TECHNICAL NOTE

A new pedicled periosteal flap for alveolar bone graft surgery: a technical note

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Abstract

Achieving a good bone volume is an important aspect of secondary alveolar bone grafting in patients with alveolar clefts. Wound breakdown is a major cause of bone graft exposure and graft failure. We describe a new technique using a pedicled periosteal flap to achieve a double layered wound closure during secondary alveolar bone graft surgery. We report the first use on a unilateral alveolar cleft. Good wound healing and bone volumes were noted on 6 months review. Bone formation by the grafted periosteum was expected in addition to wound protection.

Introduction

Secondary alveolar bone grafting (SABG) remains the most popular method in treatment of alveolar clefts. Nevertheless, complications at the primary surgical site such as wound dehiscence, premature breakdown of sutures, exposure of the grafted cancellous bone and infection can cause graft failure [1]. In these cases, second surgery is usually more complicated due to scar tissue, infection and poor compliance by patients. The new surgical technique described attempts to use a periosteal flap to achieve a good wound closure during SABG surgery.

Surgical technique

Conventional surgical techniques were used to dissect the oro-nasal fistula, expose the bony alveolar cleft and close the nasal and the palatal flaps. A crevicular incision was placed along the teeth of the distal segment up to the posterior end of the upper first molar tooth. A vertical release incision was placed at the distal end of the upper first molar tooth to open the mucoperiosteal flap. Subperiosteal dissection was extended posteriorly up to the vertical incision and superiorly to the infraorbital foramen.

An anteriorly based periosteal finger flap was harvested from underneath the raised mucoperiosteal flap taking care not to button hole (Figure 1a and Ib). The harvested periosteal flap was rotated forward and placed over the grafted cancellous bone, with the periosteum side facing down. The flap was secured with vicryl sutures to the medial and palatal sides (Figure 2). Finally, the overlying mucoperiosteal flap of the distal segment was advanced medially and sutured to the proximal and the palatal flaps. Good wound healing was noted one week postoperatively.

Discussion

In SABG surgery, the suture line of the proximal and distal mucoperiosteal flaps fall over the grafted bone of the cleft. This line forms a weak area and a potential site for wound breakdown. The new periosteal flap offers an additional layer of tissue above the grafted cancellous bone and beneath the suture line of the gingival mucoperiosteal flaps.

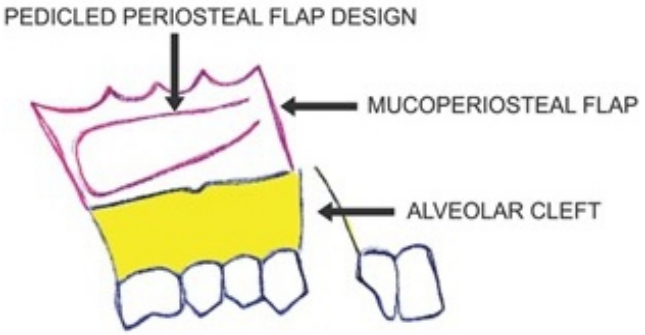

Figure 1a. Illustration of the periosteal flap design on the deep side of the mucoperiosteal flap

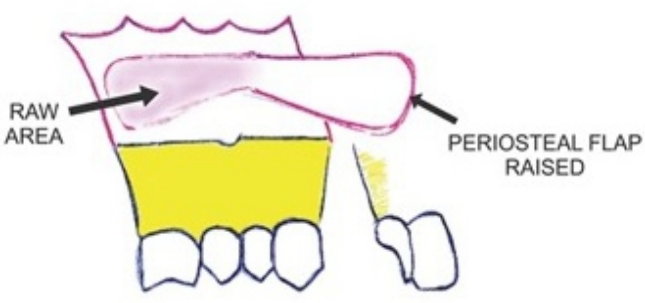

Figure 1b. Illustration to demonstrate periosteal flap harvest from the mucoperiosteal flap

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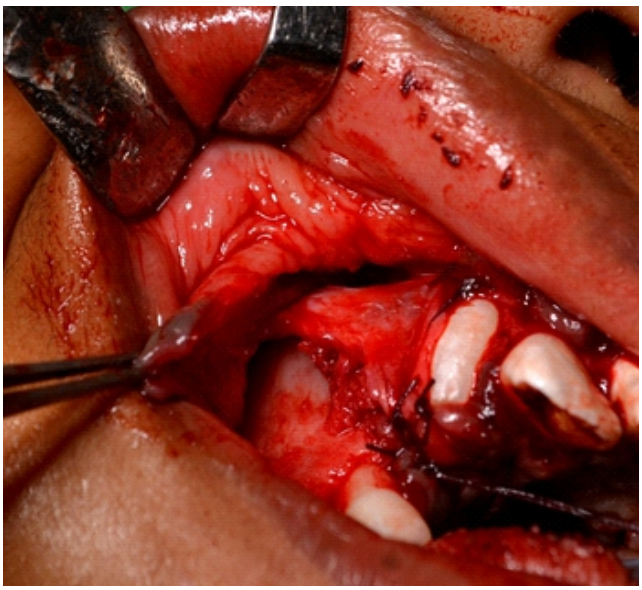

Figure 2. Intraoperative view: Periosteal flap was sutured to the medial and the palatal sides covering the grafted bone. The periosteal side of the flap was placed facing the bone graft

The flap can be made to extend over to the palatal aspect to cover the three point contact of tissues from buccal and the palatal sides. This three point contact area of tissues is a site of wound breakdown. The flap provides a double layered closure over the grafted bone.

Though a periosteum is already present beneath the proximal and distal mucoperiosteal sites, the authors believe that the periosteum at the suture line may not work effectively due to trauma from tissue handling and from the sutures themselves. Therefore, apart from offering a physical barrier, the periosteum of the flap continue forming bone, thus contributing to the graft site.

Skoog in 1965, used the periosteum over the anterior maxilla in the treatment of a patient with a primary cleft palate [2]. He noted a well formed bone ridge at the surgical site which proved bone formation. Free tibial periosteal grafts formed bone in the maxilla when performed in animal models [3]. Therefore, we believe the periosteal flap will continue to form bone over the grafted cancellous bone, thus contributing to the volume at the cleft defect in accordance with above evidence.

The new technique is an addition to the accepted surgical technique and causes slightly more postoperative oedema. However, when compared with benefit of preventing wound breakdown and the need for second surgery, this flap may be a useful adjunct in SABG, especially bilateral alveolar clefts. We hope to evaluate the new flap on bilateral alveolar clefts as a case series leading to a clinical trial. The results will help to evaluate the benefits and complications of this technique in SABG surgery.

Consent for surgery and photographs were obtained from the patient and his parents.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

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