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Fibrous Dysplasia of Maxilla

Tall Tilted Pin Hole placement

Highlights

Indexes and Low Bone Quality

Alveolar Bone Grafting Procedures

Discovering Thoughts, Inventing Future

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Correlation between Radiomorphometric Indexes and Low Bone Quality in the Success of Osseointegration in oral Rehabilitation

By Gabriela dos Santos Gonnçalves Lima, Angelinna Zanesco, DDS, PhD, José Cássio de Almeida Magalhães, DDS, PhD, Victor Perez Teixeira, DDS, PhD, José Márcio Barbosa Leite do Amaral, DDS, MS, Henrique Tuzzolo Neto, DDS, PhD, Claudio Costa, DDS, PhD & Rodrigo Alves Ribeiro, DDS, PhD

University of Santos (UNIMES)

Abstract- *Introduction:* Oral rehabilitation through implants has grown significantly in recent years, and with them also come the problems related to implant dentistry, the most important of which is the impossibility of bone tissue to establish osseointegration.

Objective: The aim of this study was to correlate radiomorphometric indices and poor bone quality in osseointegration failures in oral rehabilitation.

Material and Method: 104 missing implants were evaluated in 74 individuals, verifying in the panoramic radiographs the radiomorphometric indices Mental (IM) and the Mandibular Cortical (ICM).

Keywords: *low bone quality, radiomorphometric indexes, implants.*

GJMR-J Classification: *NLMC Code: WU 158*

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Correlation between Radiomorphometric Indexes and Low Bone Quality in the Success of Osseointegration in oral Rehabilitation

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Material and Method: 104 missing implants were evaluated in 74 individuals, verifying in the panoramic radiographs the radiomorphometric indices Mental (IM) and the Mandibular Cortical (ICM).

Results: It was possible to evaluate the correlation (-0.721) for $p<0.001$ inverse correlation between the MI and the MCI. The lower the value found in the MI, the worse the bone quality evaluated in the MCI. It was also possible to verify the relationship (0.275) to $p<0.001$ between MI and the arch where it was evaluated that bone quality in the upper arch showed worse quality when compared to the lower arch. It there was correlation to $p<0.001$ the length of the lost implant and the region (-0.339), smaller length implants were lost in the posterior. Age was correlated (0.198) with the MCI to $p<0.05$ where the older the age the worse the bone quality evaluated. The MCI correlated with the arch (-0.235) for $p<0.05$ a worse bone quality when correlated with the implants lost in the upper arch.

Conclusion: Radiomorphometric indices can be used in the preoperative evaluation to assist in the detection of patients with poor bone quality.

Keywords: low bone quality, radiomorphometric indexes, implants.

I. Introduction

Oral rehabilitation through implants has been growing significantly in recent years and reaching high rates of clinical success. Currently, bone-implant contact is considered predictable, safe, and lasting[1]. The long-term success of dental implants depends on osseointegration[2]. With the advancement of success also comes the problems related to implant dentistry[3].

Failures can be classified as biological, mechanical or iatrogenic or due to insufficient patient adaptation[4].

Among these faults, the most dangerous is the biological fault, which can be defined as the impossibility of bone tissue to establish osseointegration[4,5]. This lack of osseointegration that requires implant removal is considered a biological failure[6].

Biological faults are classified as primary and secondary. If the failure occurs during the osseointegration process, it is considered a primary failure; if it occurs after charging it is a minor fault[3,7]. Primary failures result from lack of bone repair, where the connection between the implant surface and the bone does not occur. Instead, fibrous tissue forms between the implant and bone, causing the implant to lose its stability[5,7,8].

Failures can be prevented by appropriate patient selection; proper treatment planning is critical to successful implant dentistry[9].

Some information has been reported on factors that influence implant osseointegration, such as: biocompatibility, implant design, surface conditions, surgical site, a surgical technique for implant installation, and loads applied to them[10].

Studies relate early loss in short-length implants in posterior regions where space and volume are insufficient[11].

To acquire adequate healing conditions, the implant, after insertion, must exhibit good primary stability, which may correspond to the clinical manifestation of osseointegration. Primary stability is primarily determined by factors related to bone biomechanical properties, implant design, and surgical technique; while secondary stability is also determined by bone tissue response to surgical trauma and implant surface[12]. Primary stability is achieved when the implant locks into the apical or marginal portion of the site due

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a sufficient amount of compact bone or cancellous bone[13].

The world population has been aging over the years and inevitably, the increase in individuals with low bone density[14]. Several studies have shown a positive correlation between low bone density and implant loss[15-18]. The primary stability of the implant, as well as its survival, is affected by low bone density[15,16]. The high rate of implant loss is related to bone type IV when compared to bone type I, II, III[19].

The aim of this study was to correlate radiomorphometric indices and poor bone quality in osseointegration failure in oral rehabilitation.

II. Material and Method

The project was submitted to the Research Ethics Committee (CEP) of the Metropolitan University of Santos and approved. It was used the database of the postgraduate course in implantology of the Metropolitan University of Santos, the data of 104 lost implants of various diameters in 74 individuals aged 33 - 84 years of both genders with an average of 59 years, in addition to their images and clinical records. Individuals with a history of hormone replacement therapy or calcium therapy under the age of six months, and those who did not have all the tests necessary for this study were excluded.

The implants lost in the upper and lower arch in the anterior and posterior regions were separated, also grouped by diameter and length.

All digital panoramic radiographs images used in this study are from a partner institute of the Metropolitan University of Santos and performed by the ORTHOPHOS XG 3D PAN/TELE/TOMO device (Sirona Dental Systems GmbH, Bensheim, Germany) following the same protocol of acquisition: The Panoramic Radiography 69 kV, 15 mA, and exposure time 14.1 s.

In panoramic radiographs, radiomorphometric indices were evaluated. Among, them the mandibular cortical index (MCI)[20] a bilateral evaluation with results established in: C1 - clear and sharp posterior mandibular cortical, C2 - the endosteal surface presents semilunar defects (lacunar resorption),or the surface presents cortical residues, C3 - a cortical layer is extremely porous (Figure 1).

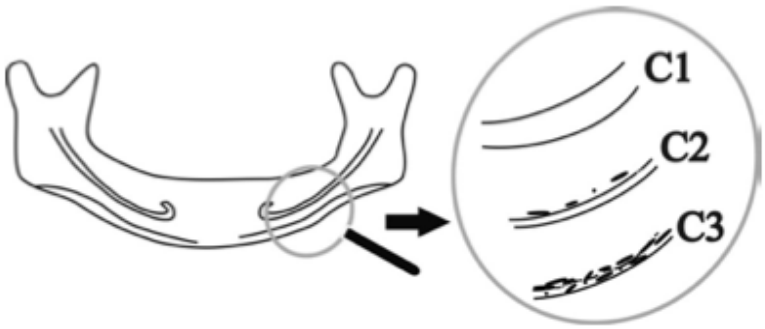

Figure 1: Illustration of the Mandibular Cortical Index

Mental index (MI)[21] bilateral assessment determined by the width of the mandibular cortex, measured on the line perpendicular to the base of the mandible, at the height of the center of the mental foramen (Figure 2).

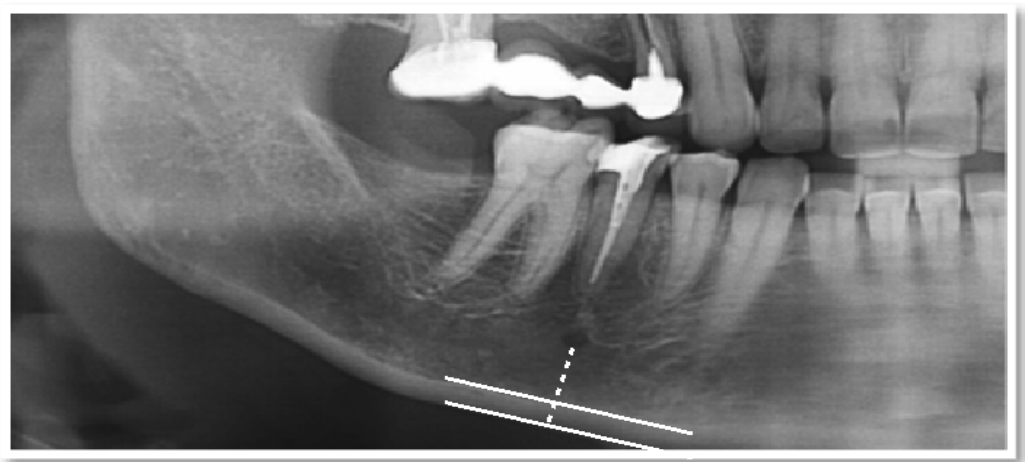

Figure 2: Mental Index Illustration

III. Results

We evaluated data from 104 implants of various diameters in 74 individuals, 48 women and 26 men, aged 33 - 84 years with a mean of 59.4 years. As for the upper and lower arches, 46 implants lost in the lower arch and 58 in the upper arch. We evaluated 76 implants in the posterior region and 28 in the anterior region. Spearman's correlation coefficient test was performed to assess the relationship between the variables of the lost implants (Table 1).

Table 1: Spearman correlation coefficient

	Age	Sex	MI	MCI	ARCADE	Region	Diameter	Lenght
Age								
Sex	R:0,209* P:0,034							
MI	R:-0,106 P:0,282	R: -0,038 P:0,701						
MCI	R:0,198* P:0,044	R:-0,021 P:0,833	R:-0,721** P:0,000					
ARCADE	R:0,214* P:0,029	R:0,052 P:0,597	R:0,275** P:0,005	R:-0,249* P:0,011				
Region	R:0,116 P:0,242	R:0,158 P:0,110	R:0,054 P:0,587	R:0,035 P:0,724	R:0,235* P:0,016			
Diameter	R:-0,028 P:0,779	R:-0,128 P:0,196	R:-0,05 P:0,616	R:0,044 P:0,655	R:0,038 P:0,700	R:0,072 P:0,467		
Lenght	R:-0,032 P:0,751	R:-0,040 P:0,889	R:-0,060 P:0,547	R:0,104 P:0,292	R: -,241* P: 0,014	R:-0,339** P:0,000	R:0,050 P: 0,615	

*p< 0,05 and **p< 0,001

According to the result of the correlation coefficient, it was possible to verify the correlation (-0.721) for p<0.001 inverse relationship between the MI and the MCI. The ratio (0.275) to p<0.001 between MI and the arch where bone quality was evaluated in the upper arch showed worse quality when compared to the lower arch.

It was also correlated (-0.339) to p<0.001 the length of the lost implant and the region, smaller length implants were lost in the posterior region.

Age was correlated (0.198) with the MCI to p<0.05 where the older, the age the worse, the bone quality evaluated.

The MCI correlated with the arch (-0.235) for p<0.05 a worse bone quality when correlated with the implants lost in the upper arch.

IV. Discussion

The use of radiomorphometric indices to assess bone quality is an effective and inexpensive instrument for this detection since the evaluation test is difficult to access and high for the population.

Several studies corroborate our results in the high correlation between radiomorphometric indices evaluated in panoramic radiographs, where these exams may be predictive in helping to assess bone quality[22-24].

Some studies contradict these findings showing that there is inconsistency in the data obtained when in smaller groups, although the mandibular cortical index is among the most reproducible radiomorphometric indices[25,26].

The influence of age with the loss of bone quality was evidenced in this study. Older individuals had worse bone quality when evaluated by the mandibular cortical index. This result was also found in other studies. Zlataric et al. 2002, verified the values of radiomorphometric indices in elderly individuals and showed that the values of these indices decreased in both sexes up to 78 years[27]. Edgerton et al. 1999 evaluated British women and observed that radiomorphometric indices gradually decreased with increasing age[28].

When the arches were evaluated, the upper arch showed worse bone quality compared to the lower arch, implants installed in the posterior regions of the upper arch showed a higher loss rate when compared to the other regions.

It was evidenced in this study when the radiomorphometric indices IM and ICM were evaluated and correlated with the length of the implants and the region where the highest concentration of loss occurred in the posterior maxilla and implants of shorter lengths. These data were also evidenced by other studies where the incidence of loss of short posterior maxillary implants was higher when compared, for example, with the mandible[29-31].

Contrary to the results obtained in this study, implants installed in the posterior maxilla of short length and diameter presented excellent fixation results[32].

V. Conclusion

According to the results of this study, radiomorphometric indices may be used the preoperative evaluation to assist in the detection of patients with poor bone quality.

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Concentrated Growth Factor (CGF) in Alveolar Bone Grafting Procedures: Dilemma or a Reality? - A Detailed Review

By Dr. Mohammadi Begum, Dr. Jayaprakash Thirumala Reddy, Dr. Sujan Kumar K V & Dr. Madhav Naik P

Abstract- Alveolar bone grafting is considered to be one of the most challenging task in the management of cleft lip and palate patients as it is expected to bridge the gap between the alveolar segments and provide the solid base for the un-erupted tooth/teeth to erupt through it, besides effectively healing the Oro-antral fistula if any passing through the cleft into the nasal cavity. Although the traditional approach is to use autogenous bone graft from iliac crest, which has its own side-effects like pain, morbidity, additional surgery, etc.

Keywords: concentrated growth factors, platelet-rich plasma, autologous bone, alveolar bone grafting, osteogenic potential.

GJMR-J Classification: NLMC Code: WE 200, WO 600

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Dr. Mohammadi Begum [α], Dr. Jayaprakash Thirumala Reddy [σ], Dr. Sujan Kumar K V [ρ] & Dr. Madhav Naik P [ω]

Abstract- Alveolar bone grafting is considered to be one of the most challenging task in the management of cleft lip and palate patients as it is expected to bridge the gap between the alveolar segments and provide the solid base for the un-erupted tooth/teeth to erupt through it, besides effectively healing the Oro-antral fistula if any passing through the cleft into the nasal cavity. Although the traditional approach is to use autogenous bone graft from iliac crest, which has its own side-effects like pain, morbidity, additional surgery, etc. However with the advent of Tissue engineering technique, it has become possible to overcome most of these challenges by using a tissue friendly yet innovative material by name CGF (Concentrated Growth Factor) which in reality is the latest version of platelet-rich plasma having in it abundant of growth factors thereby serving the purpose of a regenerative medicine, wherein three factors are important to stimulate the bone regenerative effect: 1) Scaffold 2) Growth factors and 3) Autologous cells. All these are found to be present in sufficient quantity in CGF which was first introduced by Sacco in 2006 followed by Corigliano in 2010.

Keywords: concentrated growth factors, platelet-rich plasma, autologous bone, alveolar bone grafting, osteogenic potential.

I. Search Strategy

A secondary research based upon the library referencing from the year 2000 to 2018 through online search using key words as concentrated growth factors, platelets, wound healing, osteogenic potential, platelet-rich plasma, alveolar bone grafting, etc.

II. Introduction

Concentrated growth factor is considered to be an updated and latest version of platelet-rich plasma (PRP) found to be exhibiting remarkable wound healing potential in open surgical wound sites, where its application has proven to give both soft tissue and hard tissue healing potantial by virtue of its wound healing and osteogenic potential. Such desirable clinical and biotechnological potential of this group of platelets is found to be of immense use in different craniofacial surgical procedures including alveolar bone grafting in cleft lip and palate individuals wherein the golden standard of treatment is to use cortical bone from the iliac crest. Although the conventional method has its good bone induction and conduction property to bridge the gap in the cleft-alveolar segments, yet in most of the cases would result in several side-effects like surgical site morbidity and altered gait of the individuals post-surgery creating a new surgical site to treat the existing one.

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III. History and Background

Bone defects involving the Oral and maxillofacial anatomical regions have been treated for long time by using variable platelet-concentrates, which differ from each other by their preparation methods to induce and accelerate the bone formation when mixed with bone grafts and barrier membranes. These concentrates are found to be abundantly rich in growth factors which are in reality the "PROTEINS" involved in regulating the complex process of wound healing. Since the growth factors are located in the blood plasma and platelets, these platelet-concentrates are commonly used to accelerate the tissue repair and regeneration of clefts of the alveolar region. Platelet's regenerative potentiality was introduced in the year 1974 by Rose et al who described the presence of growth factors in the blood-plasma.[1] It was also reported that based upon their methods of preparations and evolution of their clinical applications periodically, the platelet-concentrates have been grouped into various generations.

a) First-generation of platelets

Includes PRP (Platelet-rich plasma) and PRGF (Platelet-rich in growth factor) which were introduced by Marx and Anitua respectively. The method of preparation involved addition of calcium and bovine thrombin to achieve stability which in turn made it technique sensitive for all the clinical applications.

b) Second-generation of platelets

Involved PRF (Platelet-rich fibrin) introduced by Choukroun. The method of preparation involved using venous blood from the patient's veins and centrifugating the same to produce a fibrin-rich gel with aggregated platelets obtained in the middle of the tube, just between the red corpuscles at the bottom and platelet poor plasma at the top.

c) Preparation of CGF

Its method of preparation is similar to PRF but the centrifugation speed differs. Its preparation uses 2400 rpm to 2700 rpm to separate all the cells in the venous blood. As a result a block is obtained which is rich in fibrin having a thicker, larger and denser amount of growth factors compared to PRF. This makes CGF better in bone regenerative capacity improving its versatility.[3-5] After centrifugation the CGF was obtained in three parts, the upper white Part (PPP), the lower red Part (RBC) and the middle "buffy coat" Part (interface between white and red part). The results showed that platelets and leukocytes were localized in the buffy coat, whereas the erythrocytes were present only in the red part of CGF. The in vitro cumulative release of growth factors revealed the presence of PDGF-AB, TGF-β1 and IGF-1 having a constant kinetic release, reaching the maximum accumulation at day 3rd and 6th respectively. VEGF and BMP-2 had a slow kinetic release reaching the maximum accumulation at day 8th. TNFα and BDNF had a faster kinetic release reaching the maximum accumulation at day 1st and 3rd respectively. These findings have largely supported the clinical use of CGF for its enhanced healing and osteogenic-effects.[6,7] According to Professor Rodella[8] at University of Brescia-Department of Biomedical Sciences and Biotechnologies, CGF shows higher tensile strength, more growth factors, higher viscosity and higher adhesive strength than PRF. Therefore it is recommended that surgeons can use the CGF as a barrier membrane to accelerate soft tissue healing or be mixed with bone graft to accelerate new bone formation. CGF doesn't require any chemical or allergenic additives such as bovine thrombin or anticoagulants into it. Therefore it is usually free from any viral disease transmission.[9-11]

IV. Materials and Methods

A secondary research based on hand – search and online search using the key terms was done for the articles from 2000 to March 2018 involving discussion about the platelets (CGF) and their osteogenic capabilities.

a) Inclusion criteria

All original researches, reviews, case reports on the POSITIVE outcome of the osteogenic properties of the CGF were included. Studies that dealt with craniofacial surgery for total or partial reconstruction of mandibles/maxilla, cleft lip and palate surgeries, distraction osteogenesis and Osseo-integration were also added in the search strategies.

b) Exclusion criteria

Studies involving gene therapy, etc.

c) Research Dilemma

Therefore the need of the hour is to use this material which can help in efficient wound healing and also provide osteogenic impulse so that second surgical site can be avoided which would be beneficial to the patient in terms of pain, morbidity and cost.

d) Advantages of CGF

It is accepted that CGF is capable of better regenerative-capacity and higher versatility. The fibrin block is thick and dense with a very high concentration of fibrinogen, factor XIII and thrombin. The activated form of XIII (XIIIa) cross links the fibrin clot to increase the stability, strength, and protection against plasmin mediated degradation. Mixing this combination with autogenous or other fillers makes it user-friendly material to handle and fill even the larger bone defects improving the overall bone regenerative effect.[12] Sohn in 2009[3] reported that CGF has multipurpose use associated to its higher levels of active proteins which can support healing, growth and cell morphogenesis. CGF provides sufficient stability to implant- root interface during healing process providing necessary bone formation around the implant which would be capable of absorbing the functional load during healing. With the help of Resonance Frequency-Analysis (RFA) which is considered to be very important tool for assessing the Osseo-integration process and also tracks the changes in the stability not only during the implant placement but also during the healing and later periods, the active role played by CGF and other growth factors containing products during Osseo-integration and bone healing was reported. In a sum up of all its advantages, CGF appear to show superior potential for tissue-regeneration in the clinical and biotechnological applications including sinus and alveolar ridge augmentation.[13-19]

e) Possible mode of action by CGF

The various research studies have shown that the improved regenerative effect of CGF when used to treat the bone defect could be attributed to its biologic constituents which are active in presence of chemotactic and mitogenic PDGF (Platelet Derived Growth Factor) which are basically involved in tissue regeneration process. Unlike PRP, CGF does not dissolve rapidly following its application on the surgical site. However it was found that the thick fibrin-matrix is remodeled slowly like a natural blood-clot. Thus prolonging the duration of growth factors activity which in turn is found to be effective for growth factor synergy, enhancing the cell proliferation and osteogenic differentiation.[20,21]

V. Discussion

CGF, therefore is considered as the latest progeny of the platelets containing the abundant number of growth factors, leucocytes and fibrin-matrix in it. The growth factors released are responsible for aiding in tissue regeneration (both hard and soft tissue) which is the reason that it can provide immediate wound healing and repair of the surgical site by outgrowing the number of growth factors.[22-27] The greater advantage of this latest PRP is in it being an AUTOGENOUS preparation, which not only improves the tissue healing but also enhances the clinical outcome of the surgical procedure at a considerable short period of time.[28-30]It is also reported that the presence of growth factors in CGF are considered to be a class of natural biological mediators that regulate the key cellular events in the tissue repair, including cell proliferation, differentiation and extracellular matrix synthesis. Release of biological factors responsible for tissue repair occurs through platelet activation and de-granulation. These factors are PDGF (Platelet-Derived Growth Factors), VEGF (vascular-endothelial growth factors), IGF (Insulin-Like Growth Factors), TGF (Tissue-Growth Factor), BDGF (Brain-Derived Growth Factor) and BMP (Bone-Morphogenetic Protein).[31-33] Recent studies have reported that when CGF is used alone or mixed with bone allograft increased the bone growth process by accelerating the healing of the soft tissue and facilitating periodontal ligament repair in both the animal and human studies. Furthermore, the findings suggested that CGF along with CD34 positive cells has played an effective role in vascular maintenance, neo-vascularization and angiogenesis when used at the surgical wound site. This was all attributed to the presence of the growth factors in CGF which in turn would enhance the lost or the damaged tissue regrowth at the local site of application.[34-36] Although it is suggestive that the best bone grafts are loaded with the desirable qualities of Osteo-conduction, Osteo-induction and Osteo-genesis, it is the autogenous bone which is still considered the "gold standard" since it has all the three characteristics without any associated immune response. However it was found that CGF when used along with the autogenous bone could harness the osteogenic effect to achieve longer and better osteogenesis. This property is also found to be helpful in providing a complete root coverage for denuded roots in orthodontic cases as well.[37-39] Additionally it is reported that use of CGF and other platelet- concentrates during bone grafting offers the advantages in terms of formation of a dense fibrin clot which primarily plays an important mechanical role, secondly it promotes cellular migration, particularly of endothelial cells which are necessary for neo-angiogensis, vascularization and survival of the graft. Finally the presence of leukocytes and cytokines in the fibrin network play a significant role in the self- regulation of inflammatory and infectious phenomenon within the grafted material.[40]

VI. Conclusion

CGF with its well-known tissue-regeneration capability can be the next material of choice to be used for its beneficial wound healing and osteogenic property at the Cranio-maxillo-facial surgical wound site and therefore can he recommended to be used in augmenting the bone in alveolar bone grafting procedures alone or in combination with other graft materials for the best clinical outcome. Besides providing relief to the patient in terms of reduced wound healing time and an excellent opportunity to avoid another surgical procedure of harvesting bone from the iliac crest, its versatility and regeneration potentials should be given a fair chance to help the patients suffering from cleft lip and palate so that the burden of care giving is taken care by the clinicians. Although CGF has proven to be effective in Osseo-integration and bone healing further investigations and research at the clinical and histopathological levels should be encouraged to understand its role played at different levels for the benefit of mankind.

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Monostotic Fibrous Dysplasia of Maxilla - A Case Report and Review

By Dr. Y. Raghavendra Reddy, Dr. C. N. V. Akhila, Dr. A. Ravi Prakash
& Dr. M. Rajinikanth

Abstract- Fibrous dysplasia belongs to a group of fibro-osseous lesions in which cellular fibrous connective tissue stroma replaces bone. It is a developmental hamartomatous lesion with cases occurring below the age of puberty. Fibrous dysplasia can occur as the monostotic form in which single bone is affected and polyostoticwhere multiple bones are involved. Majority of the cases reported are the monostotic form with the common site of involvement being the craniofacial skeleton. Polyostotic form are often associated with McCune- Albright syndrome, Jaffe-Lichtenstein syndrome and, Mazabraud syndrome. The syndromic lesions manifest as atriad of symptoms - fibrous dysplasias, endocrine abnormalities (endocrinopathies like precocious puberty and hypophosphatemia) and skin pigmentations (a cafe- au-lait spots). Fibrous dysplasias are expansile lesions and cause complications associated with the site of origin. The maxilla is the most common site of involvement in the craniofacial skeleton. In this case, a 13-year-old male patient presented who was having maxillary fibrous dysplasia.

GJMR-J Classification: *NLMC Code: WU 158*

MONOSTOTICFIBROUSDYSPLASIAOFMAXILLA-ACASEREPORTANDREVIEW

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Monostotic Fibrous Dysplasia of Maxilla - A Case Report and Review

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I. Introduction

Fibro-osseous lesions comprise distinct clinical features with complications and co-morbid features. Fibrous dysplasia, cherubism, juvenile ossifying fibroma, osteoma, and aneurysmal bone cyst are the fibro-osseous lesions commonly encountered in the oral cavity. Fibrous dysplasia occurs as relatively rare neoplasm occurring during infancy or childhood. Monostotic fibrous dysplasia accounts for 80-85 % of all the cases with jaws being the prevalent site of involvement [1].

The etiology is mainly genetic with postzygotic somatic mutations of the GNAS gene. Mutation of which leads to altered bone-forming cells which have fibroblastic phenotype and produce neoplasms at particular sites [2]. Thereby bone is replaced by fibrous connective tissue leading to irregular trabecular pattern and woven bone formation. Mostly the diagnosis of the lesion is made by clinical and radiographic features not requiring biopsy. But some of them pose diagnostic difficulties in which biopsy is mandatory.

Treatment modalities differ based on the age and clinical behavior of the neoplasm. Surgical interventions may be difficult as they are more likely to be associated with significant anatomical structures. Follow up plays a major role if incomplete resection (remodeling) when done, lesions are more likely to recur over time. Bisphosphonate therapy can also be indicated in polyostotic fibrous dysplasia. Radiotherapy is contraindicated in these neoplasms as it increases the rate of malignant transformation, with the frequency of sarcoma occurrence [3].

In this article, we present a case of monostotic fibrous dysplasia of maxilla in a 13-year-old patient.

II. Case Report

A 13-year-old male patient reported to G. Pullareddy dental college and hospital, oral and maxillofacial surgery department, with growth in the right maxillary region for one year. The patient complained that the lesion was insidious in onset with unusual growth pattern and attained the present size (Figure 1). The swelling was not associated with pain. No known family history is revealed by the patient. No associated trauma is admitted by patient. Laboratory investigations were normal. On extraoral examination, gross facial asymmetry was noticed on the right side of the face, with a deviation of the nose to left side (Figure 2). Anteriorly the lesion extended below the orbit region at the zygomatic process of the right maxilla without eye involvement. Posteriorly it extended till the malar area of the right side face. Upon inspection the growth was round circumscribed and well-demarcated, measuring 3 X 5 cm. On palpation, the lesion was bony hard, non-tender and was not associated with pain. Intraoral examination revealed expansile swelling extending 5cm anteroposteriorly from the mesial aspect of 14 to distal side of 17 with obliteration of vestibule and 4cm Buccopalatally with bi-cortical expansion, without crossing the mid-palatal line (Figure 3). Retained 54, 55 and clinically missing 13, 15 are observed. Blanching of alveolar mucosa at 55 and 54 is observed. OPG findings revealed radiopaque, ground glass appearance borders blending with adjacent bone (Figure 4). No resorption or displacement of teeth involved is found. CBCT axial view showed varied degrees of opacifications, and coronal view showed thinning of cortical plates, with

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pushing lateral wall and septum of nose medially (Figure 5 & Figure 6).

Provisionally a diagnosis of fibrous dysplasia was considered. Differential diagnosis of other fibro-osseous lesions such as, ossifying fibroma and osseous dysplasia are considered. Taking into consideration the age of the patient surgical recontouring and long term follow up was planned. Under general anesthesia the lesion was shaved, recontoured and reshaped. A vestibular approach was used exposing the anterior aspect till infraorbital region and the bone was shaved using osteotomes and rotary instruments and while periodically checking the amount of bone removal. After adequate removal of the swelling, the area was sutured. The bone bits are sent for histopathological examination (Figure 7).

Microscopically the H & E stained decalcified sections showed irregularly shaped trabeculae of woven bone in a cellular connective tissue stroma. The bony trabeculae are not rimmed by osteoblasts. Curvilinear shaped trabeculae were evident in focal areas. Lesional bone is adjacent to the normal bone. Artifactual peritrabecular clefting is also noticed. The fibrous stroma showed coarse, irregularly arranged collagen fibers with fibroblasts (Figure 8). Based on clinical, radiographic and histological features a final diagnosis of monostotic fibrous dysplasia of maxilla was given, and the patient was advised long term follow up.

III. Discussion

Fibrous dysplasia is a benign congenital fibro-osseous lesion with physiological bone replaced by fibrous tissues. It was first described by Albright et al. in 1937 in a patient with syndromic symptoms of skeletal neoplasms, skin pigmentation, and endocrine abnormalities[4]. Pathogenesis of fibrous dysplasia mainly involves mutations of the GNAS1 gene (Guanine nucleotide-binding protein) located at chromosome 20q13.2 [5]. Early postzygotic mutations cause polyostotic fibrous dysplasia with multiple sites of involvement, and late postzygotic mutations cause monostotic fibrous dysplasia with a single area of occurrence. As these mutations are somatic familial history is not expected, as seen in the present case. These mutations cause hyperfunction of bone progenitor cells which acquire fibroblastic phenotype. The medullary and cortical bones is replaced by sheets of fibro-osseous tissues along with trabecular bone. The fibrous dysplasia occurs below the age of ten years, equally in both males and females.

Clinically the lesion exhibits severe asymmetry and associated symptoms like visual impairment, diplopia, proptosis, hearing loss, nasal obstruction, epistaxis, epiphora, pain, and paresthesia [6]. Laboratory investigations show increased levels of alkaline phosphatase, serum calcium, and serum phosphate levels. But in monostotic forms, the laboratory investigations are not elevated like in the present case. Radiographic features are generally diagnostic with characteristic ground glass appearance, orange peel or cotton wool appearance of bony trabeculae. Displacement and root resorption of associated teeth are absent in fibrous dysplasia as seen in the present case. Sometimes the density of fibrous dysplasia mimics multilocular appearance often misleading the diagnosis as ameloblastoma. Differentially diagnosis of ameloblastoma, ameloblastic fibroma, ameloblastic fibro-odontoma, central giant cell granuloma, odontogenic cyst, ossifying fibroma, chronic sclerosing osteomyelitis, and osteosarcoma are considered for fibrous dysplasia. Treatment may involve radical surgery for devastating forms or shaving and debridement as a part of conservative treatment. Sometimes the lesion is said to be regressed as the patient reaches adulthood, but this concept is not proven. Few cases reports also mentioned about deferring treatment till the patient is above ten years of age or as such with a close follow up.

IV. Conclusion

In our case report, we presented clinical, radiographic, histopathological features and, treatment plan for a case of monostotic fibrous dysplasia of maxilla. Proper clinical and radiographic features of the patient are mandatory for confirmative diagnosis. Based on the clinical behavior and age of the patient, appropriate treatment has to be planned with early intervention to avoid complications. Recurrences are frequently seen in fibrous dysplasia. Hence long term follow up should be done. Our case with its clinical and radiographic features represents an addition to the literature of monostotic fibrous dysplasia.

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Figure 1: Extraoral photograph of the patient

Figure 2: Deviation of nose is noticed to left side

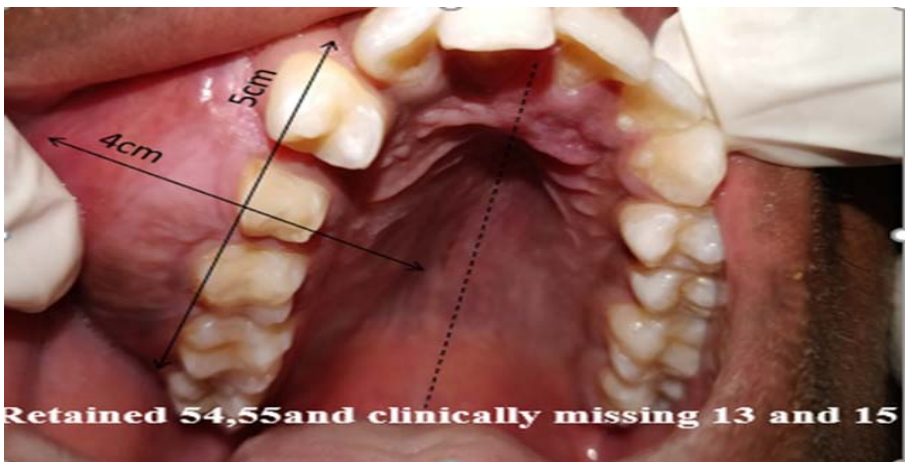

Figure 3: Intraoral Photograph of the patient

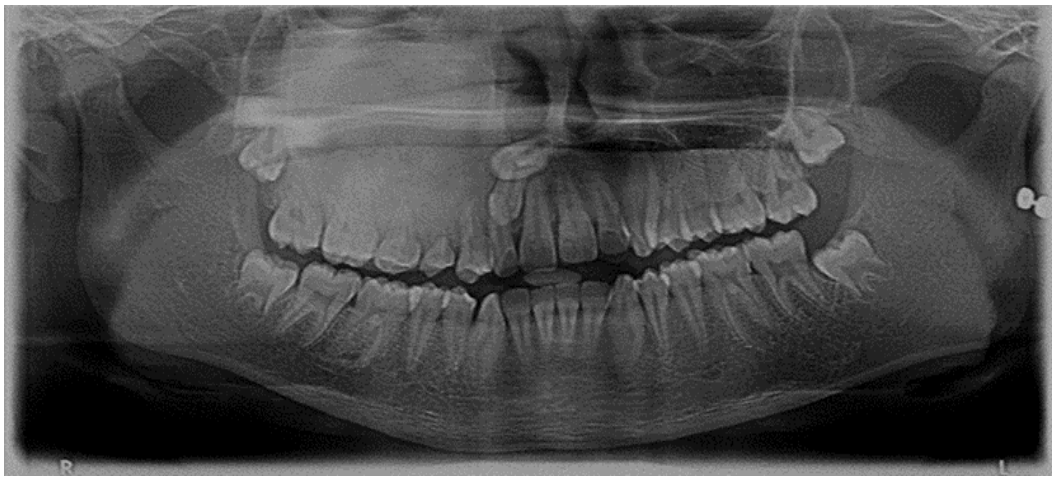

Figure 4: OPG

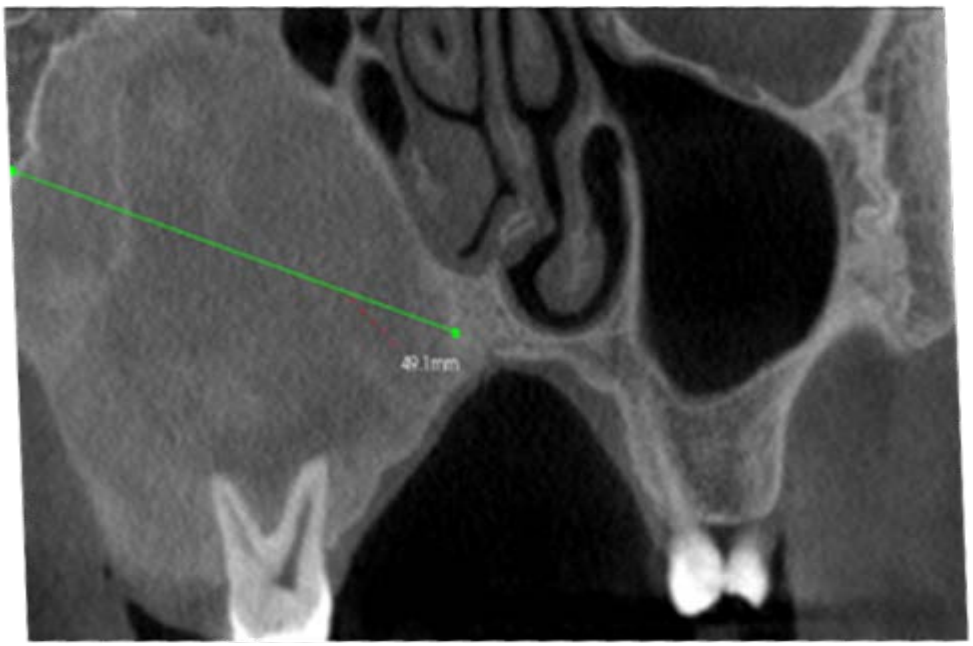

Figure 5: CBCT (axial view)

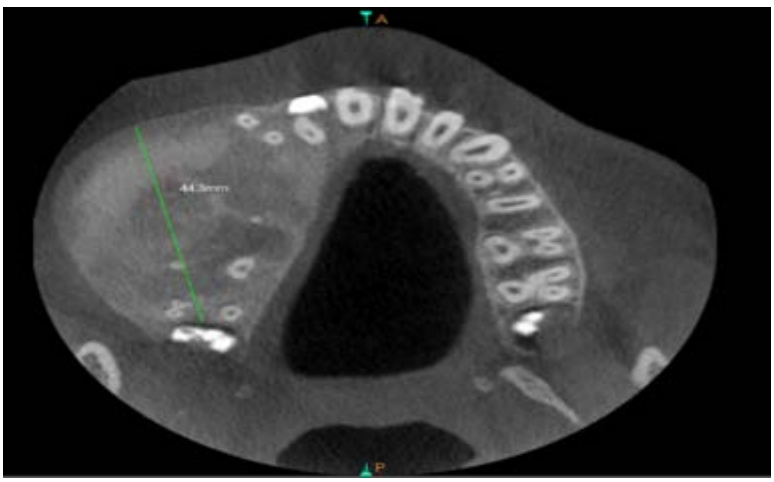

Figure 6: CBCT (coronal view)

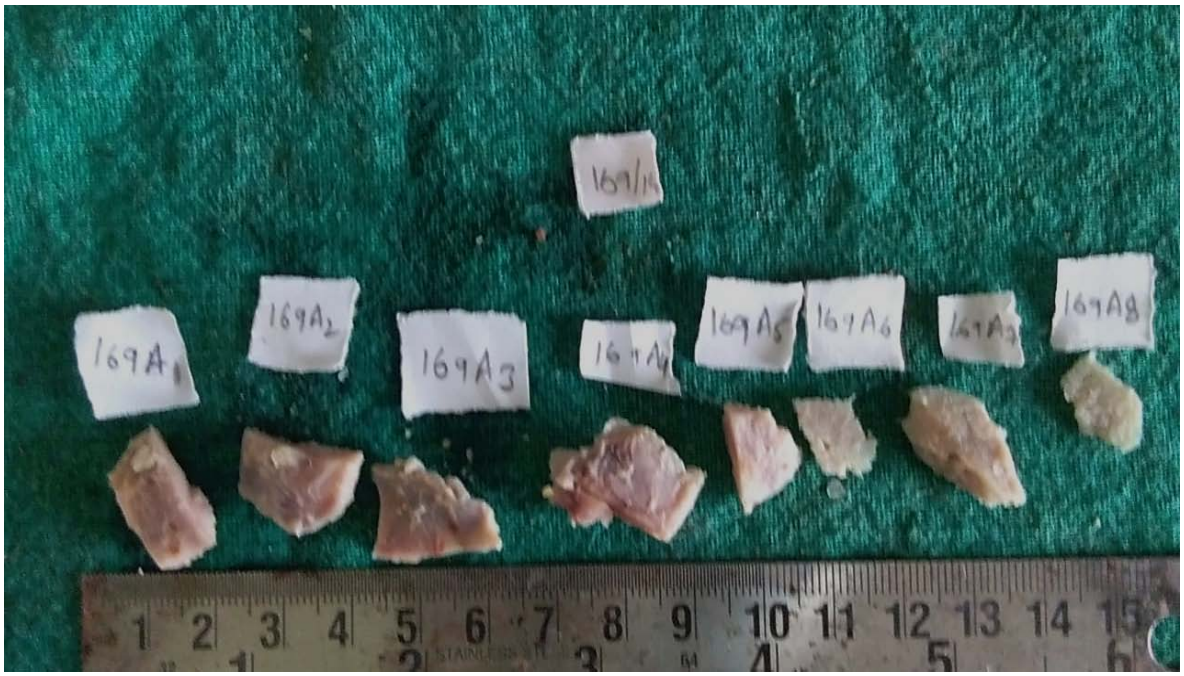

Figure 7: Grossing picture of the lesion after biopsy

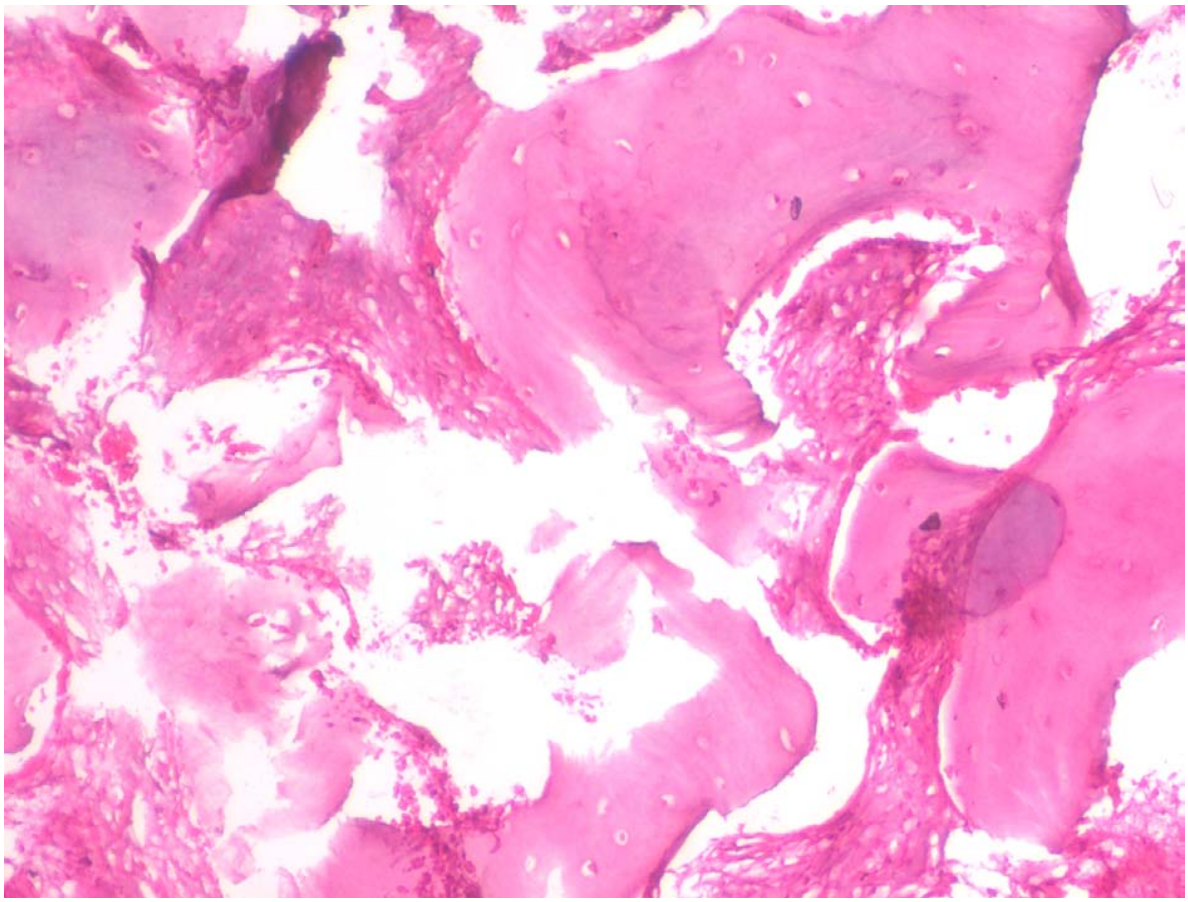

Figure 8: H & E picture of the lesion

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Pterygoid Implant: A Graftless Approach for Maxillary Rehabilitation using TTPHIL-ALL TILT® (Tall Tilted Pin Hole Placement with Immediate Loading) Technique

By Dr. P. Venkat Ratna Nag, Dr. P. Sarika & Dr. Tejashree Bhagwatkar

Abstract- Edentulism is a common dental problem in the elderly population. The maxillary posterior edentulous region offers a unique and challenging condition in implant dentistry. The maxillary posterior region presents with numerous anatomic complications in terms of bone quantity, quality, maxillary sinus pneumatization, and poor approachability. Most remarkable surgical approaches include sinus lift, bone grafting, pterygoid implant, considered as valid solutions to this problem. Pterygoid implants require lot of skill of the dentist and also is proven to be statistically superior. In this case series, the pterygoid implants placed and restored using TTPHIL (Tall Tilted Pin Hole placement with Immediate Loading)- ALL TILT® technique in the patients with atrophic posterior maxilla are discussed.

Keywords: pterygoid implants, graftless solutions, immediate loading, TTPHIL-ALL TILT®.

GJMR-J Classification: NLMC Code: WV 345

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I. Introduction

Oral health plays important role to uphold proper mastication, digestion, phonation, aesthetic, and emotional well-being. The loss of permanent teeth can occur for a variety of reasons, ranging anywhere from hereditary factor, congenital absence, diseases of the dentition (e.g., caries or periodontal disease) and trauma.[1]An edentulous condition existing in the posterior maxilla poses a challenge to all the clinicians. The reasons behind this are the anatomic factors like bone quality (type III or IV) according to Lekholm and Zarb [2], quantity, location of the maxillary sinus, and poor accessibility in the posterior region[3,4].

The pterygoid implants was introduced by Tulasne JF (1992). The advantage of a pterygoid implant is that it allows anchorage, eliminates posterior cantilever and improved axial loading in the posterior atrophic maxilla.[5] It eradicates the need for other techniques like sinus lifts or bone grafts[6,7], increased implant diameters or short implant of 8mm or lesser and implant placement in zygoma[9]. Placement of implants in the pterygoid region provides posterior bone support, bypass sinus augmentation, or bone grafts. Because of inadequate accessibility, placement of pterygoid implants is more technically demanding than placing short implants anterior to the maxillary antrum. However, there are no risks associated with implant placement in pterygoid area[3].

The TTPHIL-ALL TILT® – (Tall Tilted Pin Hole Immediate Loading) concept has evolved from various ideologies in implantology: basal, pterygoid and angulated/tilted implants under immediate loading. To maximize the success of rehabilitation, the TTPHIL technique utilizes the use of long tilted bicortical implants by engaging the pterygoid region. Pterygoid implants were intended to pass through maxillary tuberosity, the pyramidal process of palatine bone and the pterygoid process of the sphenoid bone.[3,10,11] In the literature, success rates of pterygoid implants for maxillary rehabilitation have been more than 94 to 99%. Thus, the TTPHIL-ALL TILT® technique is a novel approach for the placement of implants; it was derived from established schools of thought in implantology.[12]

In this article, following cases are examples of patients indicated for pterygoid implants using TTPHIL-ALL TILT® in partially edentulous and completely edentulous maxilla.

II. Case Report

Case 1: Partially Edentulous Maxillary Arch (Immediate Implantation)

A 42-year-old male patient reported with a chief complaint of loose teeth in the upper left back region of the jaw. Clinical examination revealed Grade II mobility about tooth 27, gingival recession, missing 26, and poor oral hygiene status. (Fig: 1 a, b) The patient was willing to go ahead with a fixed prosthesis for the same region. TTPHIL- ALL TILT® technique was planned for the same; a thorough radiographic evaluation was suggested to the patient. These studies included panoramic films, CBCT, and stereolithography models. The mouth

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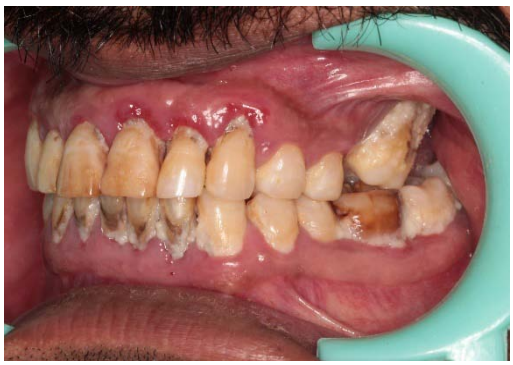
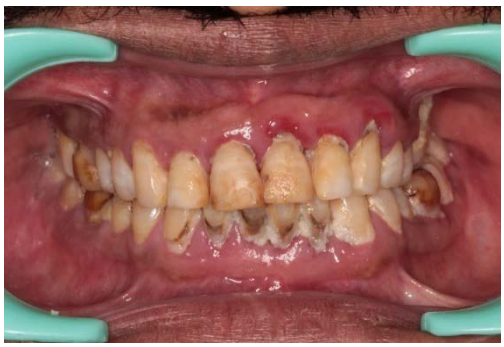
opening was also evaluated and found adequate for pterygoid implants. Routine blood investigations were performed. Radiographic picture (Fig: 1 c) and computed tomography suggested moderate bone loss present in the maxillary sinus region. Considering the amount of bone, atraumatic extraction of 27, followed by the placement of two implants in the left maxillary posteriori. e. 26, 28 (pterygoid implant) was planned and discussed with patient. Patient consent for the treatment was taken. Under aseptic precautions, local anesthesia was given at the surgical sites, and atraumatic extraction of 27 was performed. The socket was curetted carefully and irrigated with sterile saline solution, drilling was done through extraction socket at the planned length. The pilot drill of 1.2mm was then inserted through the mucosa into the alveolar bone of 26 for point of entry to a depth of 6mm. Single drill concept was used, i.e. long stepped drill with diameters of 1.4 or 2.2mm with enough coolant. The under-drilling concept was followed, wherein the dimension of the drills is less than the implant to be positioned for better anchorage. The bioline implant 3.75mm × 13mm and 3.75mm × 22mm mounted on the implant driver, and torque ratchet was used for final placement of 26, 28 (Fig: 2 a). Post-implant placement orthopantomogram was exposed (Fig: 2 b). Multiunit abutments were placed at correct angulations to compensate for the tilt of the implants. The surgical protocol was followed by the prosthetic phase of impression making with transfer copings, Jig trial, bite records, metal framework trial, bisque trial followed by placement of final prosthesis using CAD-CAM technology for design and fabrication was done (Fig: 2 c). The patient was rehabilitated with screw-retained metal-ceramic fixed prosthesis and orthopantomogram was exposed (Fig: 2 d). The patient was advised to adhere to regular oral hygiene maintenance.

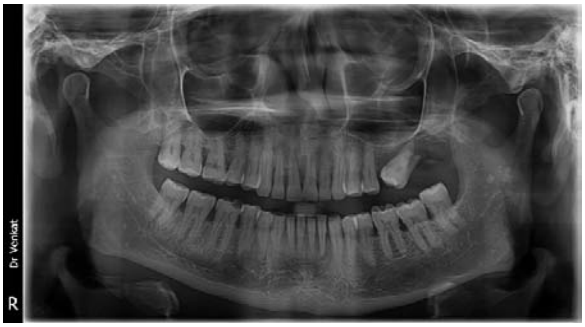


a.



b.

Fig. 1 a and b: Intra-oral view showing gingival recession with 27, missing 26



c.

Fig. 1 c: Pre-operative OPG showing moderate bone loss with 27 and minimal bone in the region of maxillary sinus and adequate bone in the pterygoid region.

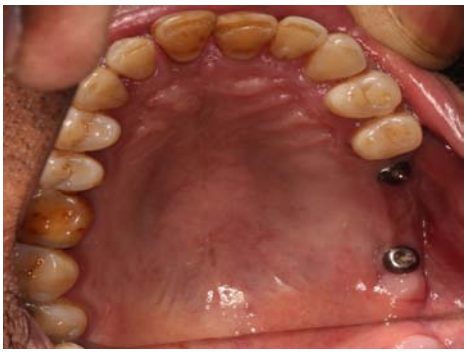


Fig. 2 a: Clinical photograph showing two implant placements (26, 28) in left maxillary region

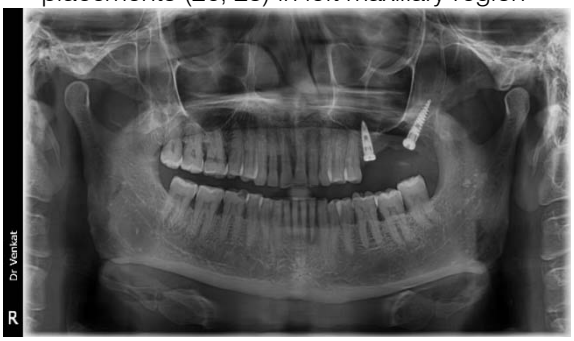


Fig. 2 b: Post-operative OPG showing placement of 2 implants in 26, 28 region

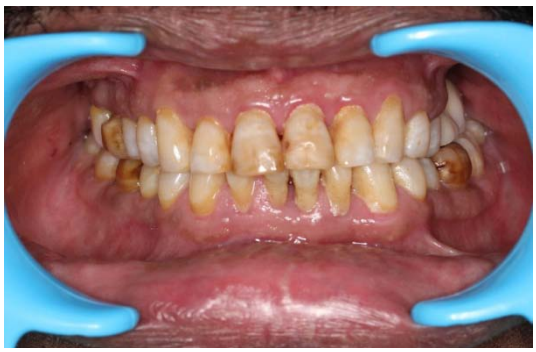


Fig. 2 c: Final Metal–ceramic prosthesis was given

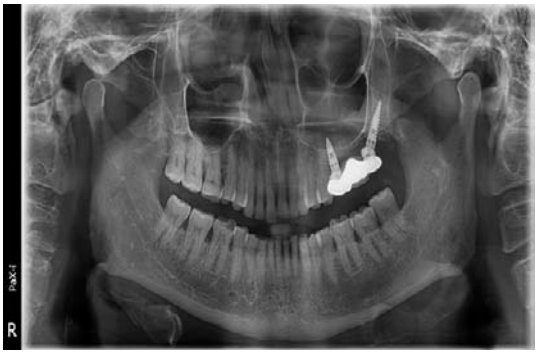


Fig. 2 d: Postoperative OPG after fixed implant prostheses

Case 2: Partially Edentulous Maxillary Arch (Delayed Implantation)

A 37-year-old female patient came with a chief complaint of missing teeth and wanted to get them replaced. On intraoral examination (Fig: 3 a), missing 15, 16, 24, 25, 27, root stumps about 17, 26 and badly decayed 11, 12, 13, 21 were observed. The patient was keen on having a fixed prosthesis. On detailed examination of the orthopantomogram (Fig: 3 b), there appeared to be adequate width of the available bone anterior to the maxillary sinus but the inadequate bone in the maxillary sinus region. Treatment plan for the patient was atraumatic extraction of root stumps and immediate placement of six implants i.e. 14, 15, 27 (pterygoid implant), 25, 26, 28 (pterygoid implant). Under aseptic precautions, local anesthesia was administered at the planned surgical sites and atraumatic extraction of 17, 26 was done. Extraction sockets were thoroughly debrided and inspected with the help of periodontal probe for any defect or possible perforation of the cortical plate. Six Bioline implants were placed in the regions of 14, 15, 17 (Pterygoid implant), 25, 26, 28 (Pterygoid implant) (Fig: 4 a). The dimensions of the implants were 3.75 mm × 20 mm (14, 15, 25, 26) and 3.75 mm × 22 mm (Pterygoid implant i.e 17, 28) respectively. The orthopantomogram of post-implant placement was exposed (Fig: 4 b). Multiunit abutments were placed at correct angulations to compensate for the tilt of the implants. Final prosthesis was designed and fabricated using CAD-CAM technology (Fig: 4 c). Postoperative OPG was taken immediately after fixed implant prostheses. (Fig: 4 d) The patient was advised to adhere to strict soft diet regimen for a few days with regular oral hygiene maintenance and recalled for clinical and radiographic assessment.

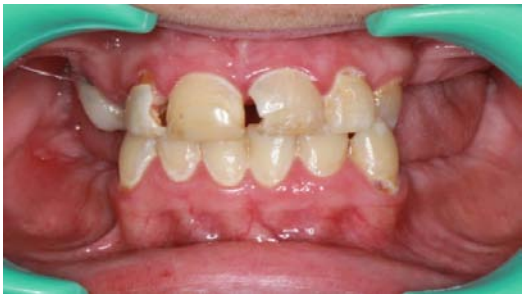


Fig. 3 a: Intra-oral view shows missing posterior maxillary teeth and badly decayed upper front teeth

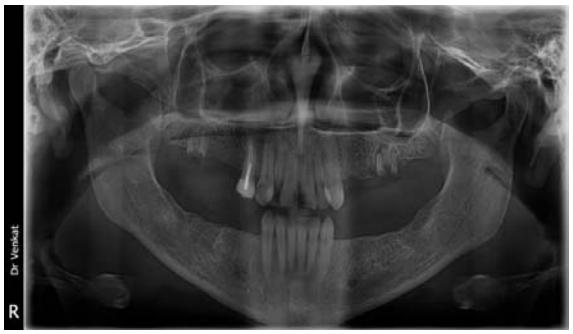


Fig. 3 b: Pre-operative OPG shows adequate width of the available bone anterior to maxillary sinus but inadequate bone in maxillary sinus region

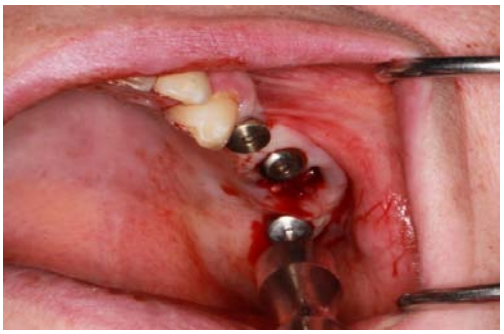


Fig. 4 a: Clinical photograph showing implant placement

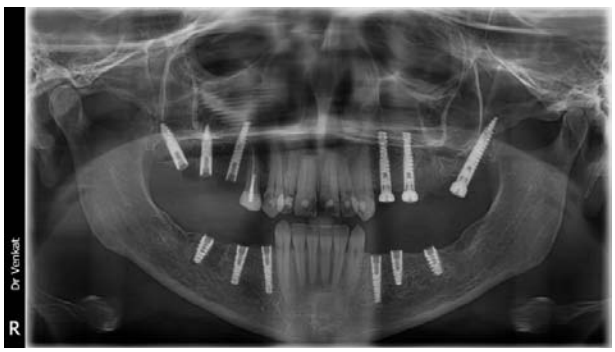


Fig. 4 b: Post-operative OPG showing placement of 6 implants

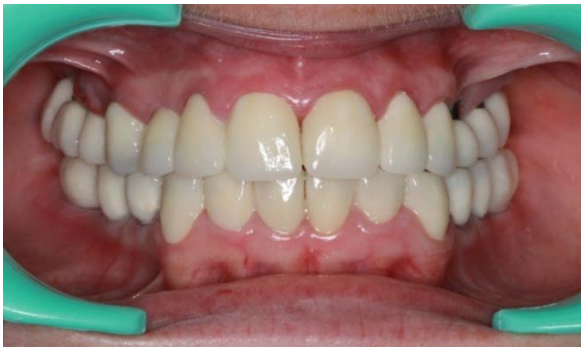


Fig. 4 c: Final Metal–ceramic prosthesis was given

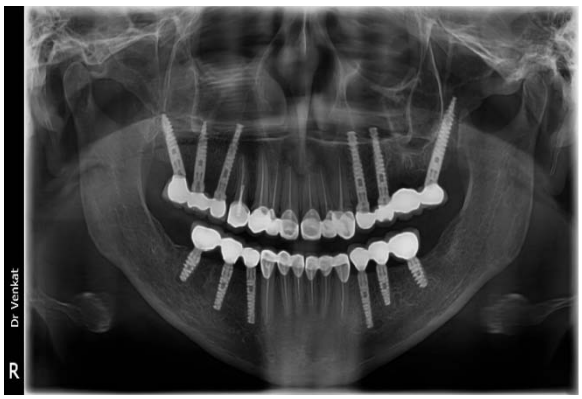
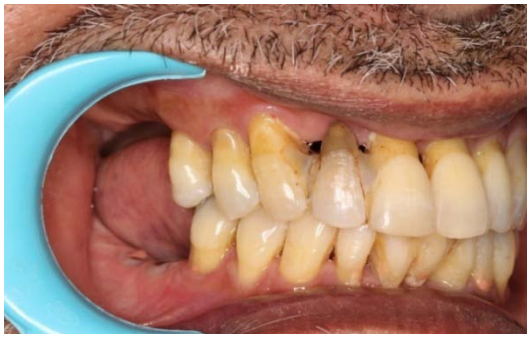


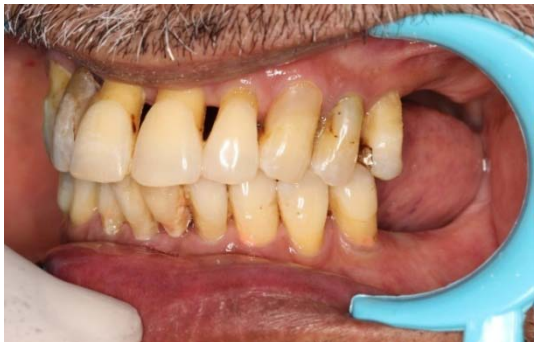
Fig 4 d: Postoperative OPG after fixed implant prostheses

Case 3: Completely Edentulous Maxillary Arch (Immediate Implantation)

A 61-year-old male patient complained of missing teeth in upper back region of jaw and desired replacement. Clinical examination (Fig: 5 a, b) revealed missing 16, 17, 26, 27, Grade II mobility about tooth 25, Grade I mobility about tooth 14, 15, 24 and splinting was present concerning11,12,13. The patient was willing to receive a fixed prosthesis. Medical history revealed a heart problem and high blood pressure. On detailed examination of the orthopantomogram (Fig: 5 c), CT scan shows severe bone loss and inadequate bone in the maxillary sinus region. Extraction of all teeth, and immediate implant placement 13, 15, 17 (pterygoid implant), 23, 25, 27 (pterygoid implant) was planned and excecuted. Routine blood investigations was performed, and the physician's fitness for the surgical procedure was acquired. Patient consent was obtained before a surgical procedure. Surgical protocol emphasized complete asepsis and infection control. Under local anesthesia, atraumatic extractions of all remaining teeth were completed. Extraction sockets were thoroughly debrided and irrigated with saline solution. Six Bioline implants was placed in the regions of 13, 15, 17 (Pterygoid implant), 23, 25, 27 (Pterygoid implant) (Fig 6 a). Post-implant placement orthopantomogram was exposed (Fig: 6 b). The patient was rehabilitated with screw retained metal-ceramic fixed prosthesis (Fig: 6 c). Postoperative OPG was taken immediately after fixed implant prostheses. (Fig: 6 d) The patient was followed up after few years for clinical and radiographic assessment.



a.



b.

Fig. 5 a, b: Intra-oral view showing missing posterior maxillary teeth and splinting present in anterior teeth

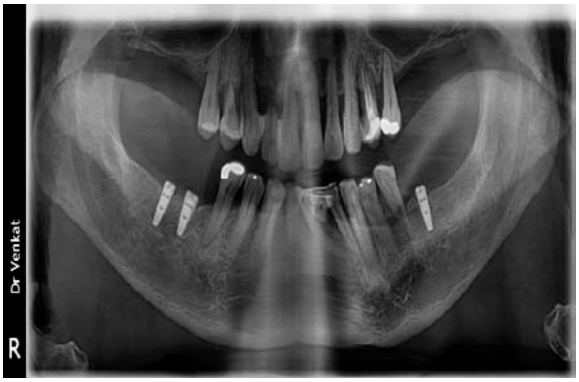


Fig. 5 c: Pre-operative OPG showing severe bone loss and inadequate bone in maxillary sinus region

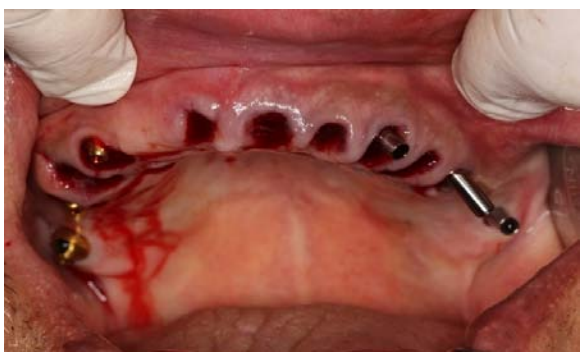


Fig. 6 a: Clinical photograph showing implant placement

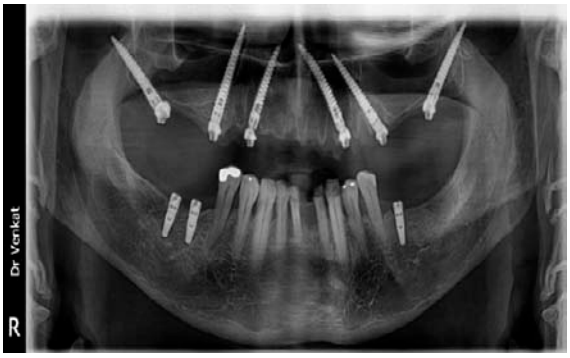


Fig. 6 b: Post-operative OPG showing placement of 6 implants

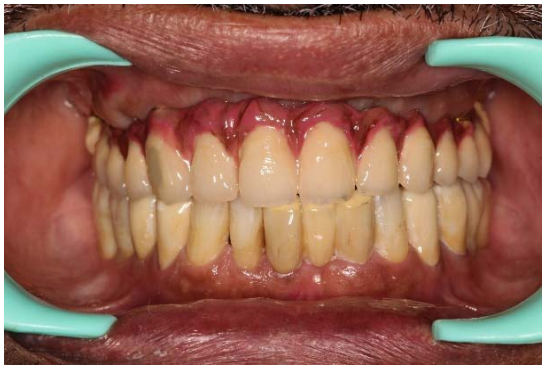


Fig. 6 c: Final Metal–ceramic prosthesis was given

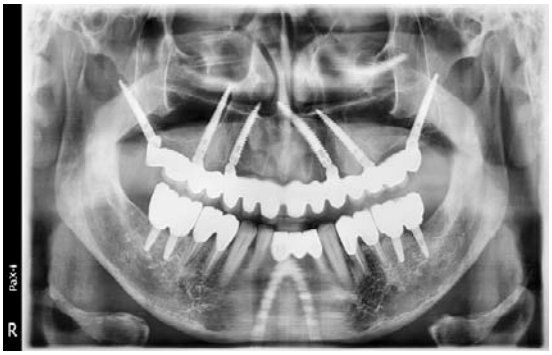


Fig. 6 d: Postoperative OPG immediately after fixed implant prostheses

Case 4: Completely Edentulous Maxillary Arch (Delayed Implantation)

A 61-year-old female patient complained of missing upper teeth and wanted replacement of her denture. Intraoral examination revealed edentulous maxillary arch (Fig: 7 a). The patient was using denture for edentulous maxillary arch for two years and wanted a fixed prosthesis. Medical history revealed diabetes and insulin-dependent. On detailed examination of the OPG (Fig: 7 b), CT scan, there appeared severe bone loss and inadequate bone in the maxillary sinus region. Treatment plan was immediate implant placement 13, 15, 17 (Pterygoid implant), 23, 25, 27 (Pterygoid implant). Routine blood investigations were performed, and the physician's fitness was obtained for surgical procedure. Six Bioline implants were inserted in the planned sites (Fig: 8 a). Post-implant placement orthopantomogram was exposed (Fig: 8 b). The prosthetic phase was carried out. The patient was rehabilitated with a screw-retained metal-ceramic fixed prosthesis (Fig: 8 c). Postoperative OPG was taken immediately after fixed implant prosthesis. (Fig: 8 d)

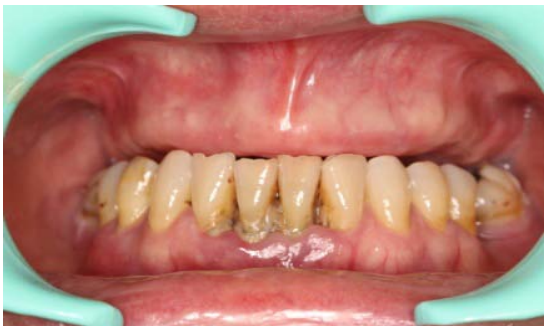


Fig. 7 a: Intra-oral view showing edentulous maxillary arch

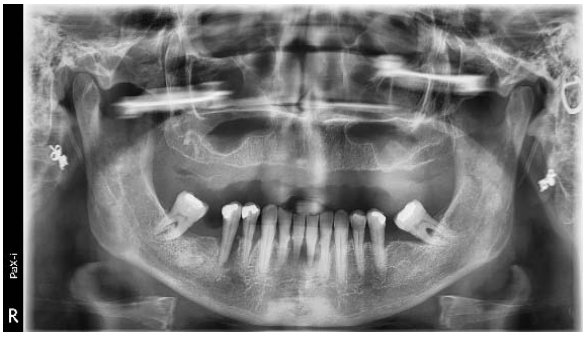


Fig. 7 b: Pre-operative OPG showing severe bone loss and inadequate bone in maxillary sinus region

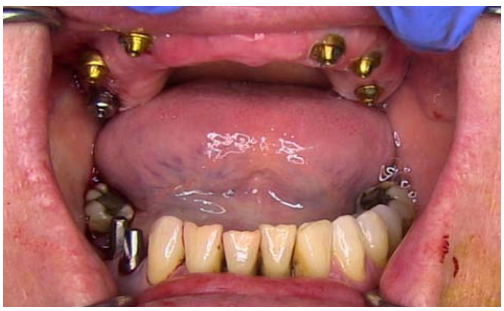


Fig. 8 a: Clinical photograph showing implant placement

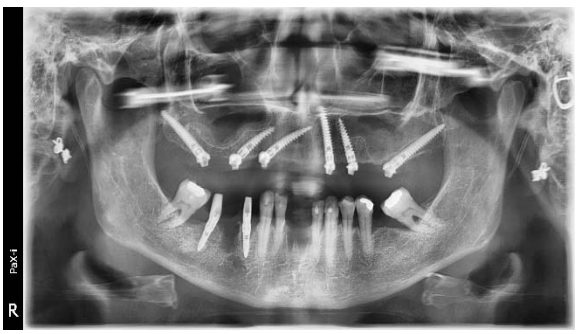


Fig. 8 b: Post-operative OPG showing placement of 6 implants

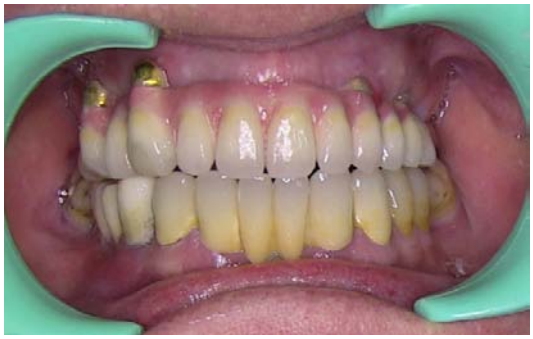


Fig. 8 c: Final Metal–ceramic prosthesis was given

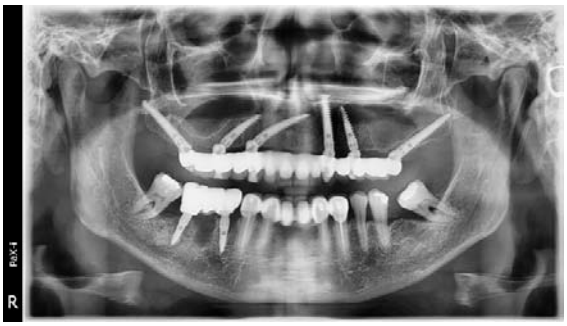


Fig. 8 d: Postoperative OPG was taken after fixed implant prostheses

III. Discussion

Treatment of edentulous patients has always been a challenging task for the dentists. In the modern era, implant dentistry gained popularity and considered as the best alternative, irrespective of resorbed bone, reduced bone density in the maxillary posterior regions and systemic conditions. Krump et al and Barnett et al reported higher success rates for immediate implant placement.[13,14]

In the literature, several articles have assigned many labels for implant placement in the posterior maxillary region. Implants placed in the posterior maxilla have been discussed as pterygoid plate implants[11], tuberosity implants [15-16], and pterygomaxillary implants [17].

The structures that offer support for implant placement are the tuberosity of the maxillary bone, the pyramidal process of the palatine bone, and the pterygoid process of the sphenoid bone [18].

Conventionally, because of the anatomic factors and biomechanical factors[19], the success rates for implants placed in the atrophic posterior maxilla was lower than that for other locations.

In literature, few studies were carried out on pterygoid implants for the survival of implant and prosthesis. Bahat [15] performed a study on 45 patients, 72 implants were engaged in the tuberosity region, and they noted 93% survival rate over an average loading time of 1.7 years. Balshi[16] reported satisfactory 3-year results for 51 implants placed in the pterygoid area supported fixed prostheses in partially edentulous patients. Khayat et al[20] reported on cases of implants placed in the pterygoid region with four years of follow up. Graves[11] described forty-three implants in the pterygoid plate area.

TTPHIL- ALL TILT® (Tall Tilted Pin Hole Immediate Loading) technique[21-25] was evolved after studying and analyzing all the advantages and shortcomings of other traditional and advanced techniques. Using this concept two tall tilted implants engaged the pterygoid region (junction of the palatine process of maxilla, the pyramidal process of palatine bone and pterygoid process of the sphenoid bone), thus eliminating distal cantilever, avoiding sinus encroachment and other augmentation procedures in the posterior maxilla. Tilting of implants avoids anatomical structures like the maxillary sinus. In literature, many studies were carried out on tilted implants, the success rates were found to be 95.7 to 100%[26], which have been improved by bicortical engagement. Tall implants with bicortical engagement offer primary stability which improves implant success.[27]

The subcrestal implant placement decreases the stress in the crestal cortical bone around dental implants. Flapless guided implant placement helps in mucointegration, good aesthetics, reduces the time of treatment, and improves patient satisfaction. Nowadays, practice-driven implantology has been evolved the dimensions (lengths 15-25mm) of implants.[28] Multi-unit abutments, and their components help dentists to correct the angulations caused by the tilted implant.[29] This aids in immediate loading of the fixed prosthesis.[30]

IV. Conclusion

Based on the outcomes of the case reports, Immediate/Delayed implant placement with immediate loading is considered as a feasible treatment option for the patients with the severely atrophic maxilla. The TTPHIL–ALL TILT® technique considered as a graftless solution which is characterized by Tall, tilted implant with bicortical engagement, minimal invasiveness (flapless approach), screw-retained prosthetic solutions with rigid cross arch stabilization with no cantileverage can be delivered in 2-5 days. However, this technique is highly sensitive and requires experts in implant dentistry for its execution. Careful selection of patients, thorough radiographic evaluation, proper treatment planning, and adequate follow-up of surgical and prosthetic protocols are the keys to success.

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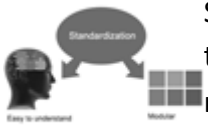

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The MARSM member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

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The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

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15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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