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RESEARCH ARTICLE

RESTORATION OF A MISSING CENTRAL INCISOR WITH DENTAL IMPLANT USING HARD TISSUE AUGMENTATION: A CASE REPORT

[1*]Dr. Sneha Gaonkar, [2]Dr. Meena Aras, [3]Dr. Vidya Chitre and [4]Dr. Saurabh Kamat

[1]MDS, Consultant Prosthodontist
[2]MDS, Professor and Head, Department of Prosthodontics and Crown and Bridge
[3]MDS, Professor, Department of Prosthodontics and Crown and Bridge
[4]MDS, Assistant Professor, Department of Oral and Maxillofacial Surgery

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ABSTRACT

Loss of natural teeth could compromise the functional, esthetics and phonetics demand by the patients. Advancements in the oral implant procedures has created various treatment options available. Adequate bone support is essential prior to dental implant placement. Bone defect associated with lost teeth in anterior maxilla will affect both surgical placement of implant and subsequent prosthetic rehabilitation. Augmentation of bone defects can be carried out using autografts, particulate grafts or block grafts combined GBR to regenerate lost bone. This case report presents step by step procedure in which missing anterior tooth was restored with dental implant using hard tissue augmentation.

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INTRODUCTION

Achieving functional and esthetic anterior implant restorations in the anterior region of the maxilla can be particularly challenging (Kuchler, 2014). The common causes that leave the region deficient in bone and soft tissue support Gincludes trauma, dental caries, vertical root fractures, recurrent failure of root canals and periodontal diseases (Hammerle, 2018). Bone defects such as intra alveolar defects, dehiscence, fenestration, horizontal and vertical ridge defects occurs in dental implant sites while soft tissue defects includes volume deficiency and quality of tissue around the dental implant sites (Hammerle, 2018). In treatment planning of placement of implants in anterior region of maxilla, it is essential to adhere to four major concepts for the success of implants that includes: Proper placement of implant in the mesio-distal, bucco-lingual, apico-coronal dimensions, implant placement with the correct angulation, selecting the appropriate dental implant size, avoiding use of excessively large implant sizes for maxillary anterior implants and ensuring that there is adequate soft tissue present for the development of dental implant soft tissue contours and interproximal papilla. Incase of deficiencies in hard and soft tiisue, grafting procedures should be utilised to create optimal sites for implant placement (Buser, 2004).

***Corresponding author: Sneha Gaonkar,**
MDS, Consultant Prosthodontist.

CASE REPORT: A 19 year old female patient reported to the Department of Prosthodontics with the complaint of missing left Central incisor (21) (Figure 1).She didn't have any relevant medical history. The patient gave the history of trauma for her missing tooth. Intraoral examination revealed a thin gingival biotype and healthy periodontal status. A CBCT (Cone Beam Computerized Tomography) scan revealed a radiolucent region seemed to suggest a bony defect in the region of missing tooth (21) with reduced bone width and a root canal treated tooth(11) (Figure 2). Hence a team of prosthodontists and oral surgeons were consulted to formulate a treatment plan. Treatment plan was divided into three phases: First phase included bone augmentation using Chin block graft, second phase included implant placement combined with Guided bone regeneration (GBR) planned by consultant oral surgeon followed by the prosthetic phase. The patient and her parents were informed about the surgical procedure, risk involved and an informed consent was obtained. The patient was advised to take antibiotic prophylaxis (2 g Amoxicillin) one hour before the surgery. In order to harvest chin block graft, Labial vestibule of the donor site in relation to teeth 33,32,31,41,42,43 was infiltrated with 5ml of Lignocaine with 1:100000 adrenaline. A crevicular incision was given from the distal aspect of 33 to distal aspect of 43.On both the sides ,vertical releasing incisions were given,full thickness mucoperiosteal flap was raised, chin block graft was harvested and resorbable sutures were placed (Figure 3A,3B,3C).

Figure 1. Missing right central incisor

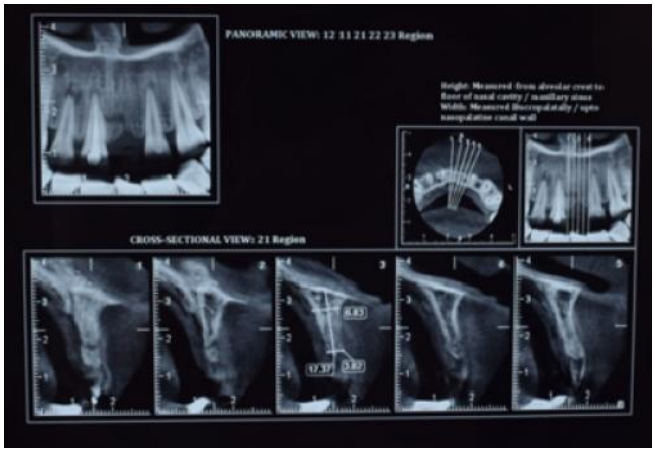

Figure 2. CBCT scan showing missing tooth and bone defect

Figure 3(A). Mucoperiosteal flap elevated Figure 3(B):Harvesting of Chin block graft on the donor site

Figure 3(c). Surgical site closure with resorbable sutures

On the same day, full thickness mucoperiosteal flap was raised on the recipient site and chin block graft was placed using bone screws to regenerate the bone in the area of defect and to increase the bone width (Figure 4A,4B,4C). After 4 months, CBCT scan revealed regeneration of bone with increase of 1.15mm in bone width (Figure 5). At this stage it was decided to place implant in relation to 21.

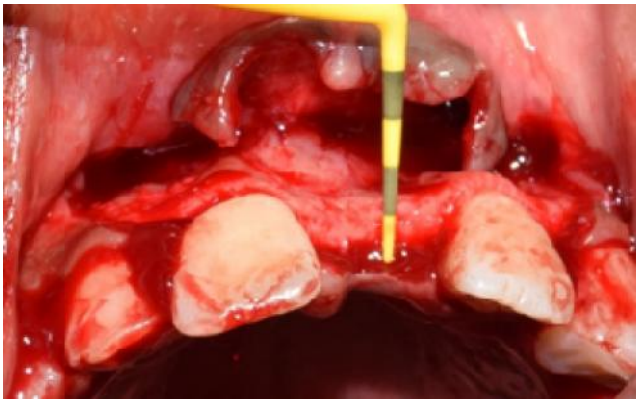

Figure 4(A). Mucoperiosteal flap elevated on the recipient site

Figure 4(B). Chin block graft placed using bone screw on the recipient site

Figure 4(c): Surgical site closure with resorbable sutures

Figure 5. CBCT scan showing increase in bone width

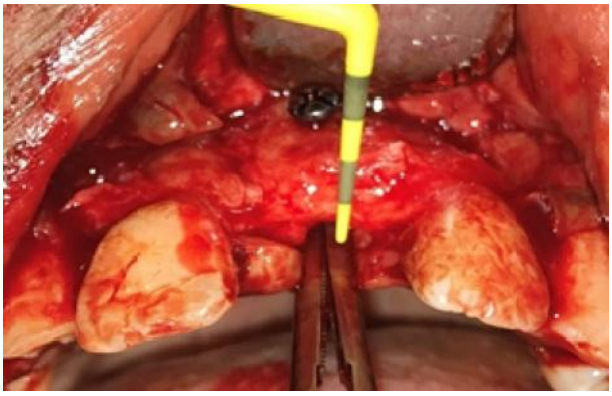

Figure 6(A): Bone regeneration seen at the recipient site

Figure 6(B): Bone screw removed and placement of implant

Figure 6(C). Implant placed with the combination of Xenograft and GBR technique

Figure 6(D). Surgical site closure with resorbable sutures

Figure 7. Closed tray implant level impression made

Figure 8. Placement of angulated abutment and tooth preparation irt 11

Figure 9. Final impression made with putty and light body (Addition silicone)

Figure 10. Veneered Zirconia Crowns cemented

Figure 11. Post operative(follow up at 6 months)

The mucoperiosteal flap was raised, bone screw was removed and an implant of size 3.2×10mm (OSSTEM) was placed(Figure 6A,6B). This was combined with the placement of Xenograft (Bio-Oss, Geistlich Pharma, Switzerland) and guided bone generation (GBR) with resorbable membrane (Bio-Gide, Geistlich Pharma, Switzerland) (Figure 6C). The surgical site was closed with resorbable sutures (Figure 6D). The patient was followed up in 1week, 1month, 3months and 6months. After 6 months, the prosthetic phase was intiated. A healing abutment was placed for 15 days to obtain good soft tissue collar. Mock up was done to evaluate final tissue contour and temporisation completed. A closed tray implant level impression was made using light body and putty (Addition silicone, Elite HD + Zhermack, Italy) to select the final abutment required (Figure 7). An angulated abutment was chosen to achieve better esthetics. The abutment was initially placed on the cast to do required milling extraorally so that accurate positioning was obtained. Intraorally, the abutment was torqued to around 30Ncm.

The abutment screw access hole was closed with Teflon tape and blocked with composite resin (Tetric N Flow Flowable Composite, Ivoclar Vivadent). At the same appointment , root canal treated tooth (11) next to the implant site was prepared for fixed crown (Figure 8). The gingival retraction was done to obtain accurate margins and the final impression was made with putty and light body (Addition silicone, Elite HD + Zhermack, Italy) using abutment level closed tray impression technique to fabricate veneered zirconia crowns (Lithium disilicate, IPS e.max on zirconia core, Lava) on 11 and the implant abutment(Figure 9). Shade selection was done to perfectly match the adjacent teeth. At this appointment, patient left the clinic with provisional crowns (Bis-Acryl Composite Resin, Protemp 4) on 11 and the implant abutment. Bisque trial was done and final cemenation was done with a non eugenol cement (Temp-Bond NE, kerr) (Figure 10). A thorough examination was performed to ensure that the gingival and peri implant sulcus are free of remaining cement particles to prevent any foreign reactions. The patient was given oral hygiene instructions including dental floss and interproximal brushes.

The patient's follow up was done for 6 months (Figure 11).The patient reported being pleased with the final result.

DISCUSSION

Adequate bone support is essential prior to dental implant placement to avoid problems in proper positioning of implants. Bone loss or defects in the bone should be addressed with bone grafts prior to dental implant placement.A combination of bone grafts and soft tissue grafts are used in the sites with thin facial bone, which will help in the formation of thick gingival biotype (Levine, 2014). Preservation of interdental papilla and gingival margin around the prosthesis in the anterior region is important to achieve esthetic results. For the complete filling of interdental papilla, the space of 5mm from the crest of interproximal bone to the contact point of teeth should be achieved (Mohanad, 2006; Walid Al-Jallad, 2014; Gregori Kurtzman, 2011; Sangeeta Dhir, 2011). Augmentation of the bone when local defects occur can be carried out using autografts, particulate grafts or block grafts combined GBR to regenerate lost bone.The GBR technique involves the use of barrier membrane between connective tissue and the alveolar bone defect allowing regeneration of bone (Kazor, 2004). Buser et al studied the use of autograft combined with E-PTFE membranes for lateral augmentation showed a bone gain of 3.5mm to 7.1mm (Buser, 1996). Other techniques includes the use of split cast technique that involves the expansion of the ridge (Goyal, 2015). In this case report, lateral augmentation was carried out using autograft in first phase followed by the combination of Xenograft(Bio-Oss) along with GBR to regenerate the bone and to preserve soft tissue. During prosthetic phase, also attention was given on soft tissue where contouring was done with the help of provisional restoration before insertion of final prosthesis to develop a proper emergence profile, re-establish normal tissue contour and interdental papillae (Mohanad, 2006).

Conclusion

The implant placement and restoring the esthetics in the anterior maxilla presents the unique challenges. The careful treatment planning is essential to achieve esthetic as well as functional maxillary anterior restorations. The thorough knowledge of bone and soft tissue dimensions are also essential to overall implant success in the anterior region.

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