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Research Article

Back Cut: A Novel Technique for Primary Soft Tissue Closure Over Particulate Bone-Augmented Extraction Sites

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Abstract

Background: The aim of this clinical case series is to describe the back cut technique for primary closure of extraction sites that underwent socket preservation with particulate bone.

Methods: The described surgical technique uses the back cut technique to seal the extraction socket. At this series 16 sockets at different locations of both jaws were treated, and include 8 molars (5 at the mandible, 3 at the maxilla) in 8 patients, second premolar and first molar at the mandible in two patients, first and second premolars at the maxilla in one patient, and two central incisors at the mandible in the last patient.

Recorded data based on the primary closure obtaining with the ability to seal the socket and maintaining the augmented bone volume, the ridge contour and the vestibular depth.

Results: In the immediate means (intra- operatively); the back cut technique enhanced the primary soft tissue closure of the socket and maintained the closure thereafter during the follow up period, and the augmented bone was preserved. The final result was an adequate bone volume for implant placement. The vestibular depth of the treated sites was unchanged, and the soft tissue architecture was satisfied.

Conclusions: The use of back cut technique is an easy and predictable procedure to obtain and maintain socket primary closure and seal.

Keywords: *Socket Preservation; Socket Seal; Extraction Site; Back Cut; Local Flaps*

Introduction

Hard and soft tissue volume is decreased following tooth extraction during the physiological healing process, leads to ridge contour deformation and has a detrimental effect on potential treatment with a dental implants or conventional prosthesis [1-4].

Socket preservation is indicated at the extraction site to preserve and create adequate hard and soft tissue volume. Several bone augmentation materials are used to fill the extraction site. Several soft tissue procedures can be used to seal and to obtain primary closure of the bone-augmented socket, which include autogenous and non-autogenous soft tissue grafts, periostal releasing cuts at the flap, and local flaps [5-13].

Advancement and rotation flaps are widely used in the oral cavity [14-15] and in the cosmetic surgery to treat open wounds and soft tissue defects [16]. The back cut incisions have been used to enhance the rotation and advancement of the designed flap for easier closure of an open wound.

The purpose of this paper is to introduce the use of the back cut technique that enhances mobilization of the flap at a coronal direction to obtain primary closure of the bone-augmented extraction sites. This technique can be used for single or multiple extraction sockets without affecting the vestibular depth.

Technique Presntation

Illustration study model (Figure 1):

The back cut technique design is demonstrated by a fabricated jaw, and a sheep jaw.

An envelope full thickness flap is raised around the tooth with two releasing cuts, anterior and posterior. The releasing cuts extend 3 - 4 mm apically to the mucogingival junction, and are followed by two back cuts (Figure 1a). At the design stage, advancement of the flap with rotation should be considered and all the points should be moved coronally and sutured in the new location. That is mean; point 1 has to move to point 1', point 2 to point 2' etc. (Figure 1b).

The tooth could be extracted before or after the flap elevation. Once the flap is elevated (Figure 1c), in this stage, it is recommended to try in the amount of the flap mobility by advancement and rotation to obtain primary closure over the open wound of the socket (Figure 1d and 1e). The next step will be the filling of the socket with bone particles, and suturing of the flap as it was designed before (Figure 1f and 1g) in order to obtain tension free primary closure (Figure 1h).

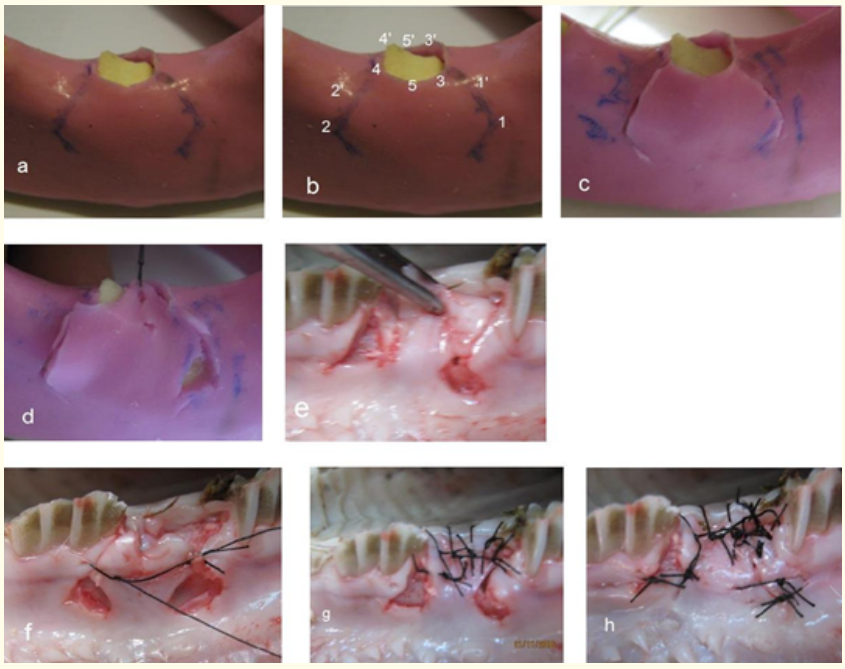

Figure 1: *Back Cut Technique; step by step on study model.*

Figure 1a: *Back cut technique; the flap design.*

Figure 1b: *The suturing design; 1 with 1', 2 with 2', etc.*

Figure 1c*: The elevation of the flap.*

Figure 1d and 1e*: Try on for coronally advancement of the flap.*

Figure 1f to 1h: *Suturing the flap step by step to obtain primary closure following the planed suturing design in fig 1b.*

Clinical Cases

Case 1:

A 61-year-old woman was referred for implant surgery to rehabilitate her left posterior mandibular region. The second first premolar and the second molar were missed. The first molar was with advanced periodontal disease (Figure2a and 2b). The treatment plane was staged in two surgeries. At the first surgery extraction of the first molar and socket preservation with human-derived particulate bone substitute. The back cut technique was utilized for primary closure of the bone-augmented- extraction site and to enhance the socket seal in order to prevent migration of the bone particles out from the socket (Figure 2c to 2j). At four months, computed tomography was performed to assess the bone gain (Figure 2k and 2l), and the second surgery was made to insert three implants (Figure 2m and 2n). This case was followed-up 38 months (Figure 2o).

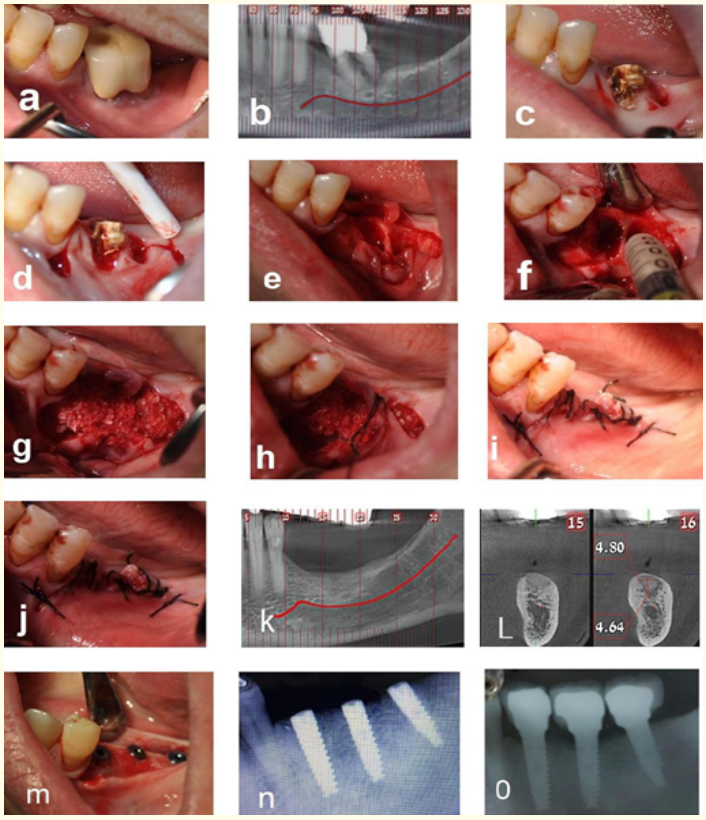

Figure 2a and 2b: *Clinical and radiographic views, advanced periodontal lesion that affected the first left mandibular molar.*

Figure 2c: *The clinical view after decoronation.*

Figure 2d: *The incision design; envelope flap with anterior and posterior back cuts.*

Figure 2e: *The socket of the molar, after meticulous debridement. The two back cuts also demonstrated.*

Figure 2f: *Particulate bone substitute is used to fill the socket.*

Figure 2g: *The socket preservation.*

Figure 2h: *Coronally advancement of the flap.*

Figure 2i and 2j: *Primary closure at the bone-augmented socket without affecting the vestibular depth.*

Figure 2k and L: *Computed tomography of the treated site at four months after the surgery.*

Figure 2m and 2n: *Implants placement.*

Figure 2o: *Follow-up 38 months.*

Case 2 (Figure 3):

Two back cut incisions, the first anterior and the second posterior at an extraction site of the first right mandibular molar in a young patient (Figure 3a). After meticulous debridement of the socket, human-derived bone particles were used to fill the socket. The extraction site open wound was closed primarily by advancement of the flap (Figure 3d). The earlier designed back cuts enhanced the advancement of the flap without making release cuts in the periosteum and without distortion of the vestibular depth (Figure 3e).

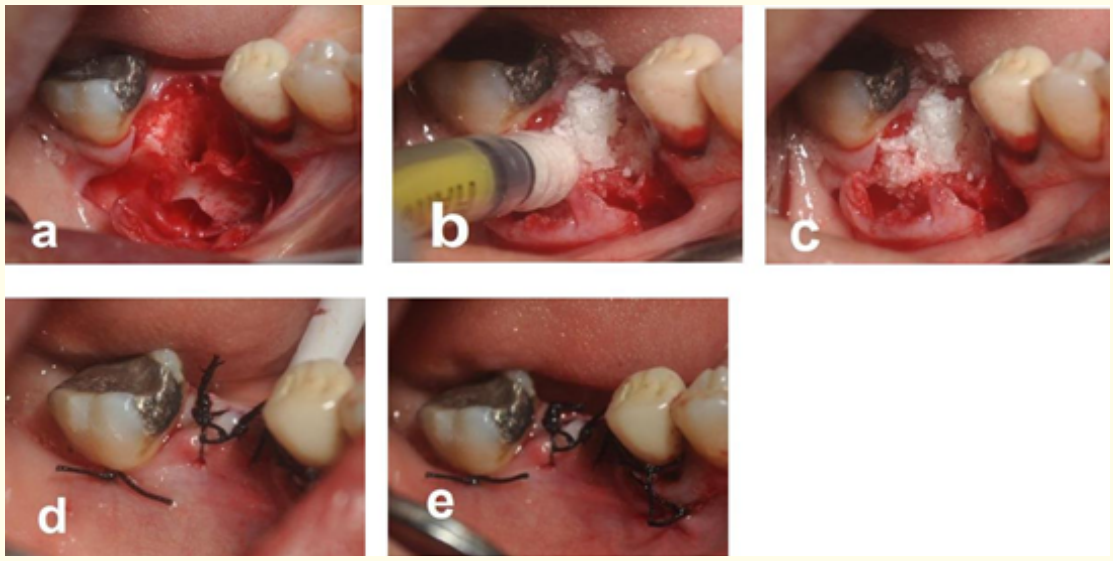

Figure 3a: *Extraction socket of the first right mandibular molar with two back cuts; anterior and posterior.*

Figure 3b and 3c: *Socket preservation with human-derived bone substitute.*

Figure 3d and 3e: *Primary closure of the bone-augmented socket, via coronally advanced flap without affecting the vestibular depth.*

Patients and Methods

During a 4-year period, the back cut technique was used to seal extraction sockets that were augmented with particulate bone substitute in 12 patients (8 women,4 men; mean age 38 years; range 23 to 63 years). At this series 16 sockets at different locations of both jaws were treated, and include 8 molars (5 at the mandible, 3 at the maxilla) in 8 patients, second premolar and first molar at the mandible in two patients, first and second premolars at the maxilla in one patient, and two central incisors at the mandible in the last patient.

Recorded data based on the primary closure obtaining and the ability to seal the socket and maintain of the bone augmented volume, the ridge contour and the vestibular depth. Follow- up examinations were performed every 2 weeks. Four months after the operation, the treated sites were evaluated clinically (to assess the ridge contour and volume and the vestibular depth) and radiographically (by computed tomography) to examine the bone gain and the available bone. At four months, dental implants were placed at the treated sockets. Patients were referred back to their dentists for prosthetic rehabilitation.

Follow- up of the treated sites and the implants included periodic clinical evaluation and periapical radiographs.

Results

The back cut technique was performed in all the patient in this series. All the bone-augmented sockets were primary closed. The primary closure was easily obtained during the surgery and maintained during four months follow-up. The healing process went very well without complications or discomfort. The augmented bone particles were saved inside the sockets without migration.

Due to the back cuts the scars were minimal at the releasing incisions and the vestibular depth remained unchanged, and was the same as in the neighboring teeth.

Four months after the operations the bone volume and quality were satisfied in all the cases and dental implants were placed without the need to add bone.

All patients were satisfied from the treatment and from the final results.

Discussion

After extraction of adjacent teeth or even only one molar an open wound is created. The extraction site can heal very well without intervention, but if augmentation of the socket with bone is performed, primary closure of the socket is necessary to prevent migration of the bone particles. The relevant literature is rich with several methods, several procedures, different exogenous materials, and soft tissue grafts, free or pedicled, to obtain primary closure of the extraction bone-augmented sockets [8-15].

This article describes the use of back cut technique to obtain and maintain primary closure in extraction sites augmented with particulate bone substitute in attempts to preserve the socket. This technique offers several advantages over the different methods and materials used to achieve primary soft tissue closure of grafted extraction sites. The back cut incisions promote the coverage of the socket open wound without periosteal releasing incisions in the inner side of the flap that could jeopardize the blood supply, and affect negatively the healing of the operated site resulting of leakage or infection of the grafting materials. The ability to close the extraction open wound without periosteal releasing incisions leaves the flap more bulky improving its circulation and survival, and doesn't affect the vestibular depth.

In those cases, that soft tissue augmentation is not mandatory at the extraction site and their use is just to achieve primary closure, the back cut technique can be used and eliminates the need of additional surgical procedures for harvesting the grafts which may increase post- operative pain, discomfort, hemorrhage or infection [10,13].

The back cut technique can also exclude the need for non-autogenous covering materials such as; barrier membranes, mucografts, acellular dermal matrix (alloderm), etc…., and so reducing the treatment costs and side effects like infections due to foreign body reaction.

Cutaneous and cosmetic medicine, deal with reconstruction of skin defects with various techniques, Such as advancement and rotation flaps. The back cuts are widely used as one of the procedures to lengthen and "push" the flap into the primary defect, reducing tension at the flap's tip while eliminating tissue redundancy at the flap's base. Additional advantages of the back cuts in those medicine areas are; improvement of the flap mobilization, minimizing of the scar length and shifting tensions away from the direction of primary defect closure [17].

The back cuts, when they used for the primary closure of the bone- augmented socket may give the same advantages. They increase the mobilization and the sliding of the flap over the open socket wound, lengthen the flap, and enhance the tension free primary closure over the bone. At the releasing cuts of the flap, the suturing is made also as primary tension free and in this way the blood supply is improved to the flap base and edges. This reduces the infections during the healing period and the scars creation and length thereafter.

It well established in the oral surgery that soft tissue closure over the surgical site allows successful bone regeneration [18].

The present article demonstrates that the primary closure of the bone- augmented sockets was obtained by the use of the back cut technique without affecting the vestibular depth, with minimal costs and minimal post-operative morbidities. The bone volume at the socket was preserved during the healing period. Dental implants were inserted in a second stage with adequate bone volume and quality at the recipient sites.

Conclusions

The use of the back cut technique during socket preservation procedure enhances the primary closure and the socket seal of the extraction site with minimal morbidity and minimal costs.

Conflicts of Interest

There are no conflicts of interest.

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