



“DIGITALIZED AESTHETIC REHABILITATION OF MISSING TOOTH ALONG WITH HARD AND SOFT TISSUE DEFECT BY BOTH PROSTHODONTIC AND SURGICAL APPROACH.”

Prosthodontics

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ABSTRACT

Ridge defect can be due to consequences of trauma or after extensive tooth extraction periodontal disease, apical pathology or developmental anomalies. This case report describes the aesthetic rehabilitation of missing maxillary anterior tooth with diastema using combination of surgical, prosthodontic and digitalized approach. Bone graft was used to repair a ridge defect along with connective tissue flap for soft tissue augmentation in the anterior maxilla. After healing period of 6 weeks, soft and hard tissue was assessed and fabrication of loop connector was started using digitalized approach. The loop connector was decided to maintain the diastema hence giving natural appearance. Digitalized approach was focused for a better smile design and more precise adaptation of prosthesis.

KEYWORDS

Ridge defect, Diastema, Loop connector, DMLS

INTRODUCTION:

Ridge defect may result from the extraction of a tooth with subsequent loss of the labial alveolus, advanced bone loss from either periodontal disease, apical pathology and developmental defects. Subsequent healing often results in ridge deficiency, scar formation, and compromised esthetics during rehabilitation. The maxillary incisors, with their extremely thin facial and thick palatal plates, are common sites for ridge deficiencies.¹ Management of such cases includes soft and hard tissue augmentation and appropriate prosthetic management. Prosthetic management of ridge defects includes placing pink porcelain in the gingival region and using gingival prostheses.^{2,3} Diastema associated with tooth length and with discrepancy are often challenging to treat.⁴ Maintaining diastema during prosthetic rehabilitation is a good option in some cases where the entire closure of diastema may not give predictable aesthetic results.⁵ The present case report describes the aesthetic rehabilitation of missing maxillary anterior teeth by a combination of prosthodontic and surgical approaches.

Case Presentation:

A young female in her 20's reported to the department with the chief complaint of an unesthetic appearance due to missing front teeth. History revealed that the patient had trauma to the maxillary anterior teeth region 3 months ago, which led to an avulsion of 21. On examination, there was yellowish brown discoloration of 11 and 22, missing 21; the ridge defect in the 21 region was Siebert class 3 and Allen's type C and moderate (3 mm to 6mm). Generalised spacing was present in the maxillary and mandibular anterior teeth (Figure 1).

Investigations:

Pulp vitality tests for 11 and 22 by cold test revealed no response. A Cone beam computed tomography (CBCT) was done to assess available bone height and width and also to know about the condition of the abutment teeth. Through proper evaluation it was revealed that the bone quantity was not favourable for implant placement.

Treatment:

Maxillary and mandibular diagnostic impressions were made using irreversible hydrocolloid (Septodont Healthcare India Pvt. Ltd., Maharashtra, India), and a diagnostic mockup was done. As the maxillary anteriors had discrepancy between tooth size and arch size, a Fixed dental prosthesis with loop connectors was planned to maintain the diastema. Bone and soft tissue augmentation was also considered to give the prosthesis a better emergence profile and life like appearance.

Endodontic treatment of 11 and 22 was done. Under local anaesthesia, a crestal incision was made from 12 to 23, and a full-thickness trapezoidal flap was raised. 0.5g of bone graft (Geistlich Bio-Oss, Geistlich Pharma, Wollhusen) was placed in the buccal defect of the 21

region after creating perforations in the buccal cortical bone, followed by collagen membrane placement (Geistlich Bio-Gide, Geistlich Pharma, Wollhusen). The trap door technique proposed by Langer and Langer was used to harvest sub-epithelial connective tissue grafts from the palate (Figure 2). The underlying connective tissue graft of 2mm thickness without an epithelial collar was harvested. To reduce dead space and stop bleeding, the palatal flap was adjusted, and the donor site was squeezed with moist gauze. The flaps were sutured with 3-0 silk sutures (Mersilk, Ethicon), followed by periodontal pack Coe-Pak (*De Trey/Denstply, Konstanz, Germany*) placement. After 6 weeks, the healing was evaluated, and there was a 2mm reduction in the ridge defect both buccolingually and apico-coronally. Tooth preparation was done at 11 and 22 for full veneered PFM FDP (Figure 3). Temporization was done using Bis-acryl composite resin (**Protemp™ Plus, 3M ESPE, Germany**) (Figure 4). The final loop connector prosthesis was designed in ExoCAD (Dental CAD, ExoCAD, Germany) software and additively manufactured by direct metal laser sintering (DMLS) using cobalt chromium alloy. Loops were 2.5mm in width, half circular in cross section, gently curved, and had adequate clearance from the palatal mucosa (Figure 5). The retention and fit of the metal copings as well as the interference during speech and tongue movements were assessed (Figure 6). Porcelain layering was done and the final PFM restoration was luted using type 1 glass ionomer cement (GC Corporation, Tokyo, Japan) (Figure 7&8).

Outcome and follow up:

After insertion of the prosthesis, patient was well satisfied regarding function, aesthetics and comfort of the prosthesis. Follow up was done after 1 week and 3 months. Favourable results was observed.

DISCUSSION:

Seibert in 1983 and Allen in 1985 classified the ridge defects.^{1,6} These defects may be restored either surgically by pedicle technique, roll technique, pouch technique, connective tissue graft technique, or onlay bone grafting.^{7,8,9} The teeth adjacent to the ridge defect should have an adequate zone of keratinized gingiva and shallow pocket depth for the success of the augmentation.¹ Prosthetic management of the defect with the use of gingival porcelain would give the appearance of a long tooth with over contoured pontics, which looks obvious in cases of a high lip line. Also, the bulk adds to the weight of the prosthesis.^{4,5} Therefore, in the present condition, a combination of surgical and prosthetic approaches was followed as there were both bony and soft tissue defects both buccolingually and apico-coronally.

A resorbable collagen membrane was used. Collagen membranes show to better interact with soft tissues, allowing more oxygen exchange, micronutrient pass and blood perfusion, and favoring cell proliferation and differentiation. Unlike non resorbable membranes there is no need for membrane removal at a later stage.^{10,11}

Loop connectors are an excellent way of preserving the existing diastema while fabricating a conventional FDP. Disadvantages of loop connectors include additional laboratory procedures, difficulty maintaining oral hygiene, interference in tongue movement, and discomfort in speech.³ However, in this case, the loop connectors was round and small in size so the problem with phonetics and food lodgment was eliminated. Alternative approaches for such conditions include resin-bonded bridges, fibre-reinforced composite bridges, and bone grafting followed by implant placement.⁴ Also digitalized approach was followed to reduce the bulk and to eliminate the disadvantages of conventional casting.

Limitations:

The protruding palatal connector, which could occasionally serve as a food trap, may cause a patient's objection.

The design of the prosthesis could make maintenance difficult and have an impact on phonetics, particularly linguopalatal sounds.

CONCLUSION:

Whenever possible pre prosthetic surgeries has to be carried for a better prosthetic outcome. A loop connector FDP provides a straightforward answer to a prosthodontic conundrum involving an anterior edentulous space, albeit the diastemas must be preserved and in cases where implant supported rehabilitation is not possible. Although infrequently used, they are an excellent option to maintain diastema in a fixed dental prosthesis.



Figure 1



Figure 2



Figure 3



Figure 4

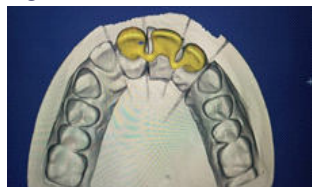


Figure 5



Figure 6



Figure 7



Figure 8

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