CASE SERIES

Modified Twin Occlusion Prosthesis—Case Series

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ABSTRACT

The use of twin occlusion is commonly associated with maxillofacial prosthesis incorporating double row of teeth in posterior region where the inside or palatal row of teeth provide occlusal contact and hence helps in mastication and the outside or buccal row towards the cheeks provide support and improves the appearance. This clinical case series reports the treatment of patients with modified twin occlusion acrylic removable prosthesis to improve the patient's facial profile and achieve satisfactory aesthetics and function.

Keywords: Double occlusal plane, maxillofacial prosthesis, twin occlusion

How to cite: Khan M, Hussain M, Kazmi SM, Habib Y, Khalil M. Modified twin occlusion prosthesis—case series. Ann Jinnah Sindh Med Uni. 2026; 12(1):50-53. DOI 10.46663/ajsmu.v12i1.50-53

INTRODUCTION

Maxillofacial prosthesis with twin occlusion has been reported to be used generally for patients with mandibular defects following segmental mandibulectomy[1-4]. Deviation of mandible towards defect side observed in such patients, makes it difficult for the clinician to record a stable maxillo-mandibular relationship and achieve acceptable aesthetics and function[5]. In order to achieve satisfactory occlusion, a palatal ramp or a broader maxillary occlusal plane with double row of teeth (twin occlusion), is used along with the mandibular guide flange prosthesis[2]. Twin occlusion provides stable occlusal contacts with the opposing natural or artificial teeth facilitating mastication, whereas, the flanges of the prosthesis provide support and help in directing mandible towards a more stable position.[1,2,6,7] Several authors have reported the use of twin occlusion with the palatal ramp and mandibular guide flange prosthesis, and almost all of them have reported use of double row of teeth in posterior region[3,4,8-10]. The inside or palatal row of teeth provides occlusal contact and hence helps in mastication. Whereas, the outside or buccal row towards the cheeks, provides support and improves appearance[5,7,10].

In this case series, authors have presented three cases with a history of congenital and acquired defects, in which removable prosthesis is fabricated with twin occlusion, to improve the patient's facial profile and achieve satisfactory aesthetics and function.

CLINICAL REPORTS

Case 1

A 28-year-old male patient reported to the Prosthodontics department of a public sector university hospital in Karachi, Pakistan. He was wearing a removable denture and complained of small size of maxillary anterior tooth, in the prosthesis. He was also dissatisfied with the denture and wanted improvement in his facial appearance. Furthermore, he also complained of difficulty in speech with the existing prosthesis.

Patient had repaired bilateral cleft lip and palate and had received multiple surgeries in his childhood during the treatment. His medical history was not contributory. Dental history revealed that he had a filling of his maxillary molar teeth a few years back and had been using a palatal obturator since childhood which was replaced many times. Currently, he was wearing a palatal obturator which was made three years ago from a private hospital.

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Submitted: Mar. 22, 2025
Revised: May 09, 2026 **Accepted:** May 12, 2026

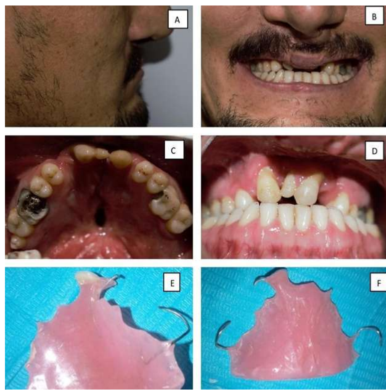

Figure 1: A, Extra-oral profile view. B, Extra-oral front view. C, Maxillary occlusal view. D, Anterior cross bite in occlusion. E, Existing prosthesis polished surface. F, Existing prosthesis intaglio surface.

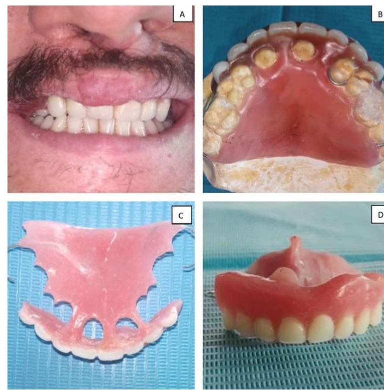

Figure 2: 2A, Clinical try-in stage. 2B, Finished wax-up. 2C-2D, finished prosthesis

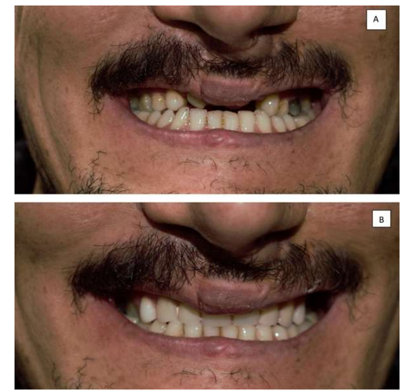

Figure 3: 3A, Clinical picture without the prosthesis. 3B, Clinical picture with the prosthesis

Extra-oral examination showed adequate mouth opening with no deviation. Nasal septum was observed to be slightly deviated towards the left side and there were bilateral scars from the previous surgeries of cleft lip on his upper lips. Straight facial profile, maxillary deficiency, inadequate upper lip support with average smile line was also observed (Fig. 1A-B). Intraoral examination revealed healthy well-keratinized mucosa with a small size palatal defect in the midline, in addition to a labial defect in the labial sulcus above the region of lateral incisors. He also had cross bite in intercuspal position with missing maxillary incisors, decayed mandibular left third molar, maxillary left first molar and amalgam filling in right first molar. A small peg shaped lateral incisor was present in the midline region with transposition of bilateral canines towards the midline. Remaining natural teeth in both arches were otherwise satisfactory (Fig. 1 C-D). Existing prosthesis exhibited adequate hygiene and was also replacing a central incisor in addition to closing the palatal defect (Fig. 1E-F). It was not sealing the palatal defect completely in the posterior region and there was no extension of the prosthesis in the labial defect, which might be a contributory factor to his nasal voice quality.

Due to financial limitations, the patient did not want any orthodontic or surgical intervention. Maxillary twin occlusion prosthesis with palatal obturator was planned, for which preliminary diagnostic impressions were made with irreversible hydrocolloid to obtain primary casts from Type II dental plaster. Diagnostic wax-up was done to show expected results to the patient. Suggested treatment plan was oral prophylaxis, extraction of decayed mandibular third molar, root canal treatment of maxillary first molars with full coverage crowns, followed by maxillary acrylic twin occlusion prosthesis with palatal obturator.

Patient refused endodontic treatment of molars as according to him he had no complaints with them and consented to proceed with the prosthetic treatment after oral prophylaxis and extraction of third molar.

CLINICAL TECHNIQUE

Impressions were made with irreversible hydrocolloid (Hygedent fast set) and master casts were obtained using type 3 dental stone. The articulation was done after bite registration. Six acrylic resin anterior teeth were trimmed in the form of labial veneer. Wax-up was completed by placing them labial to the existing anterior teeth. Additional wax was added in the labial region to provide lip support. At the clinical try-in visit, patient was not satisfied with lip support, so more wax was added in the labial and buccal region until the patient showed satisfaction. It was also observed during the try-in stage that he showed teeth up to first premolar during smile therefore, maxillary first premolars were also added labial to the existing ones in the form of acrylic shell for an improved smile (Fig. 2A-B). For retention purposes, an 18-gauge stainless steel wire was used for clasp fabrication on maxillary second molars. First molars were avoided in case the patient changes his mind about the endodontic treatment later. The prosthesis was processed in heat cure acrylic resin. After finishing and polishing, maxillary twin occlusion prosthesis (double rows of acrylic teeth in anterior region) was inserted after minor adjustments (Fig. 2C-D).

Anterior teeth in prosthesis were kept out of occlusion as the patient did not have any difficulty with mastication. Voice quality was improved but the patient still found it unclear. Palatal contact of tongue was observed after application of pressure indicating paste on the polished surface of the palate, areas of excessive pressure were relieved and prosthesis was polished again which resulted in more clarity in his speech sounds. Post insertion instructions were given regarding the maintenance of the prosthesis. Follow-up evaluation at 1, 3, and 6 months showed functional and psychological satisfaction of the patient (Fig. 3).

Case 2

A 30-year-old female came to the Prosthodontics department of a private dental hospital in Karachi, Pakistan for replacement of her missing right anterior tooth. She had a history of surgical resection of hemangioma in maxillary anterior region two years back. Her maxillary right central incisor was also removed during the surgical procedure. Medical history was not contributory. Previously, she had used an acrylic removable partial denture for some time but was not satisfied with the aesthetics of that denture

Extra-oral examination was unremarkable except the scars from the previous surgery on the philtrum region. Intraoral examination revealed healthy teeth with adequate oral hygiene and missing maxillary central incisor. She had an anterior crossbite in maximum intercuspation. Treatment options were discussed with the patient; anterior bone graft followed by implant supported fixed prosthesis, fixed orthodontics therapy, fixed partial denture, simple acrylic removable partial denture, acrylic twin occlusion prosthesis with labial flange to improve the patient's profile and address the anterior cross bite. Due to time constraint, the patient opted for acrylic twin occlusion prosthesis. Diagnostic wax-up was completed on diagnostic casts with six acrylic resin anterior teeth trimmed in the form of labial veneer and placed labial to the existing anterior teeth. Diagnostic wax trial was done and after patient satisfaction with the wax trial, final prosthesis was processed in heat cure acrylic resin. Patient showed satisfaction with the aesthetic improvement resulting with wearing of the twin occlusion prosthesis (Figure 4A-4B).

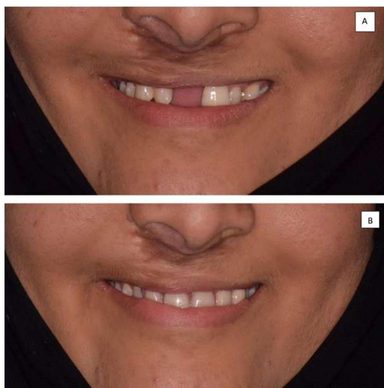

Figure 4: 4A, Clinical picture without the prosthesis. 4B, Clinical picture with the prosthesis.

Case 3

A 50-year-old male came to the Prosthodontics department of a private dental hospital in Karachi, Pakistan with complaints of difficulty in mastication with his current prosthesis. He had a history of myocardial infarction two months ago. He had been using his current acrylic removable partial denture in the maxillary arch replacing his missing teeth for one year. Extra-oral examination was unremarkable. Intra-oral examination revealed healthy teeth with adequate oral hygiene with completely edentulous mandible and multiple missing teeth in maxillary arch. Existing mandibular complete denture and maxillary partial denture exhibited adequate retention, stability, and support with satisfactory hygiene. On occlusal examination, buccal crossbite in posterior teeth with overjet in anterior region was observed with the prosthesis in place. There was no contact of maxilla-mandibular teeth in the posterior region with the existing prosthesis. Diagnostic jaw records revealed the same relationship of jaws as with the existing prosthesis. Correction of occlusal plane with extraction of mal-positioned teeth was advised before fabrication of new maxillary denture. Due to his medical condition, any surgical treatment was contraindicated. After discussion with the patient, a removable acrylic twin occlusion prosthesis was advised for the maxillary arch with double row of posterior teeth, to allow functional and stable contacts of existing mandibular complete denture with the new maxillary partial denture. The buccal row of teeth provided the needed cheek support whereas, the palatal row of teeth provided aid in mastication with wearing of the twin occlusion prosthesis. Patient exhibited satisfaction with the function and aesthetics of new modified maxillary partial denture (Figure 5A-5C).

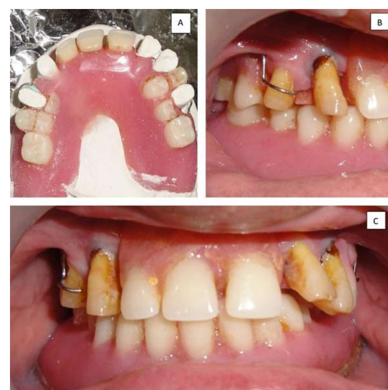

Figure 5: 5A, Maxillary twin occlusion prosthesis on cast. 5B-5C, Intra-oral view with the prosthesis.

DISCUSSION

Twin occlusion prosthesis has a long history of successful use in patients with hemi-mandibulectomy patients[7-10]. Authors of this study modified the conventional twin occlusion acrylic resin prosthesis for use in patients with maxillary defect and also in those with no history of surgery or trauma. Conventional prosthesis is designed for use in the posterior region to provide stable occlusal contacts and also guide the mandible into a more repeatable position[1-3,10].

Modification to provide a double row of teeth in the anterior region, provides improved lip support along with veneer effect to mask any morphological deformities in anterior teeth. Removable nature of prosthesis allows the patient to perform adequate oral hygiene and allows room for further modification in the prosthesis, where future surgical procedures are needed, as in patients with congenital anomalies or aggressive carcinomas. Furthermore, this modification can provide aesthetic improvement in those cases where complex procedures of bone grafting or surgical correction cannot be implemented due to financial, time or systemic health concerns.

The heat cure acrylic resin is used for the prosthesis as it has advantages of being readily available, easy to fabricate and repair, low cost, and aesthetic[10]. The presented prosthesis also has some limitations which include that it is not fixed which can be a major concern for some patients, also inadequate maintenance of the prosthesis may be associated with caries and periodontal compromise of natural teeth, mucosal lesions, fracture of prosthesis, and discoloration[6,8]. Authors recommend such modification in cast partial denture for improving strength and durability, whereas digital 3D printing techniques can be employed in future with novel materials for better precision and fit. Further studies with similar cases should be reported to strengthen and validate the findings of the present study in future.

CONCLUSION

Modified twin-occlusion prosthesis reported in this article provides an effective and functional prosthesis with significant psychological and aesthetic advantage to the patient. It is reversible, cost effective and simple in fabrication and will provide a conservative yet immediate treatment plan for patients with low socioeconomic background who cannot afford complex rehabilitative procedures.

Consent Statement: An informed written consent was taken from the patients for publication of images after hiding their identity.

Funding: Nil

Conflict of Interest: Authors declare that there is no conflict of interest.

Authors' Contribution: MK conceptualized, wrote original draft and collected resources. **MH** reviewed and edited the manuscript. **SMR** worked on validation and visualization. **YH** contributed to validation and resources. **MKH** supervised the study.

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