

An Interdisciplinary Case Report

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Abstract: An interdisciplinary approach has often been utilized for esthetic rehabilitation of compromised dentitions. The loss of anterior teeth has serious functional and esthetic disabilities in addition to compromising the patient's quality of life. Chronic mouth breathing due to nasal adenoids is known to cause gingival and periodontal diseases. There is adequate dental literature which proves the association of nasal breathing, tongue thrusting and anterior open bite. This can then bring about change in arch shape and tooth position which are primarily determined by the equilibrium of the forces from tongue and perioral musculature. A comprehensive and systematic treatment plan is a prerequisite to achieving success in these conditions. Replacement of the anterior teeth in the patient will also help in restoration of anterior guidance, which is critical for the health of TMJ, posterior teeth and musculature. This case report illustrates how an interdisciplinary approach can benefit the patient and improve his aesthetics thereby improving his entire personality.

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I. Introduction

Respiratory needs are the primary determinant of the posture of the jaws and the tongue. Therefore it seems entirely reasonable that as altered respiratory pattern such as breathing through the mouth rather than the nose could change the posture of the head, jaw and the tongue. This in turn could alter the equilibrium of pressures on the jaws and the teeth and affect both jaw growth and tooth position. If these postural changes were maintained, face height would increase and posterior teeth would supraerupt, the mandible would rotate down and back, opening the bite anteriorly and increasing overjet. The increased pressure from the stretched cheeks might cause narrower maxillary dental arch. This type of malocclusion is often associated with mouth breathing, sucking habits and tongue thrust swallow.¹ If these conditions are not corrected the malocclusion can remain throughout adulthood.

Adjunctive orthodontic treatment for adults is, by definition tooth movement carried out to facilitate other dental procedures necessary to control disease, restore function and/or enhance appearance. Almost always, it involves only a part of the dentition, and the primary goal usually is to make it easier or more effective to replace missing or damaged teeth. The treatment duration tends to be a few months, rarely more than a year, and long term retention usually is supplied by the restorations. The goals of adjunctive treatment should be to:

1. Improve periodontal health by eliminating plaque harbouring areas and improving the alveolar ridge contour adjacent to the teeth
2. Establish favourable crown to root ratios and position the teeth so that occlusal forces are transmitted along the long axes of the teeth
3. Facilitate restorative treatment by positioning the teeth so as to allow for more ideal and conservative techniques (including implants) to be used so that optimal aesthetics can be obtained.²

II. Case report

A 23 year old male patient was referred to the Department of Orthodontics and dentofacial orthopaedics from the Department of Prosthodontics for an opinion. The patient complained of forwardly placed upper and lower anterior teeth which resulted in his inability to close his lips. On extra oral examination in frontal view, showed increased lower face height, lip incompetence, short upper lip, everted lower lip and full maxillary incisor exposure. The profile view was convex with protrusive lips due to severe proclination of upper and lower incisors and deepened mentolabial sulcus. On intra oral examination, a full complement of teeth was noted with 11mm of overjet, 1 mm overbite and Class I molar relation with respect to left side. The first molar on the

maxillary right side was found to be grossly decayed. There was also chronic gingivitis due to mouth breathing. A diagnosis of mouth breathing was made based on history and clinical findings.

Radiographic examination involved oral pantomograph showing grossly decayed maxillary right first molar (Fig 1). Cephalometric analysis revealed dentoalveolar proclination of maxillary and mandibular anterior segments with anterior vertical maxillary excess (Fig 2).

III. Treatment plan

Orthodontic consultation indicated extraction of the upper and lower incisors due to the severity of bone loss with respect to these teeth and alignment and levelling of the remaining teeth to allow for prosthetic replacement of extracted teeth. It was also decided to extract the grossly decayed maxillary right first molar and place a prosthetic replacement for the same. For a proper prosthetic replacement it was further noted that the upper canines were proclined and extruded. The patient required orthodontic treatment to correct the position of the upper canines and to correct the malalignment in the lower dentition. After a thorough scaling and polishing by the Department of periodontics the patient was given oral hygiene instructions and recalled after one week to start the orthodontic treatment. The molars were banded and maxillary canines were bonded. The lower dentition was completely bonded and 0.014" Niti was placed for alignment. A modification of the K-SIR³ was placed on both the maxillary canines (Fig 3). Initially the spring were placed but not activated. Activation was done after 1 month and then subsequent activations were done every six to eight weeks until the space distal to the canines were closed and the canines were intruded. Once the maxillary canines attained their proper position the first and second maxillary premolars were bonded and continuous wires were placed for arch alignment and levelling. The wire sequencing for the maxillary arch was as follows- 0.014" Niti, 0.016" Niti, 0.017 X 0.025" Niti and 0.019 X 0.025" S.S. Debonding was done (Fig 4) and a functional retainer (Fig 5) was placed till the department of Prosthetics was able to deliver their prosthesis to the patient.

The possible treatment options to rehabilitate the missing anterior teeth were discussed with the patient, including implant supported prosthesis and conventional tooth supported fixed denture prosthesis. Conventional fixed partial denture was chosen due to the patient desire and socioeconomic factors.

Clinical and radiological examination was done to evaluate pulpal and periodontal health of the abutment teeth. No pathology was noted. Due to the favourable crown root ratio, the respective canines were selected as abutments for the maxillary and the mandibular central and lateral incisors.

The diagnostic casts were made and a diagnostic mock-up was done to ascertain the esthetic outcome and patient response. The patients previous functional retainers had supernumerary acrylic teeth to compensate for the excessive inter abutment distance. To attain a satisfactory esthetic proportion between the teeth, the excess space was distributed proportionally amongst the abutments and the pontics.

An autopolymerized acrylic denture base was fabricated on the dental cast for the edentulous area; an occlusal rim was made using modeling plastic compound. The vertical height was adjusted according to the anatomic landmarks, visibility and phonetics. The patient was asked to perform all physiological functions like swallowing, sucking and phonetics. According to the neutral zone,⁴ the exact tooth position and inclination was achieved using recontoured modeling compound.

During the fabrication of provisional restorations, the exact position and inclination of the pontics was achieved by split putty indexing. The tooth preparation of the abutments was done for metal fused to ceramic retainers. A definitive impression was made with putty-light body fast set silicone impression materials (Virtual, Ivoclar Vivadent). The poly methylmethacrylate provisional fixed partial dentures were fabricated with indirect-direct technique. After the necessary adjustments for aesthetics, phonetics and occlusion, to establish proper canine guidance; the provisional bridges were cemented with noneugenol temporary luting cement. The patient was recalled after 24 hours to evaluate gingival health and comfort. Continuous monitoring was done, for six weeks to evaluate the overall satisfaction of esthetics, phonetics and function and when required, minor adjustments were made. A polyvinylsiloxane putty index was fabricated over the provisional prosthesis to replicate the labial contour, teeth shape and inclination in the permanent prosthesis. After necessary occlusal refinements, the final porcelain fused to metal restoration were fabricated and cemented with the help of glass-ionomer type I luting cement (Figure 6 and Figure 7).

The patient was recalled after seven days to evaluate the residual cement, gingival health, and occlusal harmony. The patient was kept on regular recall. The patient showed a phenomenal improvement in speech, aesthetics and overall appearance. He was highly contented with the aesthetic outcome of the prosthesis (Figure 8).

IV. Discussion

Adults who seek orthodontic treatment fall into two categories. The first are younger adults below the age of 35 who desired but did not receive comprehensive orthodontic treatment as youths and now seek it as they are financially independent. The second group belong to the age group of 40 - 50 years who have other

dental problems and need orthodontics as a part of a larger treatment plan. The patient came to us with severely proclined upper and lower incisors due to a chronic mouth breathing habit. This would have been due to an upper airway obstruction. The associated lip incompetency created significant imbalance in force between the tongue and perioral musculature, resulting in progressive flaring of incisors.⁵ On radiographic examinations the severity of the boss loss in the upper and lower anteriors determined that these would have to be extracted and the missing teeth would need to be replaced. Replacement of the missing teeth required the alignment and leveling of the remaining teeth especially the abutment teeth in this case being the canines, as the placement and further success of the prosthesis depended on the location and condition of the abutment teeth. So adjunctive orthodontics was carried out in this patient to facilitate other dental procedures necessary to restore function and enhance appearance. The prosthetic rehabilitation carefully considered all the involved factors and addressed them individually. The replacement of the teeth in the neutral zone would help in stabilizing the tooth position and restore proper lip support. The reestablishment of incisor vertical overlap helped to restore the missing anterior guidance. Research has shown that the optimum anterior guidance is vital for the health of posterior teeth and temporomandibular joint.^{6,7} The replacement of missing anterior teeth morphological characteristics and their relation to oral structure are also important for rehabilitation of phonetics. The well designed prosthesis and meticulous follow up care would completely rehabilitate patients with mouth breathing with anterior tooth loss. This case presentation illustrates the use of metal fused to ceramic fixed partial dentures in place of all-ceramic FPDs or implant-supported fixed prosthesis if there are restrictions related to bone volume, cost or treatment time.

V. Conclusion

This case report demonstrated interdisciplinary action wherein the patient required Periodontal, Surgical, Orthodontic and finally Prosthetic rehabilitation to obtain the desired result. This resulted in the correction of severely proclined upper and lower incisors and incompetent lips. This not only brought about an improvement in the patients esthetics but also had a positive impact on his confidence and personality.

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Fig 1 Pre treatment OPG



Fig 2 Pre treatment Lateral Cephalogram



Fig 3 Modified K- SIR Spring



Fig 4 Post Orthodontic treatment



Fig 5 Functional retainer



Fig 6 (a) Maxillary Porcelain fused to metal prosthesis (frontal view)



Fig 6 (b) Maxillary Porcelain fused to metal prosthesis (occlusal view)



Fig 6 (c) Maxillary porcelain fused to metal prosthesis (intraoral)



Fig 7 (a) Mandibular porcelain fused to metal prosthesis



Fig 7 (b) Mandibular porcelain fused to metal prosthesis



Fig 7 (c) Mandibular porcelain fused to metal prosthesis (intraoral)



Fig 8 Patient with maxillary and mandibular porcelain fused to metal restorations

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