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Management of the posterior maxilla in short implants Vs. long implants

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Introduction

Due to hard tissue defects caused by trauma, infection, or tooth loss, anatomy of the maxillary and mandibular alveolar process is frequently unfavorable. Dental implant placement in edentulous posterior maxillary maxilla can present problems due to a horizontal or vertical alveolar ridge deficiency, poor bone quality, or increased maxillary sinus pneumatization. The posterior maxilla was known as the hardest and most problematic intraoral area for implant dentistry that demands the utmost attention for successful surgery. Anatomic structures and dynamic mastication contribute to the survival of endosseous implants in this region for a long time [1].

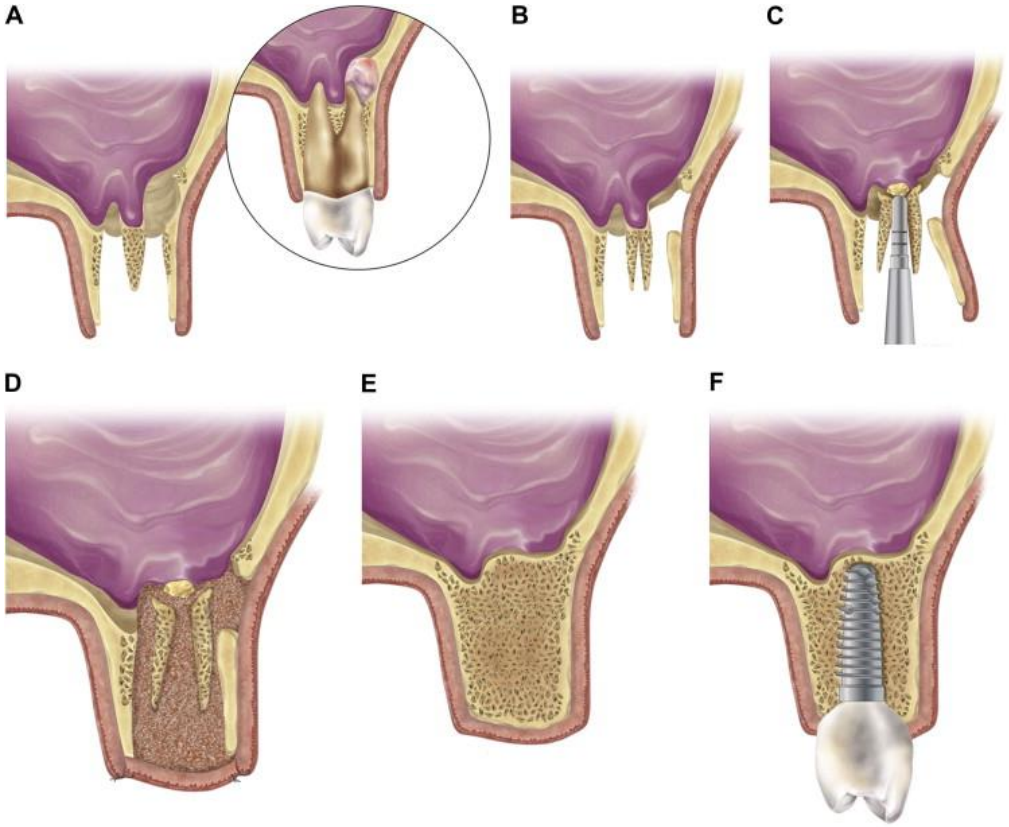


Figure (1): Segmental Alveolar Split Combined with Dental Extractions and Osteotomy Sinus Floor Intrusion in Posterior Maxilla

Over the past 25 years, surgical procedures to increase the local volume of bone have been developed, allowing for implantation [2]. Two anatomical sites, the maxillary sinus and alveolar ridge, divided hardened tissue augmentation techniques. Various operational approaches, including guided bone regeneration, onlay grafting, osteogenesis of distraction, ridge splitting, free-and-vascular autografts for discontinuity defects and socket preservation were developed and are currently being used in alveolar ridge augmentation procedures. The three most common techniques used in maxilla are the lateral

approach, osteotomic technology and ridge splitting, among the various techniques described [3].

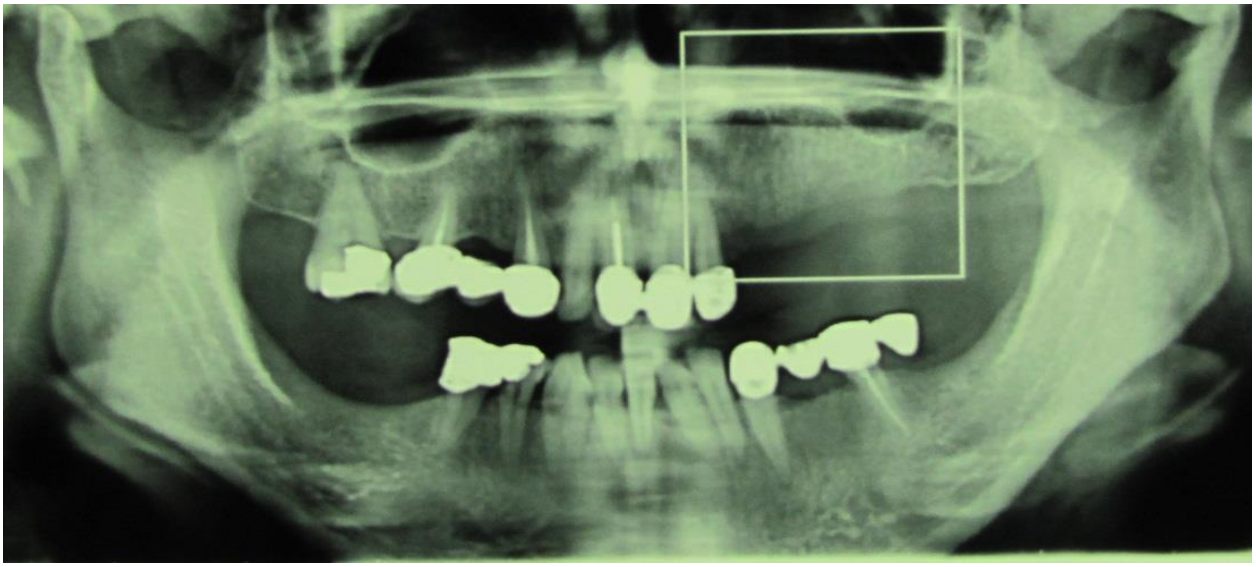


Figure (2): Dental Implant Placement in Inadequate Posterior Maxilla

Implant therapy is considered to be a predictable therapy option for the replacement of single and multiunit gaps by high survival rates of implants and prostheses [4,5]. These long-term favorable treatment results were mostly reported for Native Bone implants or for implants with a standard length and diameter only with minor concomitant regenerative bone procedures. Implant lengths and diameters have decreased steadily in the last few years. The development of better surface structures and more solid titanium alloys used to make dental implant was supporting this shift [6-8].

In addition, a range of publications using dental implants with reduced dimensions, in terms of both diameter and length, have been led by demands of patients on minimally invasive procedure, fewer complications, lower treatment costs and lower treatment time [9-11]. The primary objective after the implant is osseointegration, a solid anchorage within the bony envelope of the endoseous part of the implant. Several methods, including a resonance frequency analysis (RFA) and histological analysis, have been developed to measure osseointegration and implant stability [12,13]. On the basis of these measurements the formation of bones and the integration of implants seems to follow a certain pattern that begins with the early stage of the process of bone resorption [14], and is followed by an implant surface bone phase [15].

Dental implants have shown increased RFA values and increased contact values from bone to implant over time [16,17]. Thresholds have not been reported for either of these methods so far to determine and

predict successful long-term outcomes. One could, however, assume that increase in the dental implant dimension would lead to better results clinically. This has not been documented so far, however. In contrast, in pre-clinical experiments, attempts to break osseointegration failed in successful osseointegration and in healthy peri-implant conditions [18,19]. These findings further support the decision to reduce the dimensions of the implant and adapt it to the clinical situation.

Dental implantology is one of current dental medicine's most popular and intensively explored themes. Recently, with the broad build-up of implant support prothesis, the need for the former difficult preprosthetic surgery to facilitate partial teeth has lessened. However, a lot of comparable reconstruction treatments are inevitable due to the alveolar deficit that impedes placement of dental implants. The back maxilla is one of the most demanding anatomical regions for the insertion of an implant requiring an additional operation. This special issue offers leading research and reviews on this subject, which we think will help doctors. Insufficient bone quality and quantity at the rear maxilla are a typical clinical condition that makes it difficult to apply implants on this site. This is mostly attributable to pneumatic sinuses following tooth loss and severe alveolar resorption. The combined lifting and augmentation treatments of the subantral bone and increased interarthral distance are insufficient. T. Kanno et al. have reported results of their retrospective study titled "Simultaneous sinus elevation and alveolar distraction of a seriously atrophic postural rehabilitation maxille for dental implants" in a case series involving 27 persons. The investigation found that the new bone produced by the approach provided and the bone produced just by a sinus lift were all historically identical. Stable rehabilitation of the implants were also performed in this area. The quality and amount of the host bone are critical factors for successful implants. The bone quantity can be determined with high precision by modern radiological techniques. [20] There can, however, be no conclusive accuracy, although a number of approaches for evaluating bone quality are available. H. Bilhan et al. have reviewed existing methods used to measure host-bone quality while at the same time reporting results from a pilot experimental study comparing the densitometric dentistry (DVT) with the micro-CT dental tomography study titled "How accurate is dental volumetric tomography for bone density?" The results of the study showed Hounsfield unit assessment using DVT is not a reliable way of assessing bone density. C. Riben and Thor have published their review about the "small-floor

elevation" strategy for post-maxillary surgery, which became a popular subject for sinus elevation. Their study "Treatment for the maxillary sinus membrane elevation: bone increase around dental implants without the application of greases — a revision of an operating technique" provides the technical aspects of the procedure. The main cause of alveolar bone loss is tooth loss and this might make it difficult to place implants ideally. Various kinds of surgery to prevent bone loss are recommended. In his paper "Molar region post-extraction preservation in the alveolar ridge: biology and therapeutic," G. Pagni et al. examined various procedures. The study provides thorough information on the repair of the socket and biology of the resorption of the alveolar bone. They suggested that the improved technology for grafting would result in less intrusive surgery. Recent progress in the surface properties of the implant has led to considerable changes to former fundamentals. An rise in the osseointegration rate with the development of the dental implant surface properties has led to numerous successful implant reports that have been less than 10 mm. Today, with their freshly released 6 mm or shorter dental implants, numerous firms are on the dentistry market. As a result, practitioners can now provide their patients effective and non-invasive solutions in the event of serious alveolar atrophy, avoiding highly complicated operations. Although many clinical reports show good success levels for the mandible, the use of short implants is still disputed, in particular because of their pore structure, for single-tooth replacements. The clinical success rate of 8 mm was compared by d. Lops and others. Implants 10 mm. Implants. In its long-term study "Short implants in partly edentulous maxils and mandibles: retrospective assessments for 10 to 20 years." In general, for 8 mm and longer implants they declared similar success rates[21]

Management of the posterior maxilla

Several studies have examined the success rate of dental implants for both function and aesthetics. A sufficient amount and quality of the bone is an essential requirement for effective implant therapy. The rear edentular maxilla confronts the implant surgeon with specific problems compared to other mouth regions in this region. The presence of the maxillary sinus is very significant. The corrosion sinus is an air chamber in the corvette. It is pyramid in form and is often strengthened with vertical septide internal, forming additional cavities of the intrasinus. The dimensions of the sinus vary from person to person. The average width for the adult is 35 mm at the base and the average height 25 mm. 1 The sinus is transmitted

by the ostium to the middle meat. The membrane that borders the sinus adheres to the base of the bone. This diaphragm is exceedingly thin and is bordered by ciliated and pseudostratified epithelium. This ciliated epithel permits fluid transmission to the nasal meat. The structures below the sinus are the alveolar ridge and the back of the skin. An exterior cortex, an internal cortex in close contact with any teeth present, and a cortex below the sinus is present in the alveolar bone. Between the cortical plates is the spongy bone.[22]

The bone width decrease is attributed to the absorption of the buccal bone plate after dental extraction. With the edentulous area continuing to atrophy, bone height and density are losing and an antral pneumatics are increasing continuously. The sinus floor near the alveolar crest is therefore prevalent. This conclusion relates to two phenomenons: (1) the extension of the sinus at the expense of the Alveoli after dent extraction, simply by increasing the intra-antral positive pressure, due to the enhanced osteoclastic activity of the schneiderian membranes5 and 2). Furthermore, the maxilla consists mainly of sponge and is the least dense bone in the oral context. Often very restricted is the quantity of bone beneath the sinus. The therapy of post-machila depends on the quantity of bone in the subsinus region. Various categories were offered in order to classify the amount of bone underneath the sinus. Davarpanah et al have proposed a suitable categorization for the evaluation of bone volume in the subsinus area in three dimensions. 2 The classification of subsinus bone loss has 4 categories:[23]

1. Vertical sinus bone loss: this bone loss is due to considerable sinus pneumaticity. The remaining distance from the sinus floor to the ridge crest is shortened. The distance between the clubs is not adjusted, though. In these circumstances methods are employed to expand the volume of the intrasinus of the bone such as sinus and grease.

2. Vertical alveolar ridge bone loss (apicocoronal): This is the loss of the alveolar ridge under the sinus. The space between the clusters is increased. Such losses may impair implant placement, limit the length of an implant and lead to an undesirable ratio of crown implants. In these circumstances the volume of the crestal bone must be raised using procedures like onlay grafts and guided bone repair (GBR).

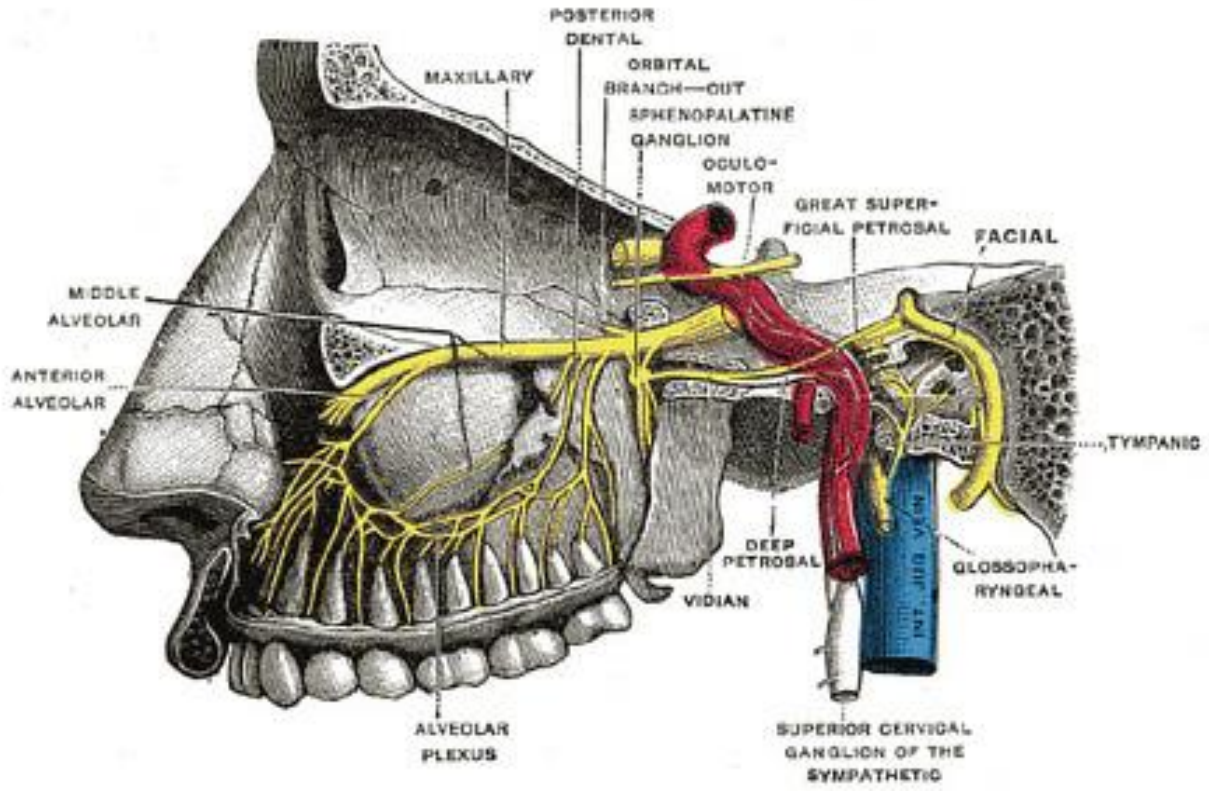
3. Bone loss in alveolar crest horizontal (buccopalatal): This is a centripetal resorption type that could result in a poor developmental implant profile. This should be corrected by surgery, either using the bone

grafts or GBR, in order to restorate the oral volume of the bone.

4. Substinal bone loss combination: This is the most frequent kind of horizontal and vertical bone loss. The bone grafts in saddle form are utilised in these cases to correct the loss of the bone. If this bone loss is linked with the loss of bone volume intrasinuum, then sinus transplants should also be coupled to the surgical procedure outlined above.[24]

Anatomy of posterior maxilla

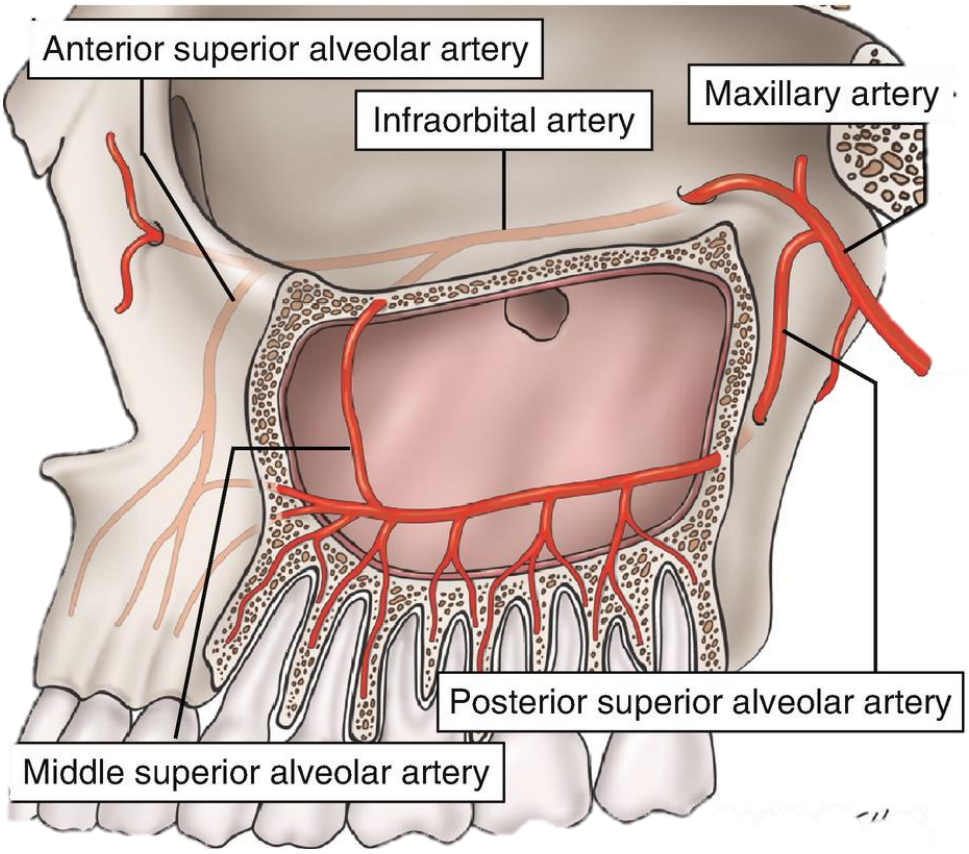
The maxillary sinus is a pyramidal cavity with an anterior wall that is corresponding to the maxillary facial surface. Until permanent teeth eruption, sinus size is minimal. The adult sinus is 2.5-3.5 cm wide, 3.6-4.5 cm tall and is 3.8- 4.5 cm deep profound on average. With ages after the maxillary molar teeth are extracted, the size of the sinus is increased. pneumatization varies among individuals and side-by-side. With the sinus membrane, also known as Schneider's membrane, is lining the internal walls of the maxillary sinus. This membrane consists of ciliated epithelium membrane cells [25].



It continues through the ostium in the central meatus and connects to the nasal epithel. The circulation of blood to the maxillary sinus is mainly derived from the posterior superior alveolar artery and the infraorbital artery, both are maxilla artery branches. Between these two arteries in the lateral antral wall,

many anastomoses have occurred. The posterior superior alveolar artery and the infraorbital artery also supply the buccal part of the maxillary sinus with such arteries. However, as blood supplies to the maxillary sinus come from the terminal branches of peripheral vessels, the branches of the maxillary artery should be considered as a means of preventing bleeding complications. The sinus nerve supply comes from the superior alveolar branch of the trigeminal nerve's maxillary division [26].

The goal of the sinus lift procedure is for compensation for the bone loss in maxillary sinuses by creating increased bones and thus allowing implants to be installed in the posterior maxilla [27,28]. Perforations of membranes and bleeding in the lateral sinus wall are procedural complications [29]. Therefore, before surgical interventions anatomy in the area should be carefully examined.



Standard Implant Placement

A mixed picture has been drawn on the long-term success of osteointegrated implants implanted in the back maxilla. Jaffin and Berman reported a greater failure rate associated with type IV bone especially for implants utilised in this location. Schnitman revealed that osseointegration only occurs in 72% of implants in the posterior maxilla. When Widmark et colleagues analysed implant results implanted in the severely absorbed maxillary of 36 patients (with 16 bone grafting patients and 20 not), they discovered

the success rates at three to five years of age at 74 percent and 87 percent accordingly in the two groups10. However, other researchers have shown substantially higher percentages of success. [30] Bahat has identified a cumulative success rate of 94.4% at the five to six years and a 93.4 percentage rate in 10 years following the analysis of experience with 660 Brånemark System implants implanted in the back maxilla, followed in 202 patients for up to 12 years after the loading. Among 529 implants implanted into the rear maxilla, Lazzara and coworkers found a 93.8 percent success rate12. According to Haas and colleagues, the Kaplan-Meier success rate was 96.9 per cent for 167 posterior IMZ maxillary implants after 80 months.respectively. When Buchs and associates evaluated HAcoated threaded implants for Steri-Oss containing 416 inside the back maxillary, their life-table study showed a success rate of 96.6 percent over 5 years.[31]

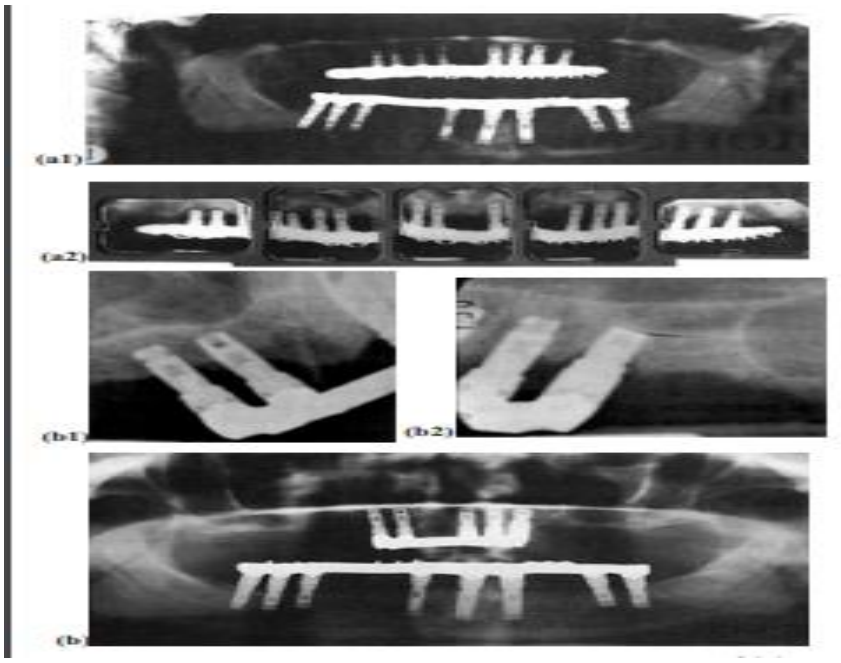


Figure 1 (a) Panoramic and periapical radiographs of maxillary fixed detachable prosthesis with cantilever illustrating advanced bone loss on posterior fixture. (b) Transition from fixed detachable prosthesis to maxillary implant overdenture one five implants after removal of three posterior implants with advanced bone loss. Note the bone loss on the remaining implants as well. (1c) Additional fixtures placed in the pterygoid region for extension of the overdenture bar for better stability.

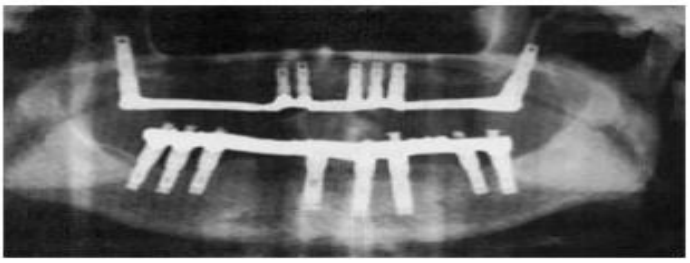


Figure 1. continued

Several recommendations have been made to achieve predictable osseointegration of implants in the back maxilla. Langer et al. proposed using wider implants to achieve a larger surface area for bone contact. More recently Bahat advocated that enough implants be placed to support the occlusal load such that nonaxial loading is not avoided. According to experience of the author, if a minimum of 8 mm bone is accessible under the sinus, standard implant placement is advised in the posterior maxilla. An implant of 10mm can be used in such instances. The implant's apical threads will involve the cortical bone layer which provides the antral ground, generating bi-cortical fixture stabilisation and a mild apical tent of the sinus membrane.[32] This tenting is analogous to the osteotome procedure for placing the fitting . Another possibility is to use lengthier implants that are tilted between the sinus floor and the canine apex or other anterior teeth beforehand. Such off-axis loading of the anterior maxillary implants showed osseointegration and the development of a solid prothesis support system. Restant bone typically occurs around the extraction site. Remaining sites also give options for normal implant insertion in posterior maxilla. The end-prothesis will not benefit from cross-arch stability if conventional implants are put into the posterior maxilla of partly edentulous patients. More implants are therefore advised in order to prevent the overload bending pressures which can induce bone loss surrounding the implants.[33]

SHORT DENTAL IMPLANTS

Implants with an endosseous component of < 8 mm > have been defined as short dental implants. These implants have been mainly introduced and clinically employed to bypass more lengthy processes for primary bone increases such as lateral sinus increases. However, according to the latter study, the survival rates in the same clinical conditions were lower than those of regular implants. The development of new implant surfaces has led to a growing number of publications for a range of purposes employing short dental implants, hence broadening the treatment choices for patients with full or partial dentures. From a clinical point of view, brief implants offer a number of clinical advantages from a patient's point of view:

fewer skills needed to perform surgery; less moral condition by avoiding more comprehensive bone growth treatments.[34] Easy removal in the event of a fault. In contrast, the negatives, such as the high curve-to-important ratio and a relatively high risk of biological and technological issues linked to possible overload may be concerned for doctors. . Neither such possible restrictions are clinically important, according to preclinical and clinical investigations, nor recent systematic reviews. With exceptions, the rates of failure of the rear maxillar with soft bone present in relation to the mandible are significantly raised and technical problems are slightly higher. In addition, long-term studies have shown that short implants have a similar rate of implant survival and biological results as long implants do.[35]

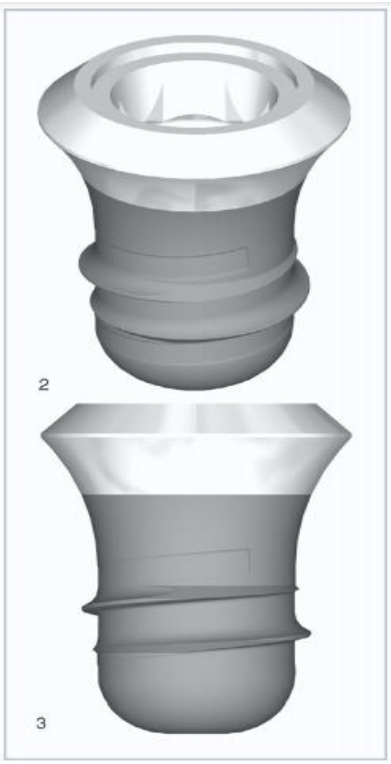
CURRENT UPDATE ON SHORT IMPLANTS

A minimum length of 10 mm was generally deemed for expected success, and so implants of this length are often called standard length implants. As a consequence, any implant less than 10 mm is called a "short" implant. The authors chose to investigate the answers to the most often asked queries from other peers before advising themselves freely about the usage of brief implants. Why, for example, if other success ways are established, would a surgeon suggest this alternative? What are the benefits of short implants and what are their difficulties? How do you handle some of the challenges of your little duration? Do they offer success rates comparable to those of ‘‘longer’’ implants? [36]

Advantages

In the severely absorbed postal maxilla there are various advantages of using short implants as a therapeutic option. Patients need not necessarily engage in extra pre-surgical diagnostic testing, such as CT, if "bone sounds" may prove enough if the sinus is to be avoided. Extra expenditures, periods of time and radiation exposure result from tests such as CT scans. The scans are most often asked for when researching the idea of sinus augmentation operation in the case of a 10 mm borderline implant case. In many instances, short implants, in combination with the risks and problems of such procedures, enable the operator to avoid altogether sinus elevation.40–42 These advantages, on their part, motivate patients and provide increasing patients with acceptance of implant-based treatment schemes. There will therefore be additional treatment options in the inventory of therapies for the implant surgeon if the available follow-up clinical studies reveal that it is wise to employ short implants in certain cases.[37]

FIGURE 1. A Nobel Replace Tapered Groovy implant 8 mm in length and 5 mm wide by Nobel Biocare. The surface of this implant is ‘‘rough’’ (acid etched) named ‘‘Ti-Unite.’’ This implant has an internal abutment connection system; namely the ‘‘tri-channel’’ connection.



FIGURES 2 and 3. A Straumann-ITI implant 6 mm in length and 4.8 mm in width with a 6.5 mm wide neck collar. The surface of this implant is ‘‘rough’’ SLA (Sand blasted; Large grit; Acid etched). This

implant has an internal abutment connection system; namely the ‘‘morsetaper’’ connection.

Disadvantages

Considering the benefits outlined in Table 1, it appears acceptable to infer that short implants are now part of the mainstream implant dentistry. However, because to various connected problems, there is still dispute concerning their indication:

• Lowering surface implant; thus, after osseointegration, reduced bone implant contact.

• Lower force distribution after charge; increased crestal bone pressure; further resorption leading to more exposed thread, reducing osseointegrated implant surface. Reduced force distribution.

• Committed ratio of crown to implant.[38]

So how can we overcome the challenges associated with short implants?

FIGURE. A Branemark implant 7 mm in length and 5 mm wide by Nobel Biocare with a Ti-Unite surface. This implant has an external connection system; namely the ‘‘external hex.’’

The Maxillary Sinus Membrane Elevation Procedure: Augmentation of Bone around Dental Implants without Grafts—A Review of a Surgical Technique:

- **Background on Sinus Lift**

Resorption of the alveolar process takes place during long-term edentulism. Given the fact that the maxillary sinus also pneumatizes, the residual volume of the bone can become very little and physicians and researchers have continually created strategies to resolve the problem.

The sinus lift is an operation aimed at creating an enlarged bone volume in the corrugated sinus so that devices are installed in the area. The grease in the bottom of the sinus can be permitted to cure principally prior to implants undergoing a second surgery (2-stage procedure) (1-stage procedure). However, the grafts are exposed to a somewhat significant degree of recovery.

The sinus lift technique was first disclosed orally by Tatum in 1976, first written by Boyne and James in 1980 and then by Tatum in 1976. The operation has developed and there are variants. Autogenous bone was eventually substituted by many surgeons by the use of bone substitutes, considered as the preferred choice but with an essential downside of an unpredictable resorption rate. There is an incredible selection of materials placed into the sinus and examined. Later study includes experiments of rhBMP-2 and the use, together with inorganic bovine bone, of mesenchymal stem cell(MSC). Tetsch et al. provided in 2010 a long-term follow-up to the implant's satisfactory survival utilising two regularly utilised techniques, the technique of lateral sinus floor elevation and the osteotome technique. They used Kaplan-Meier analysis and demonstrated an implant survival rate of 97,1 percent in 983 patients with 2190 implants during a period of 176 months.[39]

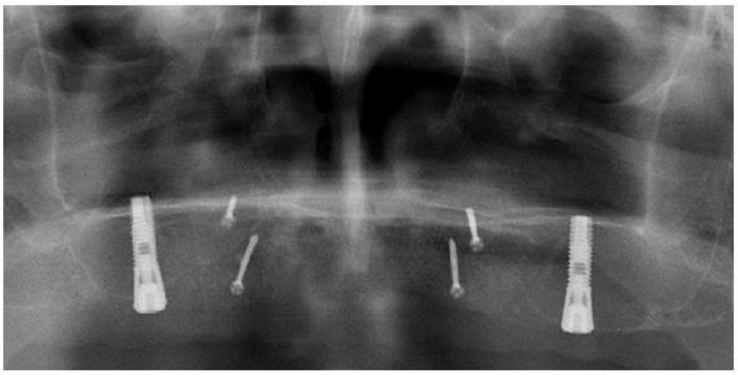
Surgical Technique

The idea and technique of basic surgery have not altered appreciably. The oral mucosa of an anterior maxillary sinus wall gives intraoral access to the maxillary sinus. A bony window is being developed to dissect the sinus membrane to the sinus floor to promote bone development in a remote location, alone or around placed implants. The ossic window was usually connected and raised superior to the membrane.

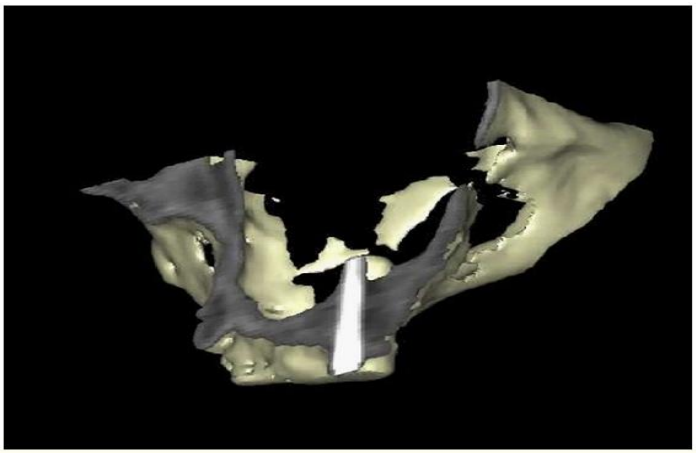
The technique of sinus lifting has evolved over time, and there are now various minor modifications. The procedure is usually carried out with local sedation and anaesthetic.[40]

Sinus Lift Surgery with Simultaneous Installation of Implants without the Use of Grafts

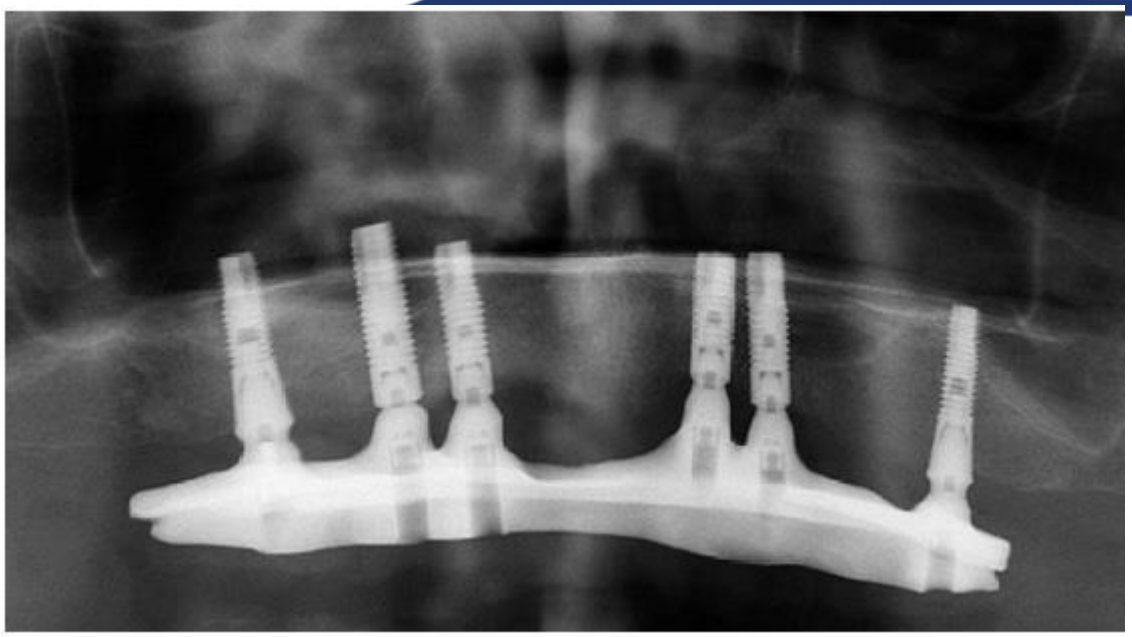
Due to the idea of the need to graft the maxillary sinuses and major industry investments in producing goods for this field substantial experimental and clinical research has been done for more than 30 years. The idea of a graftless increase in the maxillary sinus eventually evolved.[41]



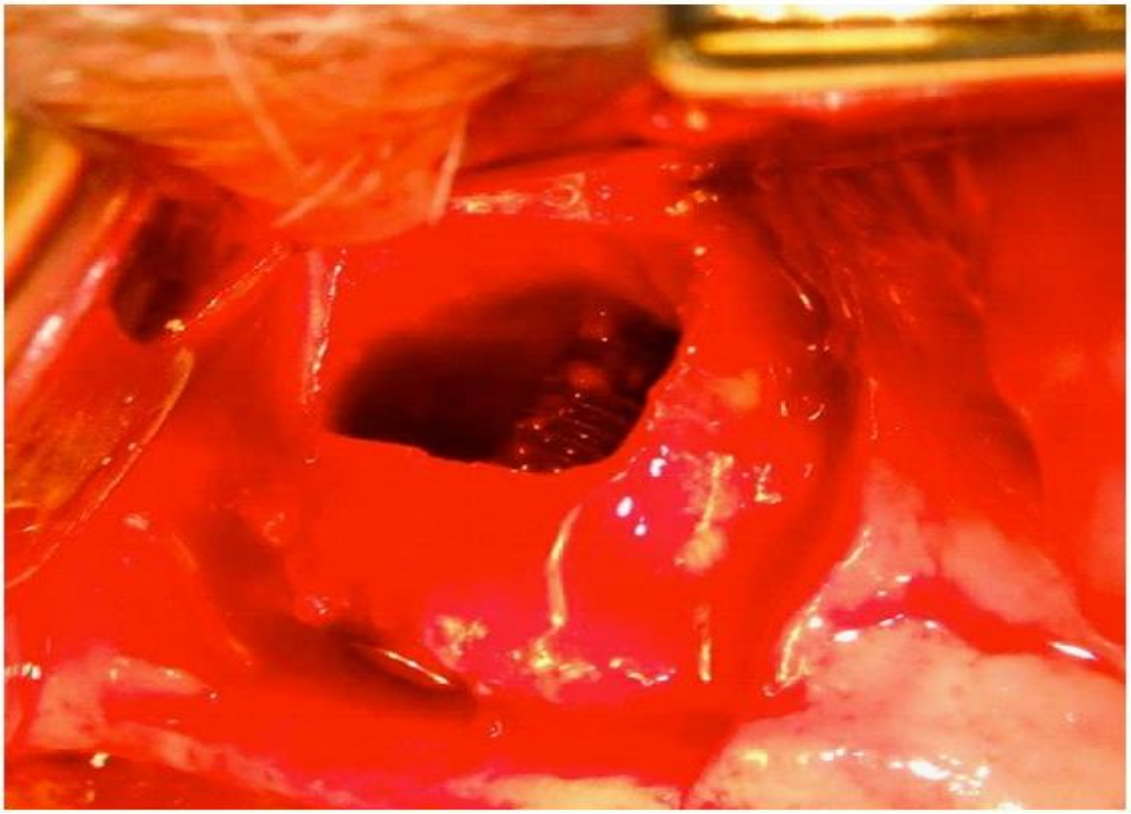
One-week postoperative baseline panoramic view over reconstructed atrophic maxilla. Block bone grafts attached with titanium screws in the anterior and sinus membrane elevation performed in the maxillary sinus floor. Notice the minute amount of bone (1-2 mm) in the sinus floor. The conical shape of the marginal part of the implant represents 5 mm.



3 D reconstruction of CT scan from the same patient as in six months postoperatively, left side. Bone is formed around implants in the maxillary sinus floor.



Situation 3 years postoperatively.



Surgical technique. An osteotomy is performed, and the bony window is temporarily removed. The installed implant is here seen elevating the sinus membrane, and, after blood has filled the created compartment around the implant, the bony window is thereafter replaced.

In a 1993 primate investigation, Boyne submitted experimental results which resulted in implants being left ungrafted into the sinus floor for 5mm and experienced creation of bones.

The method of installation of 80 fixtures at the posterior maxilla of 24 periodontally affected patients was published by Ellegaards and colleagues in 1997, of which 38 involved maximum sinus operations . In the

lateral wall of the antral at least 5 mm above the estimated maxillary sinus floor, a circular fenestration was developed. After this, both the fenestration and the floor of the maxilla sinus were dissecting the sinus membrane. In the rest of the alveolar crest the implants were traditionally fitted. On the placed protruding implantations, the sinus membrane was left to create an isolated, blood-filled gap which formed around and between implants. The repositioned pin covered the prepared fenster in the antral Wall, and the osseous defect formed for entry into the sinus did not include a barrier membrane. In the study, there was a note of the newly created ossus that rises up in the sinus cavity in following X-rays surrounding the high part of the implants. The implants were functionally loaded after 5-6 months of recovery. Of the 38 maxillary sinus implants, 35 were successfully integrated over 27 months.[42]

POSTERIOR MAXILLA: SHORT IMPLANTS VS. SINUS ELEVATION AND LONG IMPLANTS.

In the post-maxilla system, eight RCT clinics with follow-up periods up to 18 months after reconstruction have been loaded have been included in the latest evaluation. Based on 5 studies reporting on long-term (16-18 months) observation periods, the average survival rate of implants for the short-implant (99.0% confidence [CI], 96.4% – 99.8%) and 99.5% (95% CI, 97.6% –100.0%) was recorded in the long-lasting sinuses. For both groups on the restaurant level, similar results with survival levels ranging from 97% to 100% were calculated. A physician faces issues relating to intraoperative, perioperative and post-operative diseases when discussing different therapeutic options with the patient. Based on this information, a final choice to undergo a certain treatment is taken. In the reconstructions for both short and long implants the most frequent technical problems were screw-removal, but there were minimal difference between the 2 treatment ideas. Additional problems were mostly observed due to the operations (i.e., membrane perforations). 33% of the difficulties were caused by short dental implants, whereas a synthetic lifting operation increased the risk by 100%. This represents a 3-fold greater likelihood that long dental implants will cause an intraoperative complex than short implants. These statistics are based on observations that short implants give further advantages as regards lesser disease, lower expenses and a relatively short treatment period. Near implants could, at least in the short term, be suitable, provide a variety of patient-reported results measures and still provide patients with similar survival rates to long sinus implants.

provides an overview of the research properties.[43]

POSTERIOR MANDIBLE: SHORT IMPLANTS VS. VERTICAL RIDGE AUGMENTATION AND LONG IMPLANTS.

There are three alternatives: primordial vertical ridge increase and subsequent implant installation for the posterior mandible with a limited alveolary ridge height, simultaneous implant insertion with vertical rim increase, and the usage of short implants . As with the posterior maxilla, numerous methods of treatment have recently been examined

RCTs, however, are limited in their total number of investigations. Recent comprehensive review indicated that only 4 studies, covering 135 patients undergoing restaurations with 328 implants, could be included. In any study there were no reports of differing survival rates at the implant and prothesis level. Nevertheless, an examination of the complication rate indicated some variances. Even if certain grafting treatments fail, all short implants can be placed in the group with primary bone increase. The total number of complications in patients was calculated. Complications were

Table 1. Summary of the RCTs comparing the treatment options of short implants vs. standard-length implants in combination with vertical bone augmentation procedures

Region	Author	Year	Results
Maxilla	Esposito et al. [51]	2011	5-mm short implants achieved similar if not better results to those of longer implants placed in an augmented bone.
Maxilla	Gulje et al. [52]	2014	6-mm implants and 11-mm implants combined with sinus floor elevation surgery were equally successful.
Maxilla and mandible	Pistilli et al. [53]	2013	6-mm long implants with a conventional diameter of 4 mm achieved similar if not better results than longer implants placed in an augmented bone.
Maxilla and mandible	Pistilli et al. [54]	2013	5-mm implants achieved results similar to those of longer implants placed in an augmented bone.
Maxilla	Thoma et al. [55]	2015	Short implants may be more favorable in terms of short-term patient morbidity, treatment time, and treatment costs.
Maxilla and mandible	Esposito et al. [56]	2012	Short implants might be a preferable choice to bone augmentation, particularly in posterior mandibles.
Maxilla and mandible	Felice et al. [57]	2009	There was no statistically significant difference in patient preferences, as patients found both short and long implants acceptable.
Mandible	Esposito et al. [61]	2014	5-mm short implants achieved results similar to those of longer implants in augmented bone.
Mandible	Felice et al. [62]	2014	The prognosis of short implants was as good as that of long implants placed vertically in augmented mandibles.

RCTs, randomized controlled clinical trials.

reported for the enlarged group in 56 of 85 patients, while the short implant group was impacted by only 18 patients. Paresthesia of the mandibular nerve, mainly in the enlarged group, was the main consequences. Clinical advice that favour a technique over the other must be read with caution, since there are few patients and study groups who are based on scientific data.[44]

CURRENT TREATMENT CONCEPT.

There are a lot of considerations behind the clinical decision between these options (short or primary dental implants followed by long dental implants). Scientific proof, operational skills and expertise of

the surgeons, and more and more preferences of the patient are the main parameters. Systematic reviews have summarised available research about high-level RCT evidence for the surgery of the mandible and maxilla to assist the physician in the decision making process and tell the patient about existing treatment options. Short dental implants in situations with a vertical bone height of 6–8 mm are the favoured alternative for the rear maxilar. For a vertical ridge dimension of more than 8 mm and if conventional implants are the best choice, transcrestal sinus height method is chosen. In the back of the jaw.

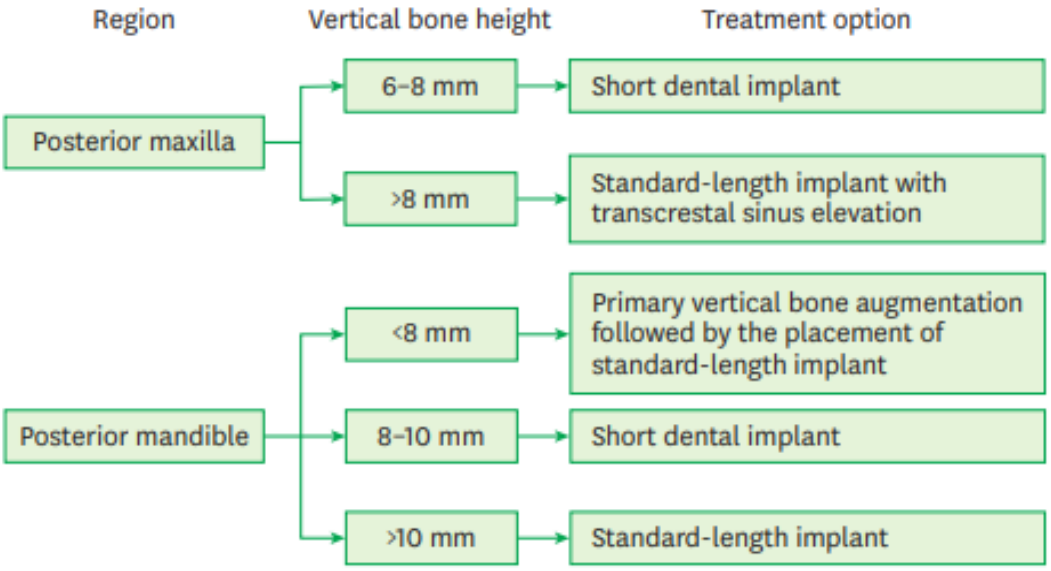
(A) A treatment option for the posterior maxilla with a vertical bone height of 6–8 mm. (B, C) A short dental implant is recommended.

(A) A treatment option for the posterior maxilla with a vertical bone height of more than 8 mm. (B, C) A transcrestal sinus elevation approach can be chosen for a vertical ridge dimension exceeding 8 mm and if standard-length implants are the preferred option.

(A) A treatment option for the posterior mandible with a remaining ridge height of less than 8 mm. (B) Primary vertical bone augmentation should be performed, (C) followed by the placement of standard-length implants.

(A) A treatment option for the posterior mandible with a remaining ridge height of 8–10 mm. (B, C) A short dental implant is recommended.

(A) A treatment option for the posterior mandible with a vertical bone height of more than 10 mm. (B, C) Standard-length implants are recommended.



Decision-making process for the posterior maxilla and mandible

Primary vertical bone increases should be made utilising one of the above therapeutic techniques and standard length implants should be placed. In cases where the remaining edge height is 8–10 mm, short dental implants are mainly advised, which enable the surgeon to insert a 6 mm implant with a safety distance of 2 mm from the alveolar nerve. If the length of the conventional implant is more than 10 mm away from the bone. A figure shows the decision-making process for the posterior maxilla and mandible.[45]

CONCLUSION :

Short implants in combination with vertical bone increment methods as well as standard implant longitude appear to produce predictable results with regard to the survival rates of implants. However, the use of short dental implants appears to provide a variety of advantages for the patient and the doctor according to current clinical research comparing various therapeutic approaches.

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