Submandibular fossa augmentation in implant dentistry

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Abstract:

Background: There are two limiting factors for determining the dental implant fixture length in mandibular posterior edentulous region: Inferior dental canal and submandibular fossa. Purpose: Submandibular fossa augmentation is a suggested way to overcome the problem of lingual undercut beneath the mylohyoid ridge in implant dentistry. Materials and Methods: Patients with lingual posterior bony undercut that interferes with the placement of a standard implant with a length of 10 mm were enrolled in this study. Results: This method was used for eight patients in 10 sites. Increased implant length and decreasing the chance of sublingual hematoma due to lingual cortical plate perforation are the results of this study. Conclusions: Submandibular fossa augmentation is a new technique to improve the maneuver of oral surgeons to increase dental implant length in the presence of deep lingual bony undercut.

Key words:

Bone graft, dental implant, submandibular fossa

INTRODUCTION

There are two limiting factors for determining the dental implant fixture length in mandibular posterior edentulous region: Inferior dental canal and submandibular fossa.[1] The problem of insufficient bone between the ridge crest and inferior dental canal is solved by nerve repositioning while there is no recommendation to solve the problem of influential lingual undercut.[2] Short or inclined dental implants to prevent lingual cortical plate perforation, are two suggestions,[3,4] the former is far from ideal crown/root ratio and the latter is accompanied with compromised occlusion.

Submandibular fossa augmentation that is a form of veneer bone grafting may solve this problem. Hematomas in the mouth floor after lingual plate perforation may compromise airway and increase the risk of infection. This risk is more pronounced in second molar site, especially if wide implants have to be inserted and should be parallel with the other implant in this region.[5,6] The aim of this study is to introduce a practical method for bony augmentation of this undercut and evaluate the results and possible complications.

MATERIALS AND METHODS

Patients with lingual posterior bony undercut that interferes with placement of a standard implant with a length of 10 mm were enrolled in this study. All procedures were approved by the Institutional Ethics Committee (number 940738) of Mashhad dental school. The patient consent form was obtained.

Crestal incision and buccal/lingual mucoperiosteal flap reflection were done. Detachment of the mylohyoid muscle from inner oblique ridge with the aid of a mediolaterally curved periosteal elevator was encountered. Sharpness of mylohyoid ridge was reduced by round surgical bur and bone graft insertion/fixation beneath the lingual undercut was done [Figure 1]. Cortical vertical part of the graft was equal to the length of the vertical distance between the ridge crest and undercut roof. Horizontal inferior component of the graft was equal to the lingual bony undercut depth. The preferred method for graft immobilization was wire osteosynthesis and reflected mucoperiosteal flaps were sutured back to original position [Figure 2].

Both autogenous or allograft bone can be used. Graft shaping according to the undercut depth was important. Dental implants were inserted after graft consolidation.

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RESULTS

This method was used for eight patients in 10 sites. Six cases were unilateral, and two patients had bilateral undercuts interfering with dental implant insertion. The range of available bone for implant insertion before bone grafting was between 7 and 8 mm. After graft consolidation with recipient bed, 12 mm length dental implants were used in all situations. There was no case of hematoma in mouth floor, injury to the lingual nerve, or damage to submandibular salivary gland, subsequent to dental implant insertion. All implants were centralized in the mandibular bone and osseointegrated. All patients were followed up for 6 months after prosthesis fabrication.

DISCUSSION

Lingual cortex perforation during implant placement in posterior mandible irritates tongue.[7] Submandibular space infection and hematoma in mouth floor are two other dangerous complications of this error.[5,8] Immediate bleeding complications in the posterior mandible is reported rarely, and dental implants causing important bleeding complications were most reported in the mandibular canine region.[9] Lingual aspect of the body of the mandible between the angle and the mental foramen is considered relatively hypovascular, but occasionally anastomosis between submental artery and inferior dental artery happens through unnamed foramina [Figure 3].[10,11]

Salivary gland injury subsequent to implant surgery and ranula formation has been reported.[12] Herniation of mylohyoid muscle that is a common finding and predispose sublingual salivary gland at risk of mechanical injury during drilling for implant bed preparation below the internal oblique ridge [Figure 4].[13,14]

Lingual concavity is common in posterior mandible, but only small percentages (10%-19%) are influential undercuts and interfere with dental implants.[15,16] This fact is more important in the second molar region than in the first molar region.[17]

Submandibular fossa augmentation is a practical way to increase the implant length in posterior edentulous mandible when there is bony undercut in lingual side of the mandible. Another indication is when there is need to inferior alveolar nerve repositioning, and the mandibular edentulous ridge is buccal to the maxillary ridge crest. In this special situation, submandibular fossa augmentation has two benefits; avoiding
the complications of nerve repositioning and improving final occlusion.

Although submandibular fossa augmentation is a form of medial onlay bone grafting, incidence of graft exposure is low, thanks to appropriate soft tissue thickness. It is expected that this bone graft undergoes small resorption because transferred bone falls in depository field of the basal bone.\(^{[10]}\)

An important note in the interpretation of postoperative radiography (periapical or panoramic), taken after dental implant insertion in augmented submandibular fossa is that the dental implant is crossed by inferior dental canal while it is actually lingual to this structure.

**CONCLUSIONS**

Submandibular fossa augmentation is a new technique to improve the maneuver of oral surgeons to increase dental implant length in the presence of deep lingual bony undercut.

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**Conflicts of interest**

There are no conflicts of interest.

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