ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 09, pp.58125-58128, September, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

IMPLANT OPTIONS FOR MAXILLARY POSTERIOR RESORBED RIDGES: BASICS TO BEYOND

***Ruthika Patil**

Dr. D. Y. Patil Dental College and Hospital, Pimpri, Pune

ARTICLE INFO

Article History:
Received 11th June, 2017
Received in revised form
13th July, 2017
Accepted 08th August, 2017
Published online 30th September, 2017

Key words:
Maxillary sinus,
Augmentation,
Implants.

ABSTRACT

Most challenging area of: Oral cavity to place implants is maxillary posterior region. Factors leading to failure of implants in this region include; unfavorable anatomical region, decreased bone quality, resorbtion pattern following tooth loss and enlargement of antrum with age. One of the options for rehabilitating posterior maxillary resorbed ridges was the use of posterior cantilever on implant prosthesis. But cantilever are avoided for they lead to, screw loosening, fracture and bone loss. This following paper reviews all basic and advanced implant options for maxillary posterior resorbed ridges.

Purpose: The standard of care regarding tooth loss replacement is evolving towards the use of dental implants. The practice of fixed bridges and partial prosthesis can be and are iatrogenic to the existing teeth and bone. Because of this principle the emphasis has focused on optimization of the alveolus to receive a root form implant. Dental implants are a viable treatment option when there is sufficient quantity and quality of bone to achieve the desired functional and esthetic results. Initially, malposition or short implants were used in areas of deficient bone volume. This often resulted in compromised prosthetic design and poor long term treatment outcomes. Therefore, the procedures for bone augmentation and implants options for posterior maxillary resorbed ridges are put forward in this the review.

Materials and method: This theoretical and review paper focuses on bone augmentations procedures and implant options for maxillary posterior resorbed ridges.

Results: Although the management of posterior maxillae presents many challenges for implant practitioners, progress on no of the fronts have made it increasingly possible to create successful bone anchored restorations in this region predictably.

Conclusion: When atleast 8mm of bone is available then conventional implant can be planned, if not, variety of bone augmentation procedures are employed. Alternatively the use of implants which draw support from more distant bony sites such as pterygomaxillarysite, zygomatic bone have also been proven successful.

Citation: Ruthika Patil, 2017. "Implant options for maxillary posterior resorbed ridges: Basics to beyond", *International Journal of Current Research*, 9, (09), 58125-58128.

INTRODUCTION

Dental rehabilitation of partially or totally edentulouspatients with oral implants has become a routine treatment modality in the last decades, with reliable long-term results (Alberktsson, 1986). However, unfavorable local conditions of the alveolar ridge, due to atrophy, periodontal disease, and trauma sequelae, may provide insufficient bone volume or unfavorable vertical, horizontal, and sagittal intermaxillary relationships, which may render implant placement impossible or incorrect from a functional and esthetic viewpoint (Mtteo, 2009). With this we are left with following options for rehabilitation of maxillary posterior resorbed ridges.

Corresponding author:* **Ruthika Patil,
Dr. D. Y. Patil Dental College and Hospital, Pimpri, Pune

Basic procedures

- Bone augmentation procedures
- Palatal positioning of implants

Advanced procedures

- Basal implants
- Zygomatic implants
- Pterygoid implants

Basic Procedures

Bone augmentation procedures: The deformity is often a composite loss of both bone and soft tissue. The alveolar bone loss frequently occurs in a three dimensional pattern. Multiple options and techniques have been advocated for correction and

reconstruction of the atrophied alveolar bones (Motamedi, 2013). They include the following: Guided bone regeneration (GBR), onlay bone grafting (OBG), interpositional bone grafting (IBG), distraction osteogenesis (DO), ridge- split (RS), and sinus augmentation techniques (SA) (Aghaloo, 2007; Thomas, 2000 and Isaksson, 1992). The complexity of the defect dictates the selection of the appropriate technique. The reconstruction must also take into account the three dimensional spatial relation of one arch to the opposing arch.

Rationale for bone augmentation

From the previous discussion sufficient amount of bone volume should be available to provide the optimum biomechanical foundation for implant placement. Sufficient bone volume will allow placement of wide diameter implants with sufficient length and number as needed by the treatment plan instead of using small sized, short implants that were only used because of insufficient bone volume compromising the treatment outcome. Adequate bone volume allows placement and alignment of implants with optimum axial inclination to receive occlusal forces in a more favorable axial direction. It is worth mentioning that proper selection of the implant design is of paramount importance in achieving long term success (Rieger, 1986). The emergence profile is greatly dependant on the bone surrounding dental implants allowing optimum soft tissue drape around the abutments for ideal esthetic results (Jivraj, 2006).

Bone augmentation techniques

Socket preservation/ Guided bone regeneration

Physiologic bone resorption results in unpredictable loss of bone following teeth extraction. This can lead to less than ideal bone volume available for implant placement especially in prolonged cases of edentulism. Multiple types of grafting materials have been used to fill the extraction sockets immediately after extraction in order to maintain the space of the extraction site and prevent its collapse. This will allow for more organized bone healing maintaining the bone height and width necessary for implant placement. Following grafting the socket, barrier membranes are used to provide guided bone regeneration by protecting the underlying grafted site during healing from undesirable cellular population from the overlying soft tissues that might compromise the outcome (Figs. 2, 3).

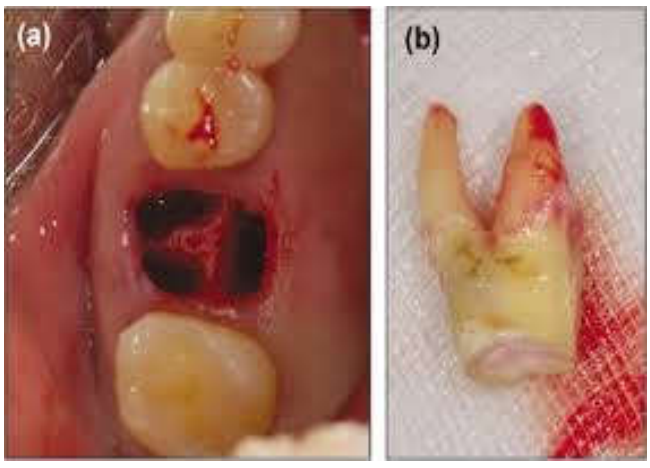


Fig. 2. Socket preservation following extraction

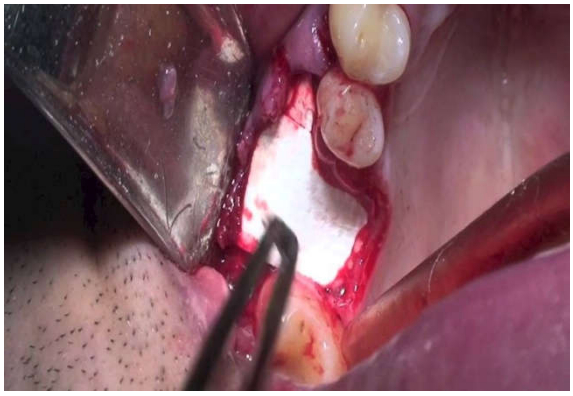


Fig. 3. Grafting particulate bone

Block bone grafting technique

Block grafting approaches can be used to reconstruct significant deficiency in the vertical and horizontal dimensions of the alveolar ridge. Autogenous block grafting procedures remain the gold standard for ridge augmentation. However, donor site morbidity associated with graft harvest has turned the attention to using allogenic grafting materials. The locations for harvesting intraoral block grafts include the external oblique ridge of the posterior mandible(ramus), symphysis. With bone defects >2 cm, an extraoral donor site is warranted for harvesting larger bone volumes. Figure 4 shows different doner site.

Fig. 4. Ramus bone harvest

Ridge expansion (split) technique

With a narrow ridge, splitting the alveolar bone longitudinally, using chisels, osteotomes, or peizosurgical devices, can be performed to increase the horizontal ridge width, provided the facial and lingual plates are not fused and some intervening bone is present. With adequate stability of the mobile segment, sufficient interpositional grafting and soft tissue protection, comparable results to alternate techniques can be obtained. The decision to place the implants simultaneously with the split procedure or delayed placement following bone healing depend on the degree of stability of the expanded segment and the volume of remaining bone.

Sinus augmentation

The most commonly used technique used to access the maxillary sinus is the lateral window technique modifying the

Caldwell-Luc operation, also called the hinge osteotomy technique, originally described by Tatum then first published by Boyne and James. A window is then created using a round bur on the lateral wall of the sinus till the bluish hue of the sinus membrane reveals itself. Using specially designed sinus elevation curettes the sinus membrane is elevated from the bony floor and is freed anteriorly, posteriorly and medially to create a tension free elevation to minimize the possibility of perforation. The trap door (window) is intruded medially forming the new sinus floor and the space created below it is then grafted to provide the platform for implant placement. The flap is then repositioned and closed. Implants are placed either simultaneously with the graft (one- stage) or after a delayed period of up to 8 months to allow for graft maturation (two- stage).

Future augmentation approaches

Future bone augmentation approaches likely will use molecular, cellular, and genetic tissue engineering technologies. Gene therapy is a relatively new therapeutic modality based on the potential for delivery of altered genetic material to the cell. Localized gene therapy can be used to increase the concentration of desired growth or differentiation factors to enhance the regenerative response. Cellular tissue engineering strategies that include the in vitro amplification of osteoprogenitor cells grown within three dimensional constructs is currently of particular interest. The use of mesenchymal stem cell for construct seeding showed promise for bone regeneration. These approaches may lead to further refinement and improvement in alveolar bone augmentation techniques.

Palatal positioning of implants

These are palatally positioned implants using optimally the palatal buttress and basal bone facilitating the rehabilitation of the severe resorbed posterior maxilla as an alternative method to avoid sinus grafting.[9] These implants are placed in the palatal sulcus direction, in the bone impression of the great palatal bundle. Furthermore, with palatal positioning of implant good primary stability could be achieved.

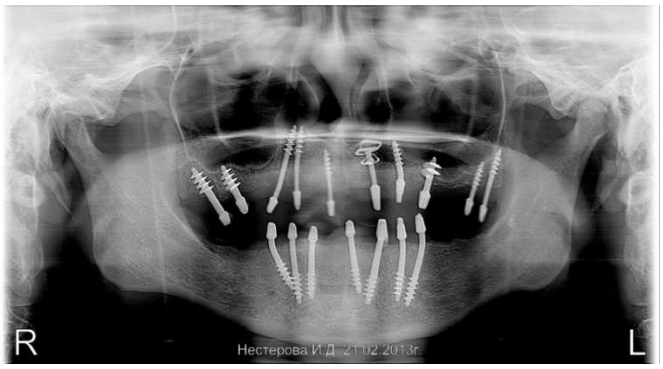
ADVANCED PROCEDURES

Basal implants: Crestal and basal implants are endosseous aids to create Osseointegrated points of retention for fixed or removable dentures (Ihed, 2009). These two implants are not only differentiated by the way they are inserted and also by the way forces are transmitted. These basal implants are synonymously called as lateral implants or disk implants. For this reason, the literature on basal implants has introduced the terms “orthopaedic technique” and “orthopaedic implant” to mark a clear distinctions between them and the well-known term “dental implants”.

Rationale

The term basal implants refer to the principals of utilizing basal bone areas free of infection and resorption and the employing of the cortical bone areas. This rationale stems from orthopedic surgery, from the experience that cortical areas are needed in the structure. Therefore, are resistance against resorption and reconstitute itself easily (Ihed, 2009). In the basal implants, the vertical implant parts (which connect the base plates with the abutments) do not participate in load transmission to the bone primarily, and that is why they are provided as thin and polished. Lateral basal implants which are inserted from lateral aspect of the jaw bone, provide the disk diameter of 7mm or more, and are inserted through a t shaped slot into the jaw bone(t shaped slot is inverted in the mandible).

Indications: Through utilizing horizontal, vertical and oblique bone support, these devices can be implanted under all anatomical conditions, even immediately post extraction. When planned and carried out properly with enough implants, the device allows immediate loading even in cases exhibiting severe jaw bone atrophy.

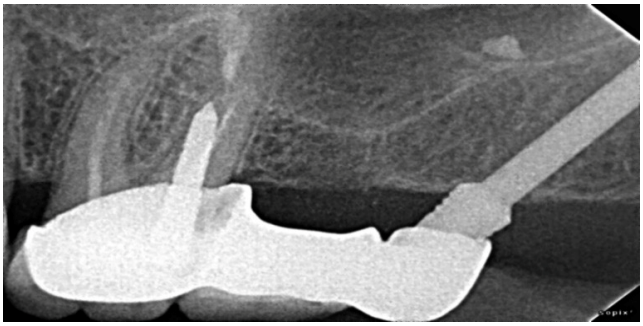


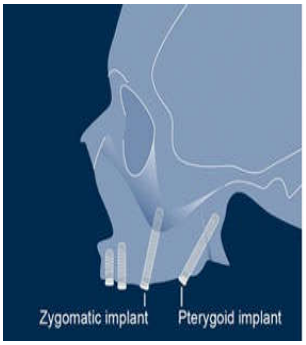
Functional overload osteolysis

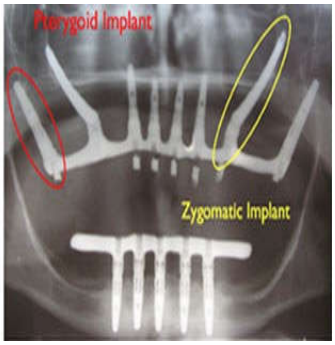
The masticatory forces transmitted via basal implants to an enossal location create local micro cracks in the cortical bone. If micro-cracks appear at the bone implant interface, the reduction in mineralization also can be seen in radiographs, where the osteolytic areas intiallyexihibits only diffuse radiologic borders. As long as the bone substance is not torn away from the implant and the area is not superinfected, the loss of mineralization remains diffuse but usually reversible. Basal implants in this status have a good chance of getting reintegrated at a high degree of mineralization, if loads are reduced to an adequate amount.

Tuberosity and Pterygoid implants

There has been long standing feeling among the clinicians that the pterygo maxillary region of the maxilla was unsuitable for implants because of the large fatty marrow spaces, limited trabecular bone and rare presence of cortical bone covering alveolus (Thomas, 2002). However, subsequent clinical trials showed that titanium fixtures could successfully osseo-integrate in this area (Balshi, 1992). Indeed some of the pterygomaxillary structures may provide stability that exceeds that offered by the anchorage in any part of maxilla (Tulasane, 1992). Reisers anatomic investigation have showed that the specific structures that may support implants are tuberosity of the maxillary bone, the pyramidal process of palatine, and the pterygoid process of spheniodbone (Reiser, 1998). If height width and length of tuberosity is not adequate, however the implants can be angled and the apex is made to engage the pterygoid process or palatine process or both. Recent observations and measurements of the height, anteroposterior distance, and mediolateral distance of the pyramidal process indicate that placement of implants in the lower half of the pyramidal process is advantageous (Lee, 2001).







Placement of total 10 implants, 6 in anterior maxilla,2 in pterygomaxillary area and 2 in zygomatic area.

- Zygomatic implants are indicated in cases of severe resorption of the maxilla:
- Free end situations in the maxilla where insufficient bone height is available for standard implant insertion and in total edentulism
- With reduced bone height of the posterior region
- Pneumatization of the sinuses decreases the anterior area of the maxilla allowing the placement of only 2, 3 or 4 implants.
- The presence of residual alveolar crest with less than 4 mm in width and height, immediately distal to the canine pillar
- The presence of buccal concavities in the maxillary sinus areas, which precluded intrasinus placement of zygomatic fixtures with the implant head emerging within a distance of 10 mm medial from the top of the alveolar crest.

Because of its insertion in the zygoma region, the zygomatic implant can be used in all of these situations. In cases of very severe resorption of the anterior maxilla in totally edentulous patients, when bone grafting cannot be avoided, the use of zygomatic implants reduces the dimensions of the bone graft and the surgery is made easier.

Conclusion

This literature review has demonstrated that a wide range of surgical procedures can be used to correct deficient edentulous ridges. Although the management of posterior maxillae presents many challenges for implant practitioners, progress on numbers of the fronts have made it increasingly possible to create successful bone anchored restorations in this region predictably. When at least 8mm of bone is available then conventional implant can be planned, if not, variety of bone augmentation procedures are employed.

Alternatively the use of implant which draw support from more distant bony sites such as pterygomaxillary site, zygomatic bone have also proven successful. Future breakthroughs in the areas of tissue and genetic engineering are likely to enhancethe developments still further.

REFERENCES

Aghaloo, T.L., Moy, P.K. 2007. Which hard tissue augmentation techniques are the most successful in furnishing bony support for implant placement. *Int J Oral Maxillofacial Surgery*., 49-70.

Alberktsson, T., Zarb, G., Worthington, P., Eriksson, A.R. 1986. The long term efficacy of currently used dental implants: A review and proposed criteria of success. *Int J Oral Maxillofac Implants*, 1:11-25.

Atamni, F., Atamni, M., Atamna, M. 2011. Palaal positioning of implants in severely resorbed posterior maxillae. *Romanian Journal of Oral Rehabilitaion*., 1:34-39.

Balshi, T.J. 1992. Single tuberosity-osseointegrated implant support for tissue integrated prosthesis. *Int J Periodontal Restor Dent*., 12:345-357.

Chandana, N., Swarajya, B., Rashmi, J., Meenu, J. 2013. *Journal of Dental Sciences and Oral Rehabilitaion*., 1-3.

Ihed, S. 2009. Comparison of basal and creastal implants and theirs modus of application. *Smile Dental Journal*., 4:36-46.

Isaksson, S., Alberius, P. 1992. Maxillary alveolar ridge agumentation with only bone grafts and immediate endosseous implants. *J Craniomaxillfac Surg*., 1:2-7.

Jivraj, S., Chee, W. 2006. Treatment planning of implants in the aesthetic zone. *Br Dent J.,* 2:77-89.

Lee, S.P., Paik, K.S., Kim, M.K. 2001. Anatomical study of the pyramidal processes of the palatine bone in relation to implant placement in the posterior maxilla. *J Oral Rehabilitaion.,* 28:125-132.

Motamedi, M.K.H. 2013. A text book of Advanced Oral and Maxillofacial Surgery. Chapter 23; p.617-640.

Mtteo, C., Paolo, C., Marco, Z. 2009. Bone Augmentation procedures in implant dentistry. *Int J Oral Maxillofac Implants*., 24:237-259.

Reiser, G.M. 1998. Implant use in the tuberosity, pterygoid, and palatine region: anatomic and surgical consideration. In Nevins M, Mellonig JT, editors. Implant therapy: clinical approaches and evidence of success, vol. 2. Chicago: Quintessences, 197-207.

Rieger, M.K., Adams, W.K., Kinzel, G.L., Brose, M.O. 1986. Finite element analysis of bone-adapted and bone-bonded endosseous implants. *J Prosthet Dent*., 4:436-40.

Thomas, J., Balshi, J., Glenn, J., Wolfinger. 2003. Mnanagment of the posterior maxilla in the compromised patients: historical, current, and future perspectives. Periodontology., 33:67-81.

Thomas, J.B., Glenn, J.W. 2000. Managment of the posterior maxilla in the compromised patient:historical, current,and future perspectives. *Periodontology.,* 33:67-81.

Tulasane, J.F. 1992. Osseointegrated fixtures in the ptyergoid region. In: Worthington P, Branemark P-I, editors. Advanced osseointegration surgery: application in the maxillofacial region. Chicago: Quintessence, 182-188.

****