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Replacement of Missing Upper 2nd Premolar by Short Implant: A Case Report

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Abstract

Compared to previous generations when tooth loss was common, modern dentistry has made it possible for people to keep their teeth healthy and attractive for their entire lives. Today, dental implants can replace missing teeth. Although the concept of a tooth implant is not new, advances in technology have improved the treatment process and the longevity of implants. Dental implants can be used for single tooth replacements, support for a permanent bridge, or as attachments to anchor a full denture securely to the jaw. The clinical reality is that many potential implant patients have limited bone height. When placing longer implants, the maxillary sinus and inferior alveolar nerve often present risk. Although bone grafting sinus lifts procedures help alleviate this risk, patients may still avoid treatment because of the financial costs and time for grafting procedures. Additionally, bone grafting procedures have their own inherent risks and morbidities which patients often find unacceptable. While Short Implants afford simpler and consistently more predictable treatments, which can significantly increase a patient's acceptance of implant treatment. With the use of Short Implants, patients with limited bone height can often avoid the inherent risks and costs associated with bone grafting procedures. Additionally, the extended healing time and cost of bone grafting procedures are eliminated. This article describes a simple approach for placement of short implant in maxillary premolar and its subsequent restoration.

Key Words: *Dental implant, Sinus lifting, Osseointegration*

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Introduction:

A dental implant is a very simple metal screw which is designed to thread into the bone of the jaw and to allow for the attachment of a (prosthetic) tooth at the top. Implants are made of Medical grade Titanium or Titanium Alloy.[1] A dental implant designed to replace a single tooth is composed of three parts: the titanium implant that fuses with the jawbone; the abutment, which fits over the portion of the implant that protrudes from the gum line; and the crown, which is created by a prosthodontist or restorative dentist and fitted onto the abutment for a natural appearance.[2] Implant is a mechanical system designed to transmit occlusal forces on prosthesis through an abutment and implant to the surrounding bone.[3,4] With dental implants, the bite force is close to natural teeth, if not stronger. A denture or false teeth only provides up to 25% of the natural bite force. Also, there is no plastic flange that covers part of the palate or gums. If a bridge is used to replace the missing teeth, the drilling of the adjacent teeth is required to provide the support. Over the long-term, it may give rise to problems such as decay, gum disease and loosening of the teeth. Implant selection generally based on maximum amount of available bone. Short implant facilitates prosthetic restoration in the setting of limited alveolar bone height. [5] Placement of short endosseous implants represents a valid treatment alternative to more complex surgical techniques such as ridge augmentation/sinus lift implant-associated procedures, in the setting of limited alveolar bone height. [6] The original and most copied method of attaching the

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abutment to the implant is by means of a screw. It is still the method common to most implant systems. Screw loosening and screw breakage is a major disadvantage of this method. [4] There is an alternative to screw retained abutment systems; a Boston based implant company called "Bicon" uses a locking taper system to connect the abutment. [4] The objective of the present article is to placement of a short implant to replace missing upper 2nd premolar.

Case Report:

A 32 years old female reported with the missing tooth in upper left region. She was non-diabetic and with good general health. After proper diagnosis and panoramic radiological evaluation various options were presented but the patient chooses replacement of upper left second premolar by short implant.

It was planned to rehabilitate the missing upper left 2nd premolar with short implant with provisory resin prostheses and install the definitive prostheses six months later. Patient assessment included a medical and oral history, panoramic radiography and a routine blood examination. Prior to surgery, impressions were made (Elite HD® putty, Elite HD® light body, Zhermack, Italy) of both arches and the maxilla-mandibular relation was transferred to the semi-adjustable articulator. The height of available bone was 13 mm from the alveolar crest up to the maxillary sinus in the present case. The implant was planned to placed at least 5 mm below from the gum.

The diagnostic wax up was performed by laboratory and a resin provisory prostheses and a surgical acrylic guide were made. Prior to surgery, antibiotic prophylaxis was followed (Amoxicillin 500mg, 2 hours before surgery than 8 hourly for 5 days postoperatively).In the first

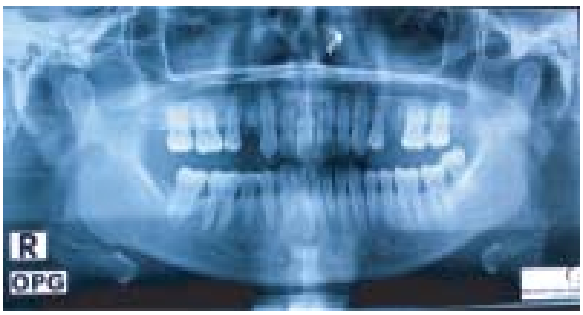

Fig. - 1: *Orthpantamogram (OPG) showing missing upper left 2nd premolar.*

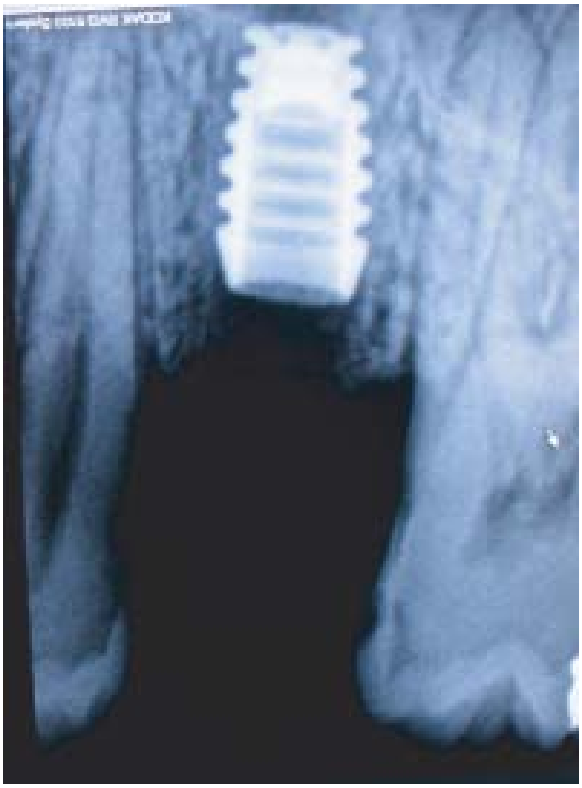

Fig. - 2: *Placement of 4.5×6.0 mm; 3.0 mm well short implant.*

Fig. - 3: *Intra oral view after placement of implant.*

phase surgical procedure was performed to place the short dental implant in upper left second premolar region. Before the initial the procedure the patient was asked to rinse her mouth by Chlorhexidine mouth wash and also the skin of the perioral region was disinfected by using povidone iodine (PVP-I). Under local anesthesia a No. 15 Bard Parkle blade was used to create a sulcular and vertical releasing distal incision. The mucoperiosteal flap was elevated by periosteal elevator in order to expose bone tissue. A full thickness flap was exposing the bone implant site. Place of penetration was marked by placing surgical template and the cortical bone was penetrated with pilot drill under copious saline irrigation. After that guide pin was used to facilitate alignment when placing implants. Then the socket was widened with sequentially larger latch reamers in 2.5, 3, 3.5, 4.0 diameters without irrigation at a maximum of 50 RPM. In this case, a 4.5 × 6.0 mm, non-shouldered, abutment 3.0 mm well implant has been chosen, so the final bur used also has a diameter of 4.5 mm. The harvested autogenous bone was intermittently removed from the flutes of the reamer burs and kept into a silicone dappen dish for later use. After that the short implant was removed from a poly bag, seated the implant by tapping gently on healing plug into the implant well with an appropriate seating tip. The healing plug was cut and ensured that no sharp edges remain that could irritate the soft tissues. The harvested bone graft was placed over shoulder of implant. At last the flap was closed by suturing with 3-0 black silk suture in close position to facilitate the healing and avoid food accumulation into the socket. The suture was removed after 10 days from the date of surgery.

Fig.- 4: *After fitting of abutment post 4.5×6.0 mm, 0 ^{0} ,non-shouldered, abutment 3.0 mm*

Fig. - 5: *After final fitting of crown*

The post-operative recovery was uneventful. The patient was recalled for follow up and second phase of treatment after six months.

Prosthodontic permanent rehabilitation:

At six months of follow up, radiographic examination showed no evidence of any pathologic radiolucent lesion. No soft tissue connects the bone to the surface of the implant. No scar tissue, cartilage or ligament fibers were present between the bones and implant surface. After six months, the prosthodontic treatment was initiated.

When ossteointegration was complete, additional surgery was performed to place the abutment, to which the crown will eventually be attached. To place the abutment, the gum was reopened to expose the dental implant. The healing plug was removed with a healing plug removal instrument. Then appropriate guide pin was placed to check integration and angulations. Excess bone was removed with sulcus reamer corresponding to the chosen abutment with either threaded knob or straight handle. Then the area was flushed and implant well was dried with a cotton tip. The chosen abutment was inserted and abutment was tapped to the dental implant in long axis of abutment post by locking taper. This minor surgery is typically done with local anesthesia in an outpatient setting. Once the abutment was placed, the gum tissue was closed around, but not over the abutment. Post used was of are following diameters: 4.0 × 6.5mm, 0 ^{0,} non-shouldered, abutment 3 mm post. After soft tissue healing final impression was taken by Elite

HD® putty, Elite HD® light body, Zhermack, Italy) for both arches. Tooth selection (Artplus IPN®, Dentsply, Brazil) was done until the patient relates satisfaction with the esthetics and phonetic results after laboratory fabrication. The prosthesis was cemented with lutting cement. The patient highly appreciated with the final rehabilitation and satisfied with the treatment. She was also instructed to follow up with proper maintenances of oral hygiene.

Discussion:

A mini implant is smaller and thinner than a regular dental implant. In addition, mini tooth implants are also considerably more affordable. The mini dental implant surgery is also less invasive, takes less time and heals faster. Placement of short endosseous implants represents a valid treatment alternative to more complex surgical techniques such as ridge augmentation/sinus lift implant-associated procedures, in the setting of limited alveolar bone height.[6] A mini implant is smaller and thinner than a regular dental implant. In addition, mini tooth implants are also considerably more affordable. The mini dental implant surgery is also less invasive, takes less time, and heals faster. [7]

The clinical application of short implants in the deficient alveolus serves to minimize or eliminate the need for vertical ridge augmentation, nerve transposition, and extensive sinus floor elevation. These advantages reduce procedural morbidity and treatment duration, as evidenced by the case reports presented where short implants were placed without ridge augmentation and only minimal sinus or nasal floor intrusion. With dental implants, drilling of the adjacent teeth especially good teeth with no filling is avoided.[9]

Once the implant has been placed, it is left to heal and integrate with the jawbone for between six weeks to six months. There are many ways to test if the implants are ossteointegrated. Percussion, x-ray, probing (checking for pus), and the clinical situation of the soft tissue. Ossteointegration of Dental Implants refers to the process of bone growing right up to the implant surface.[10]

A study showed that short implants with large diameter (6×5.7mm) have a long-term (>5 years) survival rate and crystal bone level maintenance similar to that observed for non-6×5.7mm implants.[6] Another findings observation it was found that survival estimates for 6×5.7mm implants and non–6×5.7mm implants in this study suggested that 6×5.7mm implants can become ossteointegrated and bear a functional load after placement. The height of available bone is often used to determine the implant length, if adequate width and mesio-distal space are present. The height of available bone is measured from the crest of the edentulous ridge to the opposing landmark.[5] The posterior regions of the jaws usually have the least height of existing bone, since the maxillary sinus expands after tooth loss and the mandibular canal is 10 mm or more above the inferior border of the mandibular body.[10]

Ossteointegration of Dental Implants refers to the process of bone growing right up to the implant surface. The radiographs look great and there is no evidence of any pathologic radiolucent lesion. The direct contact of bone and implant surface can be verified microscopically. When Ossteointegration occurs, the implant is tightly held in place by the bone. The process typically takes four to six months to occur well enough for the implant dentist to complete the restorations. [11]

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Another study conducted found that a lower frequency of complications was found compared to mean frequencies calculated from past reports. Ossteointegrated implants are one of the fastest growing dental treatments in Ireland today. They are not new, implant restorations have been in use for over 30 years now. They are used singularly as replacement for single tooth loss and as the support for a bridge either to a natural tooth or to another implant. Multiple implants are also used to support prostheses, e.g. full or partial dentures.[3] In implants if there is a micro gap is present, microbial leakage could lead to inflammation and bone loss; thus, it is important to minimize bacterial presence in and around the implant-abutment junction. The crown-to-root ratio guidelines associated with natural teeth should not be applied to a potential implant site or existing implant restoration.[12]

Conclusion:

Short dental implants facilitate prosthetic restoration in the setting of limited alveolar bone height. , an implant

placed into bone supports a single crown and this is know as a "single tooth implant". Dental implants can be placed in patients of any age (with fully developed jawbones), provided that they have a sufficient quantity and quality of bone tissue available. Most healthy individuals that maintain a good oral hygiene program are suitable candidates for dental implants. This case demonstrate that it is possible to achieve even greater efficiency in our efforts to give patients sound, timely and economical treatment .This procedure still is technique sensitive, it is clear that with continued innovations in the prosthetic capabilities of implant system, we should be able to enhance the service and treatment offered to our patients in regard to treatment time, patient comfort, cost and esthetics. In the case reported here, we cannot claim success in the sense of many years, particularly in the abbreviated times involved. Although the technique we used appears to be promising, additional time and evaluation are required to establish whether the soft tissue results will remain stable overtime. Long term prognosis is influenced by a good tridimensional positioning of the implants which is determined by the biomechanical requirements of the teeth being replaced.

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