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Restoration of function and appearance following hemimaxillectomy and hemimandibulectomy through implant supported fixed prosthesis: A Case Report

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Abstract

Hemimaxillectomy and hemimandibulectomy procedures present significant challenges in both functional restoration and esthetic rehabilitation. This case report highlights the successful restoration of function and appearance in a patient undergoing such extensive maxillofacial surgery through the utilization of implant placement. A 58 year old male patient presented with a carcinoma, necessitating the surgical removal of a substantial portion of the maxilla and mandible. Following

the surgery, the patient faced considerable difficulty in mastication, speech, and experienced a significant alteration in facial appearance. Four implants were strategically placed in the remaining healthy maxillary and mandibular bone, allowing for the support of a fixed prosthesis. This innovative approach not only provided adequate structural support but also facilitated the restoration of facial symmetry and harmony. Post-operative assessment revealed remarkable improvements in masticatory function, speech articulation and overall quality of life. Additionally, the patient reported heightened self-confidence and satisfaction with their restored facial appearance. This case report underscores the efficacy and versatility of implant surgery in addressing the complex challenges associated with hemimaxillectomy and hemimandibulectomy.

Keywords: Hemimaxillectomy, Hemimandibulectomy, Implant placement, Functional restoration, Aesthetic rehabilitation, Maxillofacial surgery, Prosthesis, Facial symmetry, Quality of life.

Introduction

Nowadays, implant therapy has demonstrated high success rate and its treatment outcome are being accepted by majority of patients. However, anatomic defect of residual alveolar ridge, which may be caused by trauma, periodontitis, sinus pneumatization over maxilla or due to surgical intervention may complicate the treatment plan and prolong the treatment duration. In such cases, patients with severely resorbed bony defect need to go through substantial grafting procedures which may take 6 months or longer to reconstruct implant sites [1].The maxilla and mandible are the anatomic and functional keystone of the face. Oncologic ablation and trauma are the most frequent causes of acquired maxillary defects[2]. The rehabilitation of such cases poses significant challenges in contemporary dentistry. Hemimaxillary and hemimandibular defects, whether resulting from congenital abnormalities, traumatic injuries, or pathological conditions, profoundly impact both the esthetics and functionality of the stomatognathic system. Conventional rehabilitation methods often fall short in addressing the complex needs of such patients, necessitating innovative approaches to achieve satisfactory outcomes. In recent years, the implant supported rehabilitation concept has emerged as a promising solution for the rehabilitation of edentulous arches, providing stable support for fixed prosthetic restorations with fewer implants compared to traditional approaches. These techniques involves the strategic placement of dental implants in predetermined locations within the arch and optimizing bone anchorage.[3]In this case report, we present a comprehensive treatment plan utilizing the implant supported prosthesis for the rehabilitation of a patient with extensive hemimaxillary and hemimandibular deficiencies. Through a multidisciplinary approach, we aim to restore both the form and function, thereby improving the patient's quality of life and oral health outcomes.

Case Report

A 58 year old male patient reported to the Department of Prosthodontics with the chief complaint of difficulty in chewing due to missing teeth in upper and lower front and back region of jaw since 15 years. Patient has received 35 doses of radiation therapy followed by the hemimaxillectomy and hemimandibulectomy surgery (fig. 2) due to squamous epithetlial dysplasia of left cheek caused due to tobacco chewing habit, 15years back. A detailed case history was recorded followed by a thorough intraoral examination.

Before implant surgery, the patient was advised to undergo routine blood investigation, full mouth radiograph, and CBCT scan to execute a treatment plan. He reported back with normal laboratory findings. The

bone density for anterior maxilla, posterior maxilla, anterior mandible and posterior mandible was measured using CBCT which was 400HU, 250HU, 1300HU and 900HU respectively. Radiographic examination brought us to a treatment plan involving 4 implants for both maxilla and mandible due to limited availability of maxillary and mandibular anatomical structures. The implant site was selected according to the CBCT scan and diagnostic records.

Fig. 1: Extraoral profile photograph

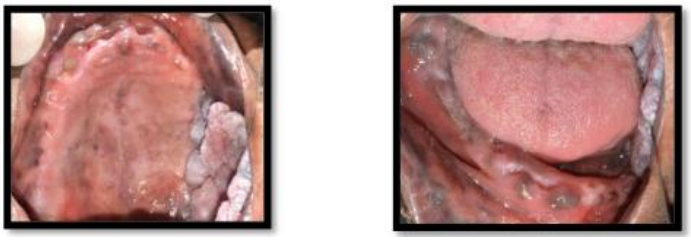

Fig. 2: maxillary and mandibular intraoral photograph

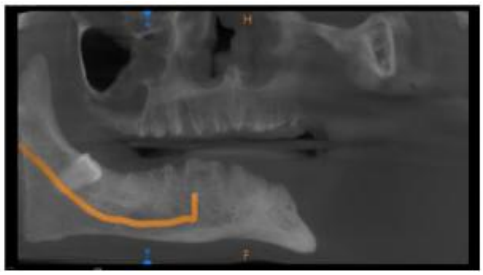

Fig. 3 A: Pre-op OPG

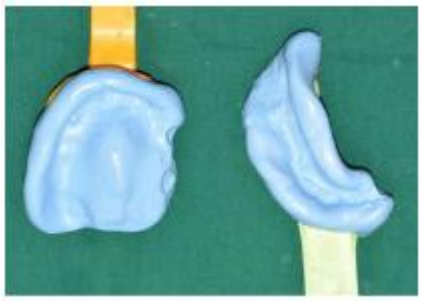

Fig. 3 B: diagnostic impression

Fig. 4: diagnostic mounting and teeth arrangement

Diagnostic impressions were (fig. 3) made and a tentative jaw relation was recorded. Diagnostic mounting and a tentative teeth arrangement was done (fig. 4) for planning the position of implants and for the fabrication of surgical stent. The interarch space was 32mm which lead us to a treatment planning involving the FP-3 prosthesis according to Misch classification (1989).

After obtaining consent from the patient, implant surgery was planned. For maxilla, posterior superior alveolar, in fraorbital, greater palatine (fig 5) and Nasopalatine nerve block was given. Midcrestal incision was made and full thickness mucoperiosteal with papilla preservation flap was reflected (fig 6). A surgical stent was placed (fig 7) and osteotomy was prepared in 11, 13, 15 and 23 regions. Implant (Adin dental implant systems Ltd.) of size 4 x 11.5mm was placed in 11 region, 4 x 11.5mm in 13 region, 4.5 x 11.5mm in 15 region and 4.5 x 11.5mm in 23 region (fig 8). 17 degree multiunit abutment was placed with 11,13, 23 and 30 degree multiunit abutment was placed with 15(fig 9). Interrupted sutures were given (fig 10).

For mandible, inferior alveolar, long buccal and lingual nerve block was given. Midcrestal incision was given and full thickness mucoperiosteal flap was reflected (fig 12). A surgical stent was placed (fig 13) and osteotomy was prepared in 32, 41, 43 and 45 region. An implant of size 4 x 11.5mm was placed in 32 region, 4x 11.5mm in 41

region, 4 x 11.5mm in 43 region and 4.5 x 11.5mm in 45 region(fig 14). 17 degree multiunit abutment was placed with 32, 41,43 and 30 degree multiunit abutment was placed with 43 and interrupted sutures were given (fig 16). Postoperative instructions were given.

Fig. 5: right PSA and greater palatine nerve block nerve block

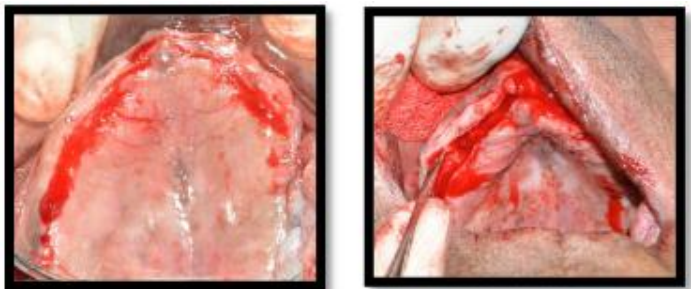

Fig. 6: mid crestal incision and full thickness mucoperiosteal with papilla preservation flap

Fig. 7: surgical stent placed

Fig. 8: implant placement done with maxillary arch

Fig. 9: multiunit abutments placed checking parallelism

Fig. 10: multiunit abutment placed

Fig. 11: interrupted sutures given

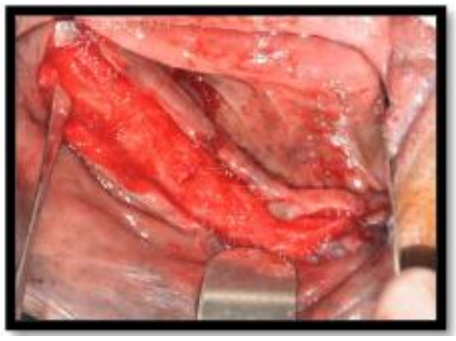

Fig 12: mid crestal incision and full thickness flap reflected

Fig. 13: surgical stent placed

Fig 14: Implant placement done with mandibular arch

Fig. 15: multiunit abutments placed checking parallelism

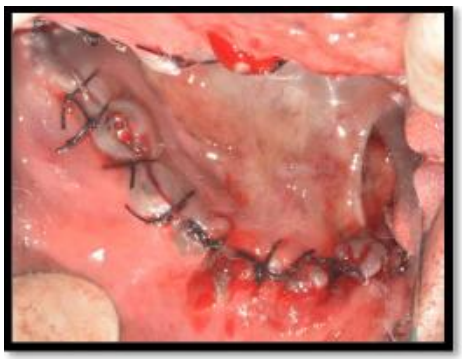

Fig. 16: interrupted sutures placed

Prosthetic Phase

- Primary impression was made using alginate and poured with type III dental stone (fig 17 and 18).
- Maxillary and mandibular cast was fabricated and custom made tray was fabricated over it with an autopolymerizing resin (fig 19).
- Multiunit Impression copings were placed over the multiunit abutments and was splinted with a pattern resin material.
- The splint was sectioned and re-splinted to prevent polymerization shrinkage (fig 20,21).
- Open tray impression for maxillary and mandibular arch was made with polyether impression material (fig 22).
- Multiunit Lab analogs were placed and cast was fabricated.
- A screw retained temporary record base and wax occlusal rims were fabricated and jaw relation was recorded (fig 23).
- A metal jig was fabricated and was tried in the patients mouth for passivity and fit (fig 24,25) where only one prosthetic screw was tightened and the fit was checked for the other 3 with RVGs (Shefield's test).
- A tooth arrangement was done and try in was performed in patient's mouth (fig 27).
- The final prosthesis was processed (fig 28) and the prosthesis was again checked for fit of passivity.
- The prosthesis was fixed and the access holes were closed with composite material and the denture insertion was done (fig 29).

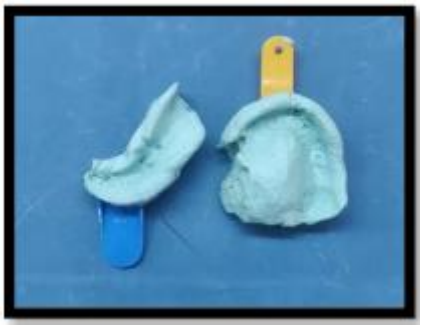

Fig. 17: diagnostic impression

Fig 18: casts poured in type III dental stone

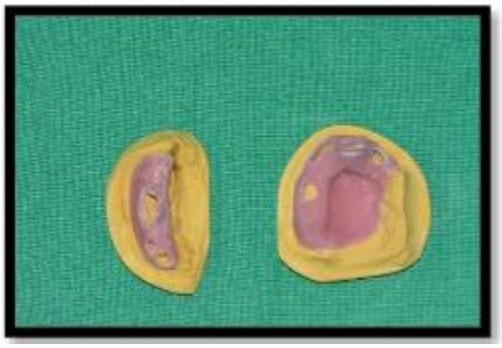

Fig 19: custom tray fabricated for open tray impression

Fig. 20: splinting of the impression copings for maxillary impression

Fig. 21: splinting of the impression copings for mandibular impression

Fig. 22: impression made using polyether impression material

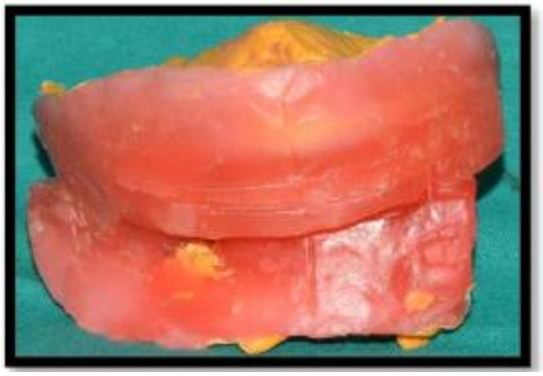

Fig. 23: jaw relation recorded

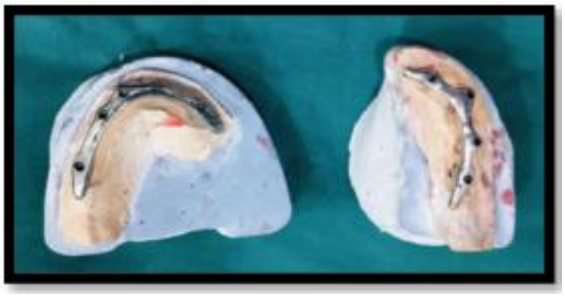

Fig. 24: metal jig fabricated

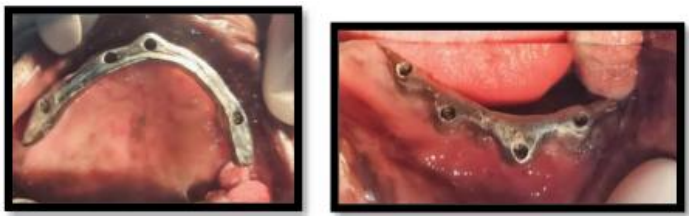

Fig. 25: metal jig trial for passivity and fit

Fig. 26: mounting and teeth arrangement done on a semi adjustable articulator

Fig. 27: try in

Fig. 28: final prosthesis

Fig. 29: denture insertion

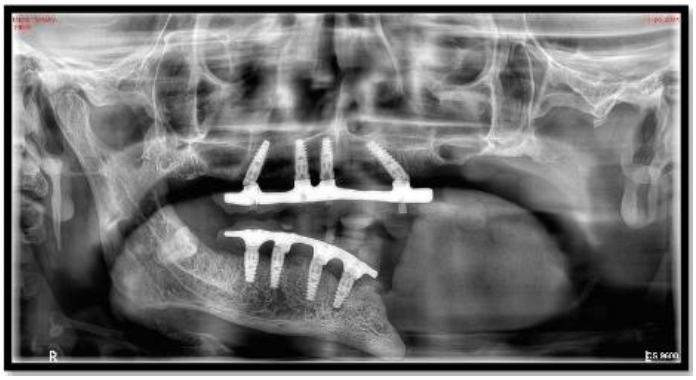

Fig. 30: post-op OPG

Discussion

Misfit of removable complete dentures can cause pain and discomfort to the patient and is a result of severe bone resorption/atrophy in the jaw, which directly impacts the patient's quality of life. Also, when the availability of the intraoral structures is limited due to surgical removal, achieving retention, stability, support and function with a removable prosthesis is difficult. The extent of these changes is important for decision- making and comprehensive treatment planning and has significant implications for alternative dental treatments, especially when implant-based restorations are planned.

Hemimaxillectomy and hemimandibulectomy surgeries pose significant challenges for prosthetic rehabilitation due to extensive maxillofacial defects. The implant supported prosthesis offers a viable solution. This case report highlights the successful restoration of function and appearance in a patient with severe maxillofacial defects using the implant supported fixed prosthesis.

Outcome: The patient achieved remarkable improvements in masticatory function, speech intelligibility and facial aesthetics. Postoperative follow-up examinations demonstrated excellent implant stability and soft tissue integration. The patient reported high satisfaction with the treatment outcome and reported significant enhancements in his overall quality of life.

Conclusion

Implant-supported fixed prostheses offer a promising solution for patients undergoing hemimaxillectomy and hemimandibulectomy procedures. Through careful planning and precise placement, these prostheses provide functional restoration, aesthetic improvement, and enhanced quality of life for such patients. Further research and long-term follow-up studies are warranted to continually refine and optimize treatment outcomes in these complex cases. In this case, a successful full mouth rehabilitation with the implant supported fixed prosthesis was demonstrated. There were no complications in the 6 months recall.

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