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Placing short implant using osteotomes: Solution to resorbed maxilla

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Type of Publication: Case Report

## Conflicts of Interest: Nil

## Abstract

According to the previous and recent studies the debate regarding the short and long implants continues and posterior maxilla is one such region where both atrophy of bone sinus pneumatization impedes implant placement and forces us to think of short implant as an alternative to rehabilitate the posterior maxillary region. The research on short and long implants proves fruitful when it helps the clinicians to avoid the complex surgical procedures on patients and rehabilitating them .Moreover when we combine the Osteotome technique of placing the short implants it helps in preserving the already soft and deteriorating maxillary bone. The aim of the narrative case report is to describe and highlight the placement of short dental implants in atrophic maxilla using the Osteotome bone expansion bicortical anchoring technique.

**Keywords:** short and long implants, bone loss, expansion osteotomes, maxillary atrophy, short implant survival, dental implant.

**Case Report:** A 45 year old female patient in good health reported with a chief complaint of difficulty

in chewing from upper left back tooth region due to pain. On intraoral examination the upper left first molar and second molar were found to be grossly decayed. Complete radiographic and clinical examination was also done which showed a periapical pathology in 26 and loss of crown structure After discussing the prognosis of both the in 27. teeth with the patient the available treatment options were also informed. The patient decided to go for immediate extraction followed by implant placement. ADIN Long implant[5mm D,10mm L] was placed in region 26 via conventional drilling technique whereas ADIN short implant[4.2mmD,10mmL] was decided for region 27 due to less bone availability by lifting the sinus floor indirectly through a crestal approach using the expansion Osteotome technique and restore the implants using delayed loading protocol.[Fig 1]

**Procedure:** Pre operatively the patient was subjected to a detailed clinical and radiographic examination of the hard and soft tissue which provides necessary diagnostic information for proceeding with the implant therapy. Patient consent was obtained , Cone Beam Computed Tomography (CBCT) was obtained to

assess the bone quality and quantity also the bone height was evaluated before extraction. On the day of surgery the patient was prepared and was given a posterior superior nerve block (PSA), greater palatine nerve block and infiltration around both the teeth and appropriately anesthetized .Intrasucular and vertical incisions were made with a 15c blade the teeth were luxated first and then carefully extracted bv sectioning so that we preserve the buccal plates as well as the interdental bone. The granulation tissue was removed, the socket was debrided and irrigated with betadine and saline followed by which the preparation of osteotomy began. A periodontal probe was inserted into the socket wall using tactile sensation. First implant(ADIN) was placed in region 26 of length 5mm and diameter 10 mm using conventional drills sequence where the final drill was short of the diameter and engaged the interdental bone which gave a primary stability of 40Ncm. Then we proceeded towards region 27 where indirect sinus lift osteotomes expansion technique had to be using applied since the distance between the root apex and sinus lining was less to place conventional implant. The placement began with 2mm pilot twist drill up till the desired depth leaving 1mm bone. Subsequently the implant bed was prepared using concave osteotomes[Jull-Dent Dental Implant Instruments &Dental [Implant ,Mumbai] starting from smaller to bigger diameter. [Fig 2,3,4] The osteotomes were inserted and rotated simultaneously and were kept inside for 30 to 60 seconds to allow the bone to expand before inserting the bigger diameter osteotome.[Fig 5]. The valsalva maneuver was performed was performed on multiple occasions to detect any communication an no oroantral communication was noted. Elevation of the maxillary sinus floor was done using the osteotome of diameter 4 which was malleted to the planned working depth .Mallet was used with gentle tapping, vigorous tapping was avoided so that we do not tear the sinus membrane followed by which the implant was inserted with a primary stability of 35ncm ,cover screws were placed and flaps were sutured. Baseline radiograph (IOPA) was obtained and bone level measured .[fig 6].

**Post-Operative Instructions:** After the surgery the patient was asked to used ice pack to avoid any edema

or swelling and were asked to refrain from blowing vigorously through the nose sucking through straws to avoid increase or decrease in maxillary air pressure. To prevent secondary infection of the sinus and surgery site 500mg amoxicillin, Metrogyl 400mg Betadine rinse and 0.2% chlorhexidine mouthwash was prescribed. Post 10 days the patient was called for suture removal.

**Radiographic Assessment:** Three radiographic readings[IOPA] were planned to assess the bone levels around both the implants. .

1. Baseline

2.4 months.[fig 7]

3. 3 months post loading

Post second stage surgery when the patient was recalled for impression making of the screw retained prostheses.[fig 8] the necessary radiographic assessment was also performed .RVG XRAY were obtained using long cone paralleling technique (70kv, 10 mA, 0.2 seconds), to avoid error and standardize each IOPA RVG HOLDER[RINN XCP FILM HOLDER ] [fig 9] was used and the x-ray was digitized using a specialized software [SOPRO IMAGING SYSTEM version 2.0.272.0). Marginal bone loss will be measured on the mesial and distal sides of the implant using computer assisted calibration using standardizes 1mm grid. The distance from the implant-abutment interface to the first bone implant contact[FBIC] will be measured separately on both mesial and distal sides .If the measured value is more than the previous value there will be bone loss, if the measured value if less than the previous value there will be a bone gain

**Discussion:** Edentulism typically results in progressive resorption of the alveolar bone. When advanced maxillary atrophy has occurred, prosthetic rehabilitation with standard implants can be difficult or even impossible. Edentulism typically results in progressive resorption of the alveolar bone As a result, different strategies have been developed for deficient maxillary bone to enable implant placement when limited bone is available [1]. With the increasing use of dental implants for the replacement of missing teeth, implants of varying dimensions have been fabricated in an attempt to manage different clinical scenarios This growing demand on dental implants led to many manufacturers entering the dental implant industry, with more than 220 dental

implant brands worldwide. Each implant system has its own diameters and length.[2]. Ten Bruggenkate et al [3] introduced the term "short implant" in a study involving 6mm-long osseointegrated implants. However, the definition of short and ultra-short implant remains inconsistent in the literature. Classification of any implant as "short" or "ultra-short" requires consideration of the implant's intra-bone length.[4] Thomas Driskell invented the Bicon system of dental implants in 1968, with the introduction of the 8-mm implant. Until 1979, the shortest conventional endosseous implants available were 10 mm in length. In this year, Branemark introduced the 7-mm implants Many companies have implants as short as 5 mm in their armamentarium. [5] So the classification is quite irrational .For the purpose of this case report  $6^{th}$  European Consensus Conference of European association of Dental Implantologists in 2011 approved the classification given by Olate which states implant as short if their length is <8mm, medium if between 9 to 13mm and long implant if > 13mm[6]. Oikarinen et al conducted a radiographic study in a population of 431, it was found that the placement of an implant of at least 6mm length was only possible in 38% maxilla, after going previous demographic studv through .systematic reviews showed that short implants are not as successful as long implants[7]. According to Misch survival of short implants is low as well as high .[8]Short implants are less successful in maxilla than in mandible.[9].Rossi et al wanted to compare the clinical and radiographic findings obtained between short and long implants however implant loss as well as bone loss was seen to be greater in short implants [10].In the case of zadeh et al, the main objective was to study whether bone loss occurred in a similar way in both short and long implants .they concluded that marginal bone loss was significantly lower in short implants that in standard implant.[11], also a study reported by kyun-Jin lee et al [2012] which stated that there was a bone formation around short implants with higher crown implant ratios which is called as the stress shielding effect .[12]So the factors like poor bone quality of maxilla. Resorbing nature of maxilla , techniques of implant placement, and rehabilitating posterior maxillary ridges by saving the available bone in less time, various views short implants came into picture and it had become even more

important to find out a protocol regarding placement short implants by which we can save the patient from procedures like direct sinus lifts, long wait after grafting which demanded financial, psychological ,physical co-operation from the patient.[13] So we opted for summers technique of bone expansion .Anitua et al [14]described maxillary bone expansion using summers osteotome which are a set of cylindrical instruments with concave tip which compresses the bone laterally and apically thereby improving the bone density .The possibility of anchoring the implants in the external cortical layer of maxillary sinus ensures good primary stability referred to as bicortical anchoring without much bone loss which occurs due to conventional drilling . so by techniques and concept of short and combining 2 long implants we rehabilitated the posterior maxilla in the above case report.

#### Conclusion

1. Short implants prove a suitable alternative for resorbed maxilla.

2. Short implants are an advanced surgical technique and should be utilized once the clinician is familiar with a conventional implant protocol as the margin of error in surgical technique is very small.

3. Osteotome improves the bone density as well as prevents further bone loss which happens while drilling technique

4. Surgeons experience and learning curve matters when one uses osteotomes .

5. Bone loss is unavoidable where we encountered 1.5 to 2mm bone loss distally post 6 months around short implants which was also reported in a retrospective study by Frank Peter Strietzel et al [15] who also encountered a 1mm bone loss post 6 months of functional loading which gives us an indication to have a follow up of patients post this technique and functional loading uptill first 2 years .

6. Osteotome technique not to be used in type 1 and type 2 bone quality and also in patients suffering with Benign Paroxysmal Positional Vertigo [BPPV].

7.Technique proves fruitful when there is no height to place implant in posterior maxillary region and also when the patient is not ready to invest in invasive surgical procedures.

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### **Legend Figure**









Figure 2



Figure 3



Figure 4



Figure 5: Preparing osteotomy using osteotome and mallet



Figure 6: Baseline IOPA



Figure 7: post 4 months IOPA



Figure 8: Screw retained crowns



Figure 9

