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Case Report

Rehabilitation of aesthetic zone with narrow maxillary ridge by staged implant protocol

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ABSTRACT

It can be difficult to achieve an aesthetically pleasing implant-supported restoration in the maxillary anterior region. With regard to the variety of factors that could affect the therapy, the treatment planning for an implant restoration is distinct. A number of elements, including those linked to the patient, careful planning of the course of treatment, implant and abutment selection, soft tissue contour, implant axis, occlusion, and other considerations, all contribute to the final clinical result. Implant supported restorations can have more prosthetic flexibility as a result of the option to select multi-unit abutments in oral implantology. Multi-unit abutments have advantages in that they provide good fit and performance together with predictable aesthetics, which significantly increases the efficacy of prostheses supported by implants. This case report describes the rehabilitation of a 42-year-old male patient with a partially edentulous arch in the maxillary anterior area using an implant-supported restoration and a multi-unit abutment.

1. Introduction

The recommended course of treatment for missing teeth in the aesthetic zone is the insertion of dental implants. The maxillary anterior region in a patient who is partially edentulous can present unique challenges in establishing both functional and aesthetically pleasing implant- supported restorations. Nowadays, success is defined by factors such as aesthetic considerations, function, and long-term predictability of the implanted system.[1,2]

Considering how visible the area is, this is particularly serious in the anterior maxilla. Maximum aesthetics is more important if there is a high lip line since it makes the smile line more noticeable. When it comes to the anterior maxillary region, some authors give equal weight to function and aesthetics.[3,4]

2. Case Report

The primary complaint of a 42-year-old male patient who presented to the Department of Prosthodontics and Crown & Bridge was that of a dislodged bridge in the upper front region that had been put 2.5 years prior. Upon clinical examination, the right lateral and central incisor were absent, the maxillary right canine and left central incisor were fractured, as shown in (Figure 1a,b).

Radiographic evaluation revealed that maxillary left central incisor was endodontically treated and the root canal tratment with right canine was unsuccessful due to complete obliteration of root canal. Vertical bone defect was

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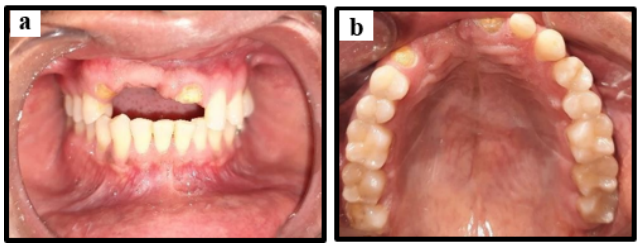

Figure 1: a,b: Pre-operative intra-oral view

observed in maxillary right canine and lateral incisor region. (Figure 2)

Figure 2: Pre-operative radiographic evaluation

The patient was presented with option for extraction of Root pieces of 13 & 21 followed by an interim Removable partial denture and definite restoration with Cast partial denture.

Another prosthetic treatment option given was Dental implant placement with respect to edentulous space, ie 13 to 22, followed by Guided bone regeneration with respect to 13 and 12 for augmentation of the ridge defect.

All the treatment planning was explained to the patient. A detailed case history was recorded and all required blood and radiographic investigations (Figure 3) were advised after patient opted for implant supported prosthesis. Consent of the patient was taken before the procedure.

2.1. Procedure

On the day of surgery, Antibiotic prophylaxis was administered (Amoxycillin 500 mg+ Clavulanic acid 125 mg). The patient was instructed to rinse with Chlorhexidine mouthwash. Blood sample was taken from patient's forearm, and was used to make Platelet rich Fibrin (PRF) membrane by spinning in centrifuge at 1300 rpm for 8 minutes.

The Implant surgery was commenced with all aseptic precautions. Anterior superior alveolar (infraorbital) nerve block using 1.5 ml of 2% Lignocaine with 1:200000 adrenaline (Lox 2%, Neon Laboratories, Mumbai, India) was given. Following local anaesthesia 13 was extracted atraumatically using a luxator (Figure 4). Extraction

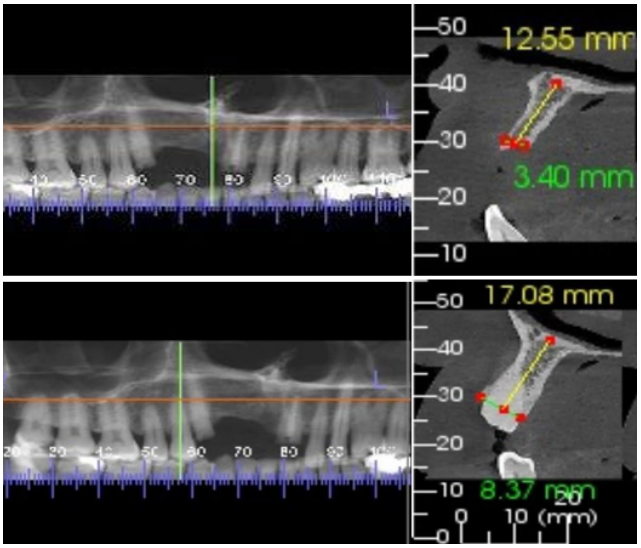

Figure 3: Radiographic evaluation (CBCT Scan)

socket was then debrided using a curette and irrigated with Povidone-Iodine.

Figure 4: Extracted 13

Stage one surgery was performed by raising mucoperiosteal flap in the region 13 to 11 (Figure 5). As it was observed that the residual ridge had vertical and horizontal bone loss, a Guided bone regeneration (GBR) with bone graft was planned to increase the width of the deficit ridge.

GBR using bone graft, chorion and compressed PRF membrane as a barrier was placed in the ridge defect site (Figure 6a). Flaps were approximated and interrupted suture was given (Figure 6b).

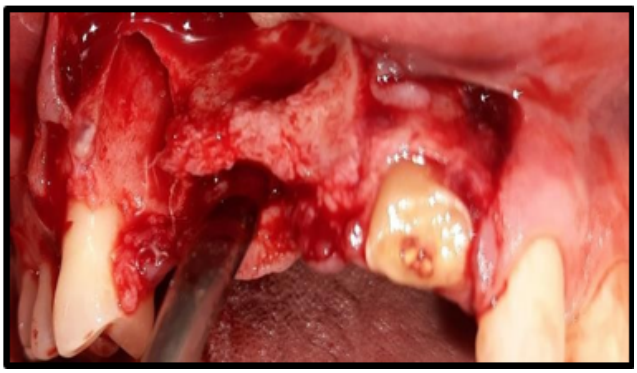

Figure 5: Mucoperiosteal flap raised

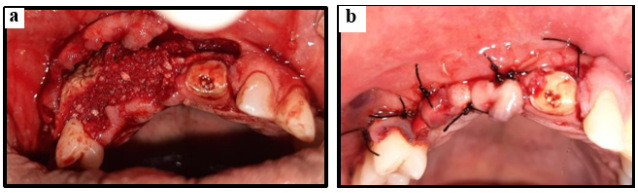

Figure 6: a: GBR placed; **b:** Interrupted suture placed

The patient was called for follow up, after 24hrs of surgery and then 7 days post-op for suture removal. An interim removable partial denture was then fabricated for the patient, due to esthetic demands, and care was taken that the prosthesis shouldn't add undue pressure on the operated site.

The patient was recalled 5 months post-op and after evaluation it revealed that residual ridge did not have adequate width for implant placement. Due to decreased width of the arch in the maxillary right anterior region, a ridge split technique was planned in order to expand the existing residual ridge.

2.2. *Procedure*

Flap was raised in maxillary right anterior region and with the help of osteotome chisel and bone mallet, ridge expansion was performed. (Figure 7 a&b)

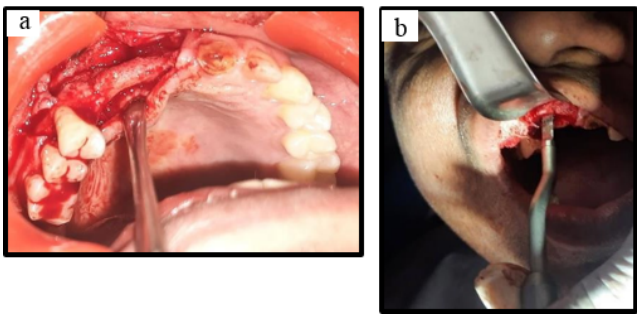

Figure 7: a: Mucoperiosteal flap raised; **b:** Ridge spliting done

After desired expansion was achieved, a sequential osteotomy was performed using conventional drills and dental implant of 2.90 x 10 with relation to 13 and 3.50 x 10 with relation to 12 was placed (Bio-line dental implant) (Figure 8).

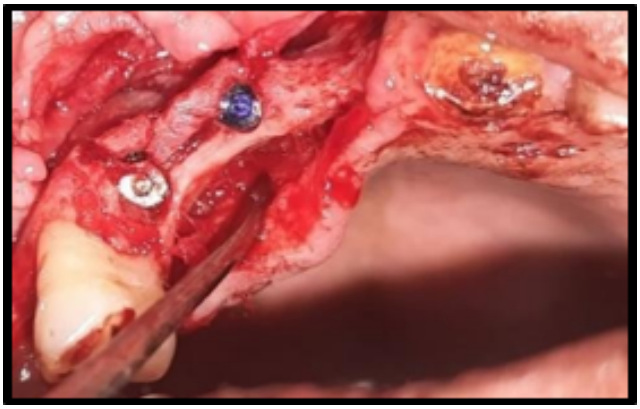

Figure 8: Implant placement done

It was then followed by placement of GBR (Figure 9a). Flap was approximated and suture was given. (Figure 9b)

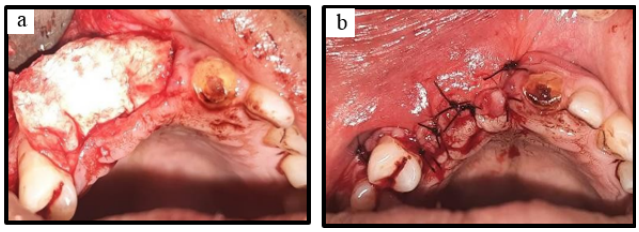

Figure 9: a: GBR placed; **b:** Interrupted suture given

After 3 months, the surgical site was observed (tooth nos. 11 to 13) for proper healing and osseointegration at the implant site. The healing was uneventful and adequate.

Later, an immediate implant placement was planned with relation to 21.

3. Procedure

Maxillary left central incisor root piece was extracted followed by immediate implant placement (Figure 10a) with bone graft (Figure 10b) and sutures were placed (Figure 10c).

Healing abutments were placed for all implants and the interim Removable partial denture was modified accordingly. (Figure 11)

After 5 months of follow up, the patient called for the Prosthetic phase of treatment. An open tray impression was made using Polyvinyl Siloxane (Figure 12a) and then cast was poured with implant analogue along with shade selection.

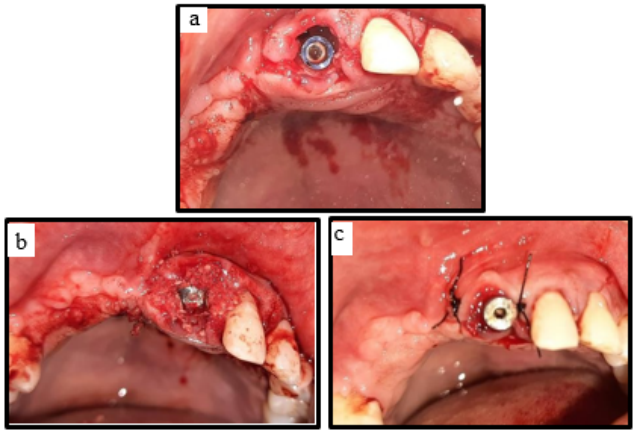

Figure 10: a: Immediate implant placed; b: GBR placed; **c:** Interrupted suture given

Figure 11: Adjusted interim RPD according to healing abutments

A jig was fabricated and trial was done to ascertain the accuracy of the impression. (Figure 12b)

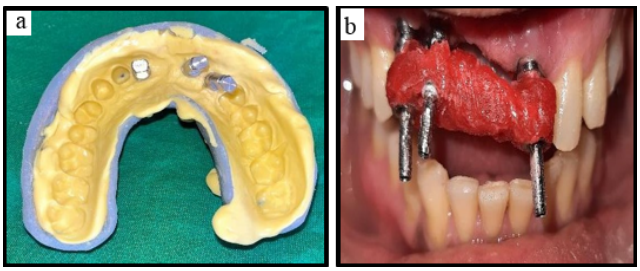

Figure 12: a: Open tray impression made; **b:** Jig trial done

Angled multi-unit abutment (Bio line dental implant series) was used and screw-retained DMLS crown was prosthesis of choice.

Bisque trial was verified (Figure 13) and final prosthesis was layered which was cemented in using GIC luting cement (Figure 14).

Figure 13: Bisque trial verified

Figure 14: Final prosthesis

4. Discussion

It is commonly known that an augmentation surgery is necessary for alveolar ridges less than 5 mm in order to accommodate an endosseous implant with 1.5–2 mm of healthy peri-implant bone. Implant placement in regions with insufficient ridge width may result in the following issues.[5]

Labial bone dehiscence increases the risk of peri-implantitis, which causes an unsightly metal display through the gingiva. Subsequent to dental extraction, residual ridge resorption manifests as an inherent biological process unfolding over an approximate duration of one year. Alveolar bone undercuts cause off-axis stress leaving a thin bone <1–1.5 mm may predispose to resorption of a thinner labial plate in the near future, producing gingival recession and implant exposure.[6–11]

By adding more bone, either by grafting or other techniques, all these issues can be solved. Increasing width by osteoplasty, using narrow diameter implants, ridge augmentation by autogenous block graft, cortico-cancellous particulate bone graft and allograft using GBR membrane, distraction osteogenesis and ridge splitting with bone expansion techniques, etc. are some of the treatment options available to manage horizontally deficient

ridges.[8] By adding more bone, either by grafting or other techniques, all these issues can be solved. Increasing width by osteoplasty, using narrow diameter implants, ridge augmentation by autogenous block graft, cortico-cancellous particulate bone graft and allograft using GBR membrane, distraction osteogenesis and ridge splitting with bone expansion techniques, etc. Are some of the treatment options available to manage horizontally deficient ridges.[8]

Implants with a narrow diameter have a larger mesial and distal cantilever, which increases the risk of fatigue fracture and abutment screw loosening. Ridge augmentation with bone block and GBR approach has a longer waiting period (6–12 months), an increased risk of membrane exposure infection, and a higher patient cost with a non-guaranteed 100% success rate. Distraction osteogenesis is laborious and difficult for the patient.[9]

Ridge splitting and bone expansion have significant benefits over alternative techniques, despite appearing to be technique-sensitive. It makes advantage of the cancellous bone's innate elasticity. Because maxillary bone is pliable, it can be gradually widened to the appropriate breadth and compressed and corticalized to improve quality. Bone can gradually mould to the intended position when clinicians give it enough time to be worked with. It never permits patient bone loss, which is typically unavoidable through simple drilling techniques. The preservation of the labial bone's integrity, which happens as long as the periosteum is intact, is also essential to the technique's effectiveness.[9] Because periosteum is elastic, it can be used to manipulate and expand bone. It also functions as a barrier membrane and promotes rapid healing of microfractures by maintaining blood flow. Therefore, it is best to preserve the periosteum that surrounds the bone. This can be done by elevating a conservative muco- periosteal flap where the implant is being placed, followed by a subsequent mucosal flap to coronally advance flap closure.[10,12–15]

5. Conclusion

This case showcases that how multiple treatment approaches can give us optimum results both functionally and esthetically.

6. Source of Funding

None.

7. Conflict of Interest

None.

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