea. In this way you can shape graft easily in the form of “J” or “L” as required. However in patients who have restricted mouth opening or small jaw reach to posterior mandibular lower border may be difficult. In this case we harvested graft from symphysis area and carved with a round bur to shape into the “L” form.

Various flap designs that cover exposure defects have been described in the literature such as; connective tissue graft, palatal advanced

Figure 6: PPF was rotated to cover dehiscence

Figure 7: Clinical view of dehiscence area 10 days after PPF

Figure 8: Computer aided design of the all ceramic restoration.

Figure 9: 24 month follow up after implant placement.
flap, buccal fat pad and flap palatal rotation flap [6]. Mucosal
dehiscence and premature exposure of the autogenous bone graft
are the most common cause of graft failure [4]. In this case we
didn’t use any additional technique to cover bone graft with soft
tissue such as pediculed palatal connective tissue graft. We closed
flap primarily with tension using mattress suture. Therefore two
weeks after the operation fenestrations and dehiscenses occurred
on grafted site.

In mono-cortical block grafting procedures, the presence and
maintenance of enough soft tissue coverage for the bone block
is more important due to the great increase in the ridge width
and height. Choukroun’s platelet-rich fibrin (PRF) is a second
generation platelet concentrate. It was reported that PRF may have
a stimulatory effect on wound healing due to the presence of many
growth factors such as platelet-derived growth factor (PDGF)
fibroblast growth factor, and epidermal growth factor. Also, PRF
provides an excellent scaffold for angiogenesis and epithelialization.
In the literature there are a few reports about the effectiveness of
PRF as an adjunct for wound healing in the oral cavity [6].

PRF membrane application for covering the fresh wound may
hurry the process of wound healing up by the way of providing
a stable fibrin mesh, which is more rigid than a blood clot and by
supplying a sustained release of growth factors [6].

Low-level laser therapy (LLLT) have been using progressively in
dentistry and medicine. The use of LLLT may help the management
of different medical situations including pain, nerve damages and
wound healing. The knowledge of LLLT effect on bone healing is
foundational to see whether LLLT may advance implant-tissue
interaction. Khadra M. (2005) found that LLLT may advance
metabolism and/or mineralization during early bone healing. Histomorphometrical and mineral analyses showed that the
irradiated implants had better bone-to-implant contact than the
control groups [7].

The application of LLLT for soft tissue adjustment provides
faster and better wound healing and also LLLT may induce faster
epithelization. LLLT application can induce wound healing by
increasing the activity of keratinocyte, promote early epithelization
by increasing matrix synthesis and increase neovascularization.
LLLT stimulation reduces the inflammation phase, accelerates
the proliferation and maturation, and positively stimulates the
regeneration of injured tissues [8]. Kara et al. (2013) investigated
the effect of LLLT on rabbit oral mucosa after soft tissue graft
operations. According to their results; LLLT application provided
better complete wound healing compared to non-irradiated group.
In the LLLT group, stratum corneum (hyperkeratosis) was found
thinner than the epithelial layer of other groups. In accordance
with the study, they concluded that quick wound repair may lead
to advanced scar tissue which generate epithelial tissue thickness
[8]. In conclusion; if one would like to augment alveolar bone in
vertical and horizontal dimension in one surgery, “L” or “J” graft
is a beneficial method for this purpose. Despite the high success
ratio of this method, complications can occur involving hard and
soft tissues. Palatal rotational flap, low level laser therapy, PRF are
helpful clinical applications to overcome problems like these. We
believe that; palatal rotational flap or pediculed palatal connective
tissue graft should be used to cover bone graft during the first
surgery to avoid graft exposure.

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