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SCALP SPLIT TECHNIQUE FOR DENTAL IMPLANTS IN THIN ALVEOLAR RIDGES

Dental Science

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ABSTRACT

Inadequate alveolar ridge width is one of the main barriers to a successful implant placement. To achieve the optimum objectives of implant dentistry, the volume and quality of both hard and soft tissues must be at their ideal levels. The labial cortical plates in the aesthetic anterior regions are the first to be lost or resorbed following tooth extraction or trauma, and they are frequently thinner than the lingual plate. Ridge deficiencies might be horizontal, vertical, or a mix of both. To consistently increase the quantity of ridge in areas of the insufficient alveolar ridge, autogenous or allograft block graft, distraction osteogenesis, alveolar ridge splitting or extension, and guided bone regeneration can all be employed alone or in combination. This article comprehensively reviews how to use this technique to place dental implants in ultra-thin ridges.

KEYWORDS

Dental implants, Bone expansion, Thin alveolar ridges, Edentulous arch

INTRODUCTION

The most common and effective treatment option for edentulous arches is now implant-supported or implant-retained prostheses. The quantity and quality of the accessible alveolar bone significantly influences the success of implant osseointegration. However, buccolingual deficiencies in edentulous alveolar ridges caused by trauma, atrophic bone resorption, or bone diseases may significantly impact favourable implant location and prosthetic results.[1] To counteract the shortage of bone quantity in atrophic alveolar ridges, a variety of augmentation techniques are available to increase the volume of bone. When it comes to restoring bone thickness, the primary methods—guided bone regeneration, ridge splitting, distraction osteogenesis, and autogenous block bone grafting—have proven effective.[2]

One major drawback of rehabilitation with dental implant-born prosthesis is alveolar atrophy after tooth loss. Alveolar atrophy occurs in the jaw after tooth extraction. Compared to the maxilla, the mandible has a greater degree of bone loss.[3]

Compared to the palatal/lingual plate, the buccal plate of the upper and lower jaw resorbs more. The ridge centre shifts in the lingual/palatal direction as a result, [4] although the upper and lower jaws exhibit different patterns of bone resorption. The alveolar process in the upper jaw is wider than the basal bone, whereas the opposite is true in the lower jaw. Consequently, a transversal and sagittal disparity is frequently caused by the bone resorption of the alveolar process.

Due to insufficient space, bone resorption may prevent implants from being inserted or may result in unfavourable functional and cosmetic circumstances for prosthetic rehabilitation.

Both the vestibular and lingual/palatal sides of the bone should be at least 1.5 mm thick to accommodate implant insertion. [5] Therefore, transverse bone augmentation is typically necessary to enable implant insertion if the alveolar width is less than 6 mm. [6–11]

About the vertical plane, a similar success rate has been obtained with implants that have a micro rough surface 8mm long in the lower jaw and 10mm in the upper jaw. [12]

Among the various techniques introduced for expanding alveolar ridges with a horizontal bone deficit is the alveolar ridge split technique. This technique has proved to be a valid procedure and a 98% to 100% survival rate has been reported following the contextual insertion of implants. [13–15] In addition to being an extremely predictable and reliable procedure, the alveolar ridge split technique is characterised by its low invasiveness.

This configuration ensures the preservation of 1.5 mm of cortical and cancellous bone on each split side, facilitating bone spreading and ensuring adequate blood supply around the implant.

Alternatives to the alveolar ridge split technique are the onlay bone grafts [16], guided bone regeneration [17,18], and horizontal distraction osteogenesis.[19] The principal disadvantages of onlay bone grafts are the invasiveness, the presence of an additional donor site related to the bone harvesting requirement, and the consistent resorption that the grafted bone undergoes in connection with the chosen donor site. [20,21] The main problems of guided bone regeneration are the risk of exposure and collapse of the membranes and the risk of resorption which the grafting material encounters when the membrane is removed. [22,23]

The patient has to be carefully selected before the alveolar ridge split technique is carried out. Good oral hygiene is crucial for the surgery and prosthetic rehabilitation success. [24]

Alveolar ridge splitting is classically performed using chisels and hammer, rotary burs, diamond disk, reciprocal saw, or piezoelectric device. [25]

Under local or general anaesthesia, a crystal incision is made on the atrophic ridge, followed by two vertical releasing incisions and an outline of planned osteotomies.

The first osteotomy is performed at the occlusal aspect of the ridge, extending the incision in the anteroposterior direction. The second is performed on the proximal and distal ends of the crestal incision, convergent and oblique, from the vestibular cortex to the cancellous bone.

The osteotomy lines should be traced using progressively sized tips, varying the power level of the incision change to deepen the osteotomies, resulting in more aggressive and faster cutting.

Calibrated tips achieve the desired cut depth, but if the cortical width exceeds 5mm, a normal tip or chisels can be used to complete the osteotomy.

The greenstick fracture is created using chisels and a cortical bone graft harvested from the mandibular ramus, gently hammered between the vestibular and lingual cortex, and stabilised using titanium osteosynthesis screws.

To achieve supracrestal regeneration, a bone graft between the vestibular and lingual/palatal cortices can be fixed higher, acting as a vertical support for particulate autografts mixed with bone allograft, covered by a resorbable collagen membrane. The buccal segment can be replaced and stabilised with screws, and the surgical site heals for 6-9 months. After removing the sutures, implants are prepared, and positioned according to the prosthetic rehabilitation program, and patients receive fixed implant-supported restorations.

CONCLUSION

Ridge splitting and expansion is an efficient method for enlarging ultrathin alveolar ridges with the least amount of natural bone waste. Compared to other augmentation techniques like block grafting or guided bone regeneration, the procedure offers benefits like patient comfort, time savings, and less invasiveness with fair predictability. The scalp-spilt approach is a promising ridge-splitting and expansion method for creating implant-supported or implant-retained prostheses over extremely thin edentulous alveolar ridges.

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