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Management of Deficient Ridge during Implant Placement- A Case Report with 8 years follow up

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ABSTRACT

Deficient alveolar ridges are a common hurdle faced by the dental practioners during implant placement. In such compromised situations, there is a need to manage the residual ridge with a simple technique with a long term success and survival rate of the implant. Ridge-split is one such technique which can be used in deficient bucco-lingual width provided the height available for implant placement is sufficient and there is a presence of cancellous bone in between the two cortical plates. In this case report, we present a case of deficient bone width in the 36 region successfully managed with a ridge-split technique and having a long term success rate of 8 years. The 8 years follow up report shows excellent soft tissue contour around the prosthesis and the radiograph depicts only 1mm crestal bone loss around the implant which is well within the physiological bone loss parameters around the dental implants.

Keywords: Ridge Split, Ridge Expansion, Ridge Augmentation, Horizontal Ridge Defects

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BACKGROUND

Atrophy of the maxillary and mandibular ridges is one of the greatest limitations in placing dental implants with straight forward conventional techniques. Residual ridge resorption due to long term edentulous ridges is a definite pathophysiological phenomenon which is the deciding factor for the type, position and complexity of dental implant placement. Atwood in 1962 describes the residual ridge configuration classifying it under Order I - Pre-extraction, Order II- Post-extraction, Order III- High, well rounded, Order IV- Knife-edge, Order V- low, well-rounded, Order VI- depressed. [1] The Residual ridge resorption is a chronic, irreversible, multi-factorial, biomechanical disease that results solely or from a combination of anatomic, metabolic and mechanical determinants. [2] Order III or high, well rounded ridges with sufficient bone height and bucco-lingual width qualify for regular implant placements. However, a compromised situation of Order IV, V or VI occurs when either the bucco-lingual width or the height from the important anatomic landmarks (maxillary antrum in maxillary anterior region, maxillary sinus in maxillary posterior region and inferior alveolar nerve in mandibular posterior region) or both are insufficient for placement of dental implants. Various surgical techniques have been implicated for managing such compromised situations.

Compromised situations of insufficient height can be managed depending on the region of edentulous arch. Maxillary posteriors regions in close proximity to the maxillary sinus can be managed by indirect sinus lift when the available height from the crest of the bone to the floor of the sinus is 5-8mm with simultaneous placement of dental implant. A direct sinus lift procedure can be performed when the available height is less than 4mm in a two stage or a single staged manner. For deficient height in mandibular posterior region, a nerve repositioning surgery can be performed. Alternatively, short implants and Guided Bone Regeneration (GBR) can be used in deficient height. [3]

When the bucco-lingual width is less than 3mm, (GBR) using block or particulate graft along with titanium mesh can be used in a two staged technique to augment the deficient ridge. For bucco-lingual width of 3-5mm, distraction osteogenesis can be performed as a two staged technique. When sufficient cancellous bone is available between the bucco-lingual widths of 3-5mm, we can attempt a ridge split technique with simultaneous implant placement which reduces the time and patient compliance as a second surgery is not required for the placement of the implant. [4]

The alveolar split-crest technique was originally described by Simion to deal with ridges with sufficient vertical bone height but insufficient bone width. [4] Conventionally a full thickness flap is reflected in his technique. However in cases of anterior aesthetic regions, morphogenic bone splitting technique as described by Scipioni can be performed where a partial thickness muco-gingival flap is used. His technique also avoids the use of graft materials providing a functionally favourable healing. [5]

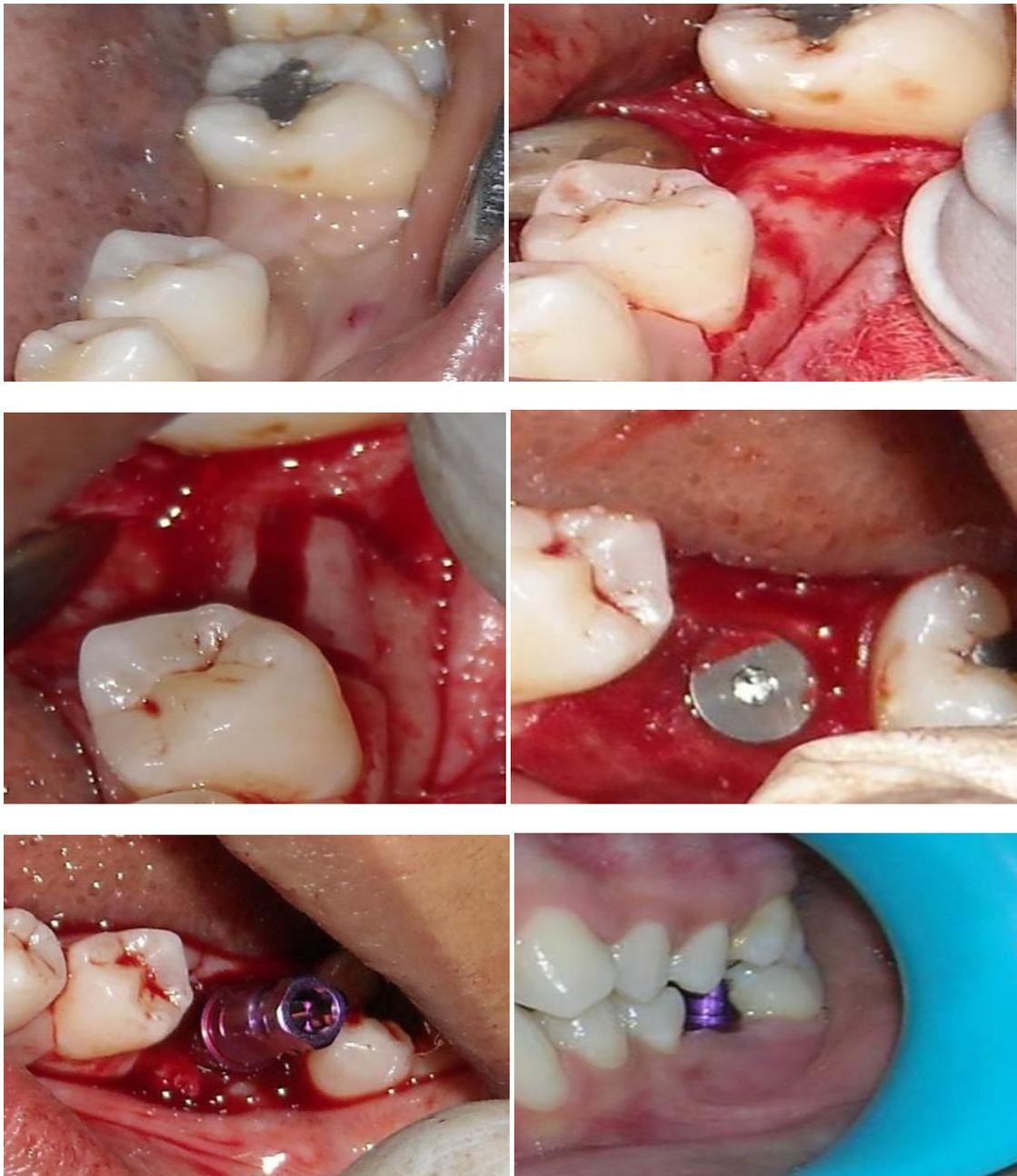
Our case report presents a compromised bucco-lingual width in mandibular posterior region managed with ridge split technique giving promising results with 8 years follow up. The crestal bone loss after 8 years was found to be 1mm which is well within the physiological range for marginal bone loss. [6-9] The long term success rate of this technique makes it an important procedure for managing compromised alveolar ridges with deficient bucco-lingual width.

CASE REPORT

A 24 year old systemically healthy female patient reported to the Department of Periodontics with missing mandibular left first molar. History revealed that 36 was extracted 5 years back due to dental caries and acute pulpitis. A CT scan was taken which revealed bucco-lingual width to be 3.5mm in a well encapsulated cancellous bone surrounded by cortical bone. Sufficient height from the inferior alveolar canal was however available. Since the residual ridge was deficient in the bucco-lingual width, we planned to expand the ridge along with simultaneous placement of implant in relation to 36.

After a complete haemogram, the patient was posted for surgery. Adequate topical anaesthetic was given followed by inferior alveolar nerve block and buccal block on the left side. A full thickness mucoperiosteal trapezoidal flap was reflected from 35 to mesial of 37 region. Bucco-lingual width of the exposed ridge as measured by bone callipers was found to be 3.5mm. Since this was a load bearing area, a wide platform implant was necessary for a long term survival rate. Hence we decided to expand the ridge

along with simultaneous placement of dental implant. Using a 701 bur, a horizontal mid-crestal cut along with sufficient saline irrigation was performed on the residual ridge leaving a safe margin of 1.5mm from the adjacent teeth to preserve the periodontal ligament space. On either sides of the horizontal cuts, a vertical cut up to 6mm height from the alveolar crest was performed. Using a series of expanders and osteotomes, the bucco-cortical plate was expanded using the wedge and lever technique. The ridge was expanded till 6mm as measured by the bone callipers. After sequential drilling, a cylindrical screw vent type Zimmer® dental implant of width 4.7mm and height 13mm was placed in relation to 36. The surrounding area was packed with Equinox Ossifi® (β -Tricalcium Phosphate with hydroxyapatite in a ratio of 30:70) bone graft. The site was covered by a collagen membrane Healiguide® of Advanced Biotech Product (India) with a punch hole in the centre to accommodate the cover screw of the implant. The membrane was then stabilized by the cover screw. The flap was approximated and sutured with tension free simple interrupted loop sutures. The patient was prescribed with Amoxicillin 500mg and Metronidazole 400mg TDS for 5 days. After 5 months, a second stage surgery for placement of abutment was performed and a metal ceramic crown was delivered to the patient in 14 days. The patient was frequently recalled for evaluation at 1 month, 3 months, 6 months, 1 year, 2 years, 5 years and 8 years. The CBCT taken after 8 years revealed a crestal bone loss of 1mm which is well within the physiological range for marginal bone loss.





DISCUSSION

Edentulism can occur due to various causes. Pre-existing pathologies like periodontitis and pulpitis followed by extraction can lead to atrophic bone not ideal for an implant placement of sufficient height and width. In such cases, it would be heart breaking to abandon the ridge and not providing an implant with similar success rate. The alveolar split-crest technique was originally described by Simion to deal with ridges with sufficient vertical bone height but insufficient bone width. His procedure involved splitting the alveolar ridge longitudinally in two parts using a chisel; provoking a greenstick fracture and then augmenting with graft material with simultaneous implant placement. [4] Scipioni et al described a similar technique of ridge split with a success rate of 98.8% which is similar to the success rate of placing implants in native bone. [10] Coatoam described a technique in which he stabilised the cortical plates of either side using a ligature wire. [11]

The segmental ridge-split technique is indicated in cases where the alveolar height is sufficient but the bucco-lingual width is insufficient for implant placement. Adequate amount of cancellous bone should be present in between the buccal and the lingual cortical plate. It works best in a localized bone defect where we wish to place one to two implants. The ridge should be vertically intact with a wide base to promote primary stability. [12]

In the present case report, we chose to use the ridge split technique since the height of the alveolar crest from the inferior alveolar canal was sufficient and the width for the placement of a wider platform implant was compromised. The necessity for wider base implants occurs in functional load bearing regions. We chose to use full thickness flap technique as given by Simion [4] since it was not an aesthetic area. Post-operative images after 8 years follow up shows adequate soft tissue coverage without any soft tissue loss. The CBCT taken after 8 years follow up shows crestal bone loss of only 1mm. This qualifies for 100% success of this technique over a long term follow up according to Albrektsson's criteria of implant success. [13]

CONCLUSION

Ridge split technique for deficient width of alveolar bone is a paramount technique with a high success rate over a long term follow up.

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