

# Single Tooth Replacement with Implant Supported Prosthesis Using Composite Grafting Technique.

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For an implant to be successful there must be adequate bone structure surrounding the implant three dimensionally. An implant must be protected by the cocooning effect of the bony wall. Unfortunately tooth loss and aging cause inevitable bone loss.

Graft less procedures such as osseodensification and ridge splitting have been successfully done for cases with border line defects. However, in order to get soft tissue contour, additional bone grafting would be paramount to achieve the desired results. (1)

Various grafts are available at our disposal with osteogenic (new bone formation), osteoinductive (induction of bone formation) osteoconductive (scaffolding) properties. Autografts remains the gold standard. However, auto- grafts have higher resorption rates and other drawbacks like donor site morbidity (2,3).

50:50 ratio of particulate autogenous versus allografts have been used successfully. The osteogenic potential of the autogenous grafts and the low resorption rate of the allografts is an ideal combination to promote growth of bone architecture required for optimum aesthetics. (4)

The following case report presents rehabilitation of missing anterior teeth with implant supported prosthesis. A ridge

splitting procedure and lateral augmentation with particulate allograft with autograft mixture also was done. A one year follow up showed sustained bone level around implants.

### Case Report:

#### Preoperative Stage:

A male patient aged 30 years, presented to the department of Oral Implantology with missing upper front tooth due to trauma.



Fig. 1

(fig 1) Preoperative procedures such as facial profile analysis, intra oral examination and radiographic analysis were performed. The following were the findings.

Intra oral examination: 21 was missing, 11 had periapical lesion.

Smile line: The patient had a low smile line and a toothy smile. There was also a marked shift in the midline.

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Patient expectations: Patient was co-operative and had moderate expectations of outcome.

Radiographic analysis; (fig 2)

OPG AND CBCT analysis indicated 16 mm bone height and bone width of 4 mm with a bucco- palatal hourglass shaped bone defect wrt 21.

Treatment planning: ridge splitting and immediate implant placement with lateral augmentation

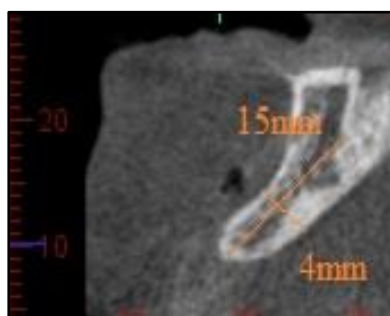


Fig. 2

Patient was advised oral prophylaxis, there after a root canal treatment wrt 11.

Diagnostic impressions were made, occlusion and vertical dimensions were established.

**Surgical phase:** Antimicrobial prophylaxis was obtained with the use of 500 mg of Amoxicillin thrice daily for 5 days, starting 1 day and 1 hour before surgery. 0.2% Chlorhexidine Gluconate mouth rinse was also prescribed one week and one-hour prior surgery. Perioral disinfection of the patient was done with 5% w/v Povidone Iodine solution.

The surgery began with the administration of local anaesthesia (2% lignocaine hydrochloride). A full thickness flap was elevated A sharp bone chisel was then

positioned midcrestally and tapped using a mallet to create a minor split. Care was taken to manoeuvre the instruments as gently and firmly as possible in order to avoid any inadvertent fractures. Ridge splitting was done using ridge expanders (ankylose set ridge expanders/Dentsply). Sequential splitting resulted in progressive increase of the diameter. Ankylose straight osteotomes was then used to finalize the split (fig 3). Sequential osteotomy and reaming were done and Implant (ANKYLOS C/X A 11) was prosthetically driven 1mm sub-crestally.



Fig. 3

Lateral augmentation was done with autogenous bone collected from the patient's osteotomy site and mixed with patient's blood periosteal blood AND Ringer's Lactate.

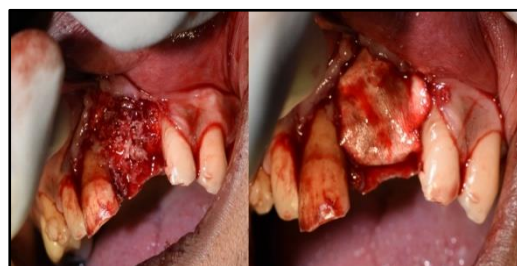


Fig. 4

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Allograft also was mixed with this to make an osteogenic rich composite graft. A collagen membrane was then placed to cover the graft (fig 4)

A primary closure with everted edges was achieved with Vicryl 3.0 sutures. Immediate post-operative x-ray was taken. (fig 5)



Fig. 5

**Post operative care:** Postsurgical analgesic treatment was performed using 100 mg of aceclofenac twice daily for five days along with the antibiotics and mouth rinse. Oral hygiene instructions were provided. Patient was advised to return for suture removal and be on soft diet for 6 weeks

**Prosthetic Phase:** Patient was recalled for second stage surgery four months post-operative. Cover screw was retrieved noninvasively. A 3.0 wide diameter sulcus former was placed for 15 days and a provisional restoration with an ovate pontic design was delivered subsequently.

Patient was recalled for implant level impression. Regular non angulated abutments were selected (Regular C/X 3.0/A0). An orientation jig was used to confirm the placement of the abutment. Finally, the abutment was torqued(15Ncm) and sealed with Teflon and composite. The PFM crown was then cemented using Zinc

Phosphate. (Fig. 6)



Fig. 6

A post cementation X-ray was taken to evaluate the abutment connection and the presence of excess cement.

Follow up: patient was advice peri implant care and given proper advice on oral health care. A one year follow up x-ray revealed intact crestal bone levels.

### Discussion:

Implant placement in the aesthetic area comes with many challenges and is dependent on various factors. Therefore, a thorough diagnosis of the existing factors (anatomic and host response) and customised treatment planning (surgical, materials used and prosthetic philosophies) is imperative.

In the above-mentioned case, the CBCT revealed 4-5mm of Buccolingual width. Although there was enough bone to place an implant, it would not guarantee an optimal prosthetic placement. It is also crucial to have 1mm of bone surrounding the implant in order to have successful (short and long term) outcome. A 2mm facial bone would be ideal. (5) Ridge splitting and bone expansion methods have been used with wide success

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rates. Splitting has to be done in cases there is adequate cancellous bone and residual ridge heights. It should be also noted that the thereinto excessive facial inclination of the bone. Inorder to recreate and follow the contour of the adjacent teeth, horizontal augmentation was also done.

Autologous bone is considered to be the gold standard due to its osteogenic, osteoinductive, and osteoconductive properties including lack of immunogenicity(6,7) However, autologous bone grafts may show a number of disadvantages, such as increased operation time, donor site morbidity, post-operative discomfort, limitations in bone quantity and volume, unpredictable bone quality, reduced volume stability, and fast resorption rate.

Furthermore, the intraoral amount of autologous bone collection from an osteotomy site is limited thus allograft are the next best choice. Demineralized freeze-dried bone allografts have osteoinductive properties as well that helps attract bone forming cells and ectopic bone formation. (7)

The combination of collagen membranes with autologous bone and a superficial layer of deproteinized bovine bone mineral (DBBM) is a widely used guided bone regeneration (GBR) technique(8) Thus the choice was made to use a mixture of autograft and allograft in the site. Autogenous bone shavings collected in the reamer was also mixed with the allograft along with the patient`s blood and ringer`s Solution collected from the osteotomy (periosteal blood) site .

In a study done by Aspurahova et al, Significant quantities of TGF- $\beta$ 1 ( $2.1 \text{ ng} \cdot \text{mL}^{-1}$ ,  $P < 0.001$ ) were measured in BCM prepared with Ringer`s solution (RS) within 10 minutes (8) Bone conditioned medium harvested for minutes induces genes encoding bone matrix proteins, but does not contribute to matrix mineralization, whereas BCMs prepared over days contribute to the progression osteogenesis. However, the autogenous bone chips collected were placed in the Ringers solution for 10 minutes. Meanwhile a slow resorbable membrane was used as barrier membrane was packed against the soft tissue a pocket was created to receive the conditioned composite graft material.

Resorbable sutures were then placed making sure no membrane was impregnated during the procedure. This is done to protect the membrane from contamination.

After four months of healing period, the site showed well-formed soft tissue and sustained crestal

Bone levels. Thus, an if factors like patient expectations, defect morphology, adjacent teeth morphology 3D implant positioning and post operative care are favourable, hard tissue grafting would bring forth a successful outcome.

### Conclusion:

Failure to achieve functional and aesthetic results in dental implants can have disastrous effect that could potentiate un necessary and additional waste of surgical and prosthetic interventions. It is therefore vital for a clinician to have proper understanding of the science that deals with implants and also

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tailor an effective treatment best suited for the individual.

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