Full Mouth Rehabilitation of a Patient with Bilateral Asymmetric Posterior Open Bite: A Case Report

Jain V[1], Pruthi G[2], Rajendiran S[3]

Abstract:

The etiologies of posterior open bite are numerous. The usual mode of management of posterior open bite is orthodontic treatment. But certain cases involving greater number of teeth or with more posterior extension are not amenable by orthodontic treatment and they need to be managed with prosthodontic treatment. This case report describes a unique case which presented with multiple ankylosed teeth, uneven occlusal plane and asymmetric posterior open bite. Patient reported with chief complaints of unaesthetic appearance and difficulty in eating food. Clinical examination revealed worn out maxillary and mandibular anterior teeth, uneven posterior open bite and only anterior teeth in occlusion in centric relation position. A systematic approach to restore patient's esthetics, function and stable occlusion with the help of fixed dental prosthesis in maxillary arch and telescopic removable dental prostheses in mandibular arch is presented.

Keywords: Full Mouth Rehabilitation, Fixed Removable Prosthesis, Open Bite, Occlusal Cant, Overlay Prosthesis.

Introduction

Posterior open bite is defined as "the lack of posterior tooth contact in any occluding position of the anterior teeth".[1] Unilateral presentation is more frequent than bilateral one. The severity of posterior open bite determines its treatment modality. [2]

Orthodontic treatment is an effective treatment modality when the condition is caused by mechanical interferences, not in cases with primary failure of eruption.[2-4] It consists of extrusion of maxillary posterior teeth but the resisting factors for extrusion such as forces exerted by tongue, orbicularis oris muscle complex and periodontal ligament may pose a high potential for relapse. The more posterior and more number of posterior teeth involved in open bite, poorer is the prognosis for orthodontic treatment. In such cases, the possibility of ankylosis of involved teeth exists and orthodontic extrusion results in undesirable intrusion of the uninvolved teeth.[2] Combination of surgical and orthodontic treatment has also been recommended to treat such cases but it requires patient's willingness to undergo surgery. [2,4]

The purpose of this article is to describe the clinical presentation of a case of bilateral posterior open bite, strategic treatment

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planning and its prosthodontic management.

Case Description

A 28 year old male was referred to the Department of Prosthodontics from the Department of Orthodontics at AIIMS, New Delhi. The patient's chief complaint was difficulty in chewing food because his “back teeth did not meet”. History revealed no conspicuous medical findings, no history of trauma during childhood and no history of familial occurrence of the presenting condition.

Extra oral examination revealed a slight facial asymmetry with mandibular deviation to the right side during closure, prominent angles of the mandible, wide alar base, reduced OVD, as evident by the over closure of mandible with the resultant protrusive everted position of lower lip and a slight concave profile.

Intra oral examination (Fig.1a) revealed bilateral asymmetric open bite (3-4 mm on right side and 8 to 10 mm on left side), anterior edge to edge relation, attrition of maxillary and mandibular anteriors, submerged 36, rotated 24 and 25, supernumerary teeth buccal to 25 and 26, a steep occlusal cant and an exaggerated curve of Spee. The teeth 21, 22 and 27 were missing. FDI's two- digit tooth notation system has been used throughout the article.

Fig. 1a: Pre-treatment frontal view of dentition

Orthopantomographic examination (Fig. 1b) revealed the presence of impacted third molars in all the four quadrants, multiple ankylosed posterior teeth and supernumerary teeth in relation to 24 and 25, severity of occlusal cant and the exaggerated curve of Spee.

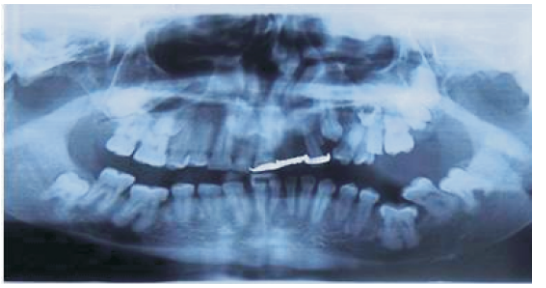

Fig. 1b: Pre-treatment OPG

The patient's freeway space was determined by Niswonger's method [5] and was found to be around 6 mm. The presence of occlusal contacts which were restricted to 12, 11, 23, 32, 41, 42 and 43 resulted in trauma from occlusion leading to grade I mobility of mandibular anteriors and incisal wear. TMJ examination revealed no positive findings.

Visual treatment objective (VTO) suggested that OVD could be increased to improve the collapsed appearance of face and to restore the maxillary and mandibular anteriors and establish anterior guidance.

Diagnosis and Treatment Planning

According to the Prosthodontic Diagnostic Index [6], patient was classified as a PDI class IV with insufficient tooth structure and guarded prognoses for some abutments and requiring re-establishment of the occlusion with a change in OVD.

A treatment plan was drawn to restore the masticatory function and improve the esthetics of the patient. Orthodontics as a mode of treatment was not possible due to ankylosis of the involved teeth and the severity of the posterior open bite was a poor prognostic indicator. It was decided to raise the OVD by 3 mm in the anterior segment that gives 1-1.5 mm separation at 2nd molar region [7]

based on the facts that freeway space of 3mm was still available for the patient and positive VTO.

Metal-ceramic crowns and 3-unit fixed dental prostheses (FDP) were planned for restoration of teeth in maxillary arch.

Metal ceramic crowns were planned for mandibular anteriors and telescopic removable dental prosthesis[8] (RDP) was planned in relation to mandibular posteriors up to 35 on left side and 47 on the right side. The involvement of 36 in the telescopic RDP design was not possible as it was submerged and lingually placed. Initially mandibular left second molar was planned for inclusion in the design. But, severe undercut was found after surveying of the master cast, that when blocked out would cause undesirable tongue annoyance. Thus, it was excluded from the design. The teeth numbers 34, 35, 44, 45, 46, 47 were planned to receive the telescopic copings that would support and retain the removable superstructure. The copings on both sides were planned to be connected to a lingual bar major connector with minor connectors.

Patient was explained in detail about the treatment plan and informed consent was obtained.

Treatment executed

Obtaining initial records:

Three sets of maxillary and mandibular impressions were made with irreversible hydrocolloid (Zelgan, Dentsply, Mumbai, India) and casts were poured with type III gypsum product (Orthokal, Khalabhai, Mumbai, India). Maxillary cast was mounted on a semi adjustable articulator (WhipMix Corp., Louisville, USA) using face bow transfer (Quick mount Facebow). Centric relation for the articulation of mandibular casts was registered by Dawson's bimanual manipulation method using Lucia jig as anterior deprogrammer.

Fabrication of Centric Stabilizing Splint: A maxillary occlusal splint was fabricated in heat cured clear acrylic resin (Travelon, Dentsply, India) on another set of mounted casts at raised OVD (3 mm at the anterior region). The occlusal contacts were adjusted intraorally to provide uniform and maximum occlusal contacts. The patient was instructed to wear it for as much time as possible for about 4 to 6 weeks with periodic corrections for accommodating changes in muscle tension. The occlusal splint assisted in deprogramming the muscles of mastication and in assessing the effect of increased OVD on the TMJ and surrounding musculature.[9]

Diagnostic wax up and mouth preparation: The diagnostic wax up (Fig. 2) was done for the anterior teeth to establish the anterior guidance tentatively. Mouth preparation included a thorough oral prophylaxis, endodontic treatment of 24, 25, 36 & 37, extraction of supernumerary teeth located buccal to 24 and 25 and surgical crown lengthening in relation to 34, 35, 46 and 47.

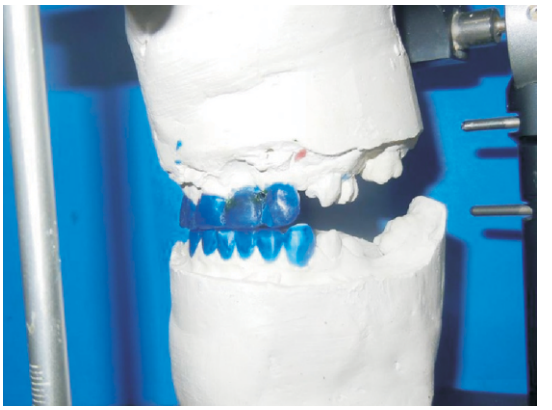

Fig. 2 : Anterior diagnostic wax up on articulated casts

Maxillary and mandibular teeth were prepared and temporary crowns were fabricated with

the help of silicone index of the tentative diagnostic wax up. The temporary crowns were adjusted to establish anterior guidance based on esthetics and phonetics and luted with Zinc oxide non-eugenol cement (Temp NE, 3M ESPE, St.Paul, Minnesota, USA). Maxillary and mandibular impressions were made using irreversible hydrocolloid and casts were poured with type III gypsum product. This pair of casts was used for wax up of posterior teeth.

Diagnostic wax up to establish the occlusal plane and the posterior occlusion: The mandibular posterior wax up was done using artificial resin teeth set in modeling wax at an occlusal plane determined by anatomical landmarks. The wax up of maxillary posterior teeth was done against the wax up of the mandibular teeth.

Maxillary posterior teeth were prepared for metal ceramic crowns whereas mandibular posterior teeth excluding 36 and 37 were prepared to receive telescopic copings and tempororization was done. 36 and 37 were prepared to receive metal copings only, as per the diagnostic wax up. Gingival retraction was done for all the prepared teeth with braided retraction cord preimpregnated with aluminum chloride (Ultradent Products, Jordan, USA). Secondary impression was made with polyvinyl siloxane heavy body and light body (Reprosil, Dentsply Caulk, Milford, USA) by two step technique.

The secondary impression was poured with Type IV gypsum product (Kalrock, Kalabhai, Mumbai, India) and individual dies were prepared. The casts were mounted on the semi adjustable articulator using face bow transfer and jaw relation record. Wax patterns for primary telescopic copings were prepared with cervical shoulder, surveyed to check their parallelism and were cast in chrome cobalt alloy. Metal copings for maxillary and mandibular teeth were tried in the patient to check for their adaptation and marginal fit. The telescopic copings were luted with type I Zinc phosphate cement (Fig. 3a). Porcelain application was done and PFM crowns were cemented on maxillary and mandibular anteriors using type I Zinc phosphate cement. The occlusion of maxillary posterior crowns was adjusted against the mandibular diagnostic wax up and bisque stage try-in was done.

Fig. 3a: Telescopic copings luted on mandibular posterior teeth

Fabrication of overlay metal framework for mandibular posteriors: Impression of mandibular arch was made with polyvinyl siloxane impression material using double viscosity two- step technique. The master cast was duplicated using a reversible hydrocolloid and the refractory cast was articulated against the maxillary cast using a new centric relation record.

Wax pattern was fabricated on the mounted refractory cast. The design included a lingual bar major connector and secondary copings on 34, 35, 44, 45, 46 & 47. The pattern was invested in phosphate bonded investment and cast in Ni-Cr alloy (Bellabond, Bego, Bremen, Germany). The casting was finished and a clinical try-in was done (Fig. 3b). The master

cast with the overlay metal framework was articulated against the maxillary cast using a new centric relation record (Fig. 4a). Porcelain was applied on the overlay copings against the crowns of maxillary arch (Fig. 4b). The occlusion was refined to provide posterior disoccclusion on mandibular protrusion and posterior group function on the working side.

Cementation of fixed prosthesis and delivery of removable prosthesis: The crowns were luted with type 1 Zinc phosphate cement and the overlay RDP was delivered to the patient (Fig. 5a, 5b). Fig. 6a and 6b show smile view and OPG of the patient after the delivery of final prostheses. Post insertion instructions were given that included regular flossing of interproximal areas and removal of overlay RDP during sleep to allow rest for the supporting tissues. The patient was put on a six monthly follow up regimen.

Fig. 3b: Try in of telescopic RDP framework (mirror image)

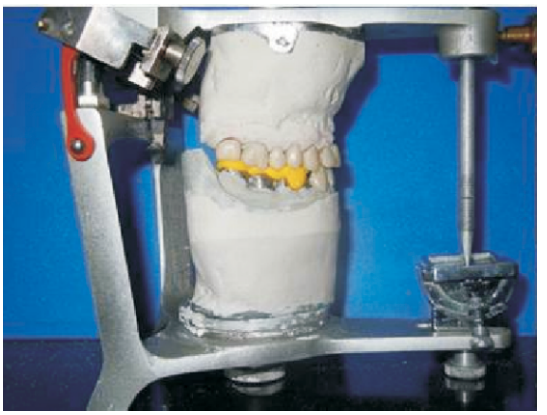

Fig. 4a: Mounting with silicone bite record

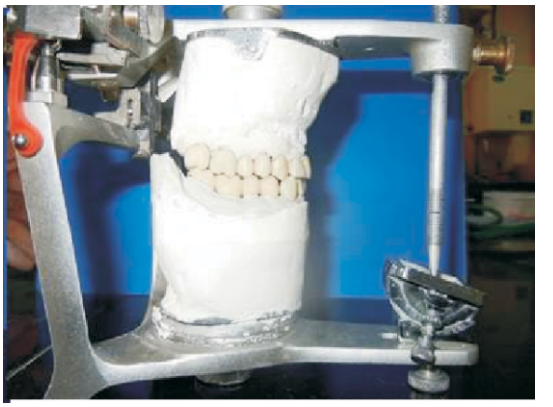

Fig. 4b: Final restorations on articulator

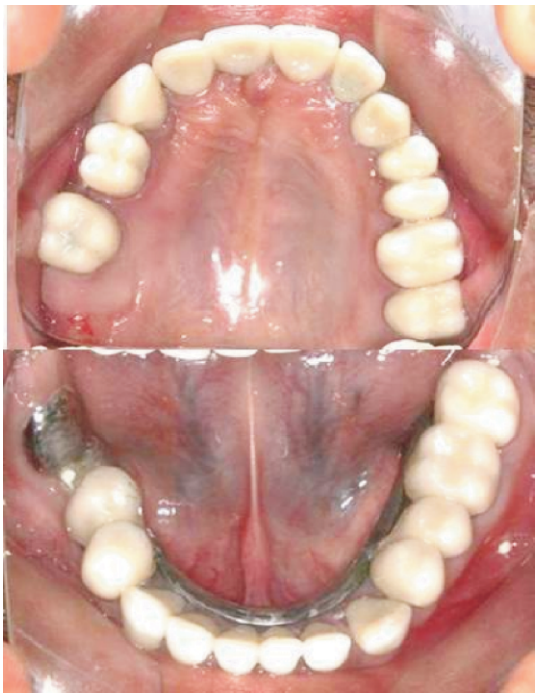

Fig. 5a, 5b: Final restorations in mouth (mirror view)

Fig. 6a, 6b: Post treatment smile and OPG

Discussion

Telescopic RDP is a viable and simple treatment modality for management of posterior open bite that is not amenable to orthodontics. Telescopic RDP provides, through its major connector, cross arch stabilization that counteracts the cantilever forces that the telescopic crown abutments may be subjected to during the eccentric mandibular movements. Existing dentition is used with minimal alteration and correction of occlusal plane achieves increased functional occlusion. [3]

In this case, extraction of the 36 and 37 were not considered to avoid subsequent bone loss as well as taking into account the patient's preference for a non surgical method of management.

The teeth 26 was restored with crown, but left out of occlusion due to two reasons. One was steep occlusal plane, which would have necessitated a long crown with undesirable crown root ratio. Second was to improve the esthetics by bringing the teeth in level with the adjacent teeth.

FDP was not considered as a treatment option for the mandibular arch due to the presence of unequal amount of open bite which might lead to undesirable lateral cantilever forces because of abnormal crown root ratio if they would have been restored with individual crowns. Posterior group function occlusion was given as it enhances mandibular stability during eccentric movements.

In the immediate post insertion period, the patient complained of difficulty in speech which got better with time and effort from the patient. The patient reported with good oral hygiene maintenance and improved chewing efficiency at subsequent follow up visits.

Conclusion

Proper diagnosis and strategic treatment planning play a crucial role in management of complex cases. Patient presented above had asymmetric posterior open bite, severe cant of occlusal plane and multiple ankylosed teeth. Orthodontic treatment was not feasible. So, telescopic prosthesis was given which improved patient's esthetics, oral function, and established a more favorable plane of occlusion. Patient's self-confidence also increased significantly as a result of the dental treatment.

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