International Journal of Dental Research
www.dentaljournal.net
Online ISSN: 2664-9055, Print ISSN: 2664-9047
Received: 25-05-2023, Accepted: 11-06-2023, Published: 27-06-2023
Volume 5, Issue 2, 2023, Page No. 61-64

Correction of angles' class i bimaxillary protrusion with first premolar extraction – A case report

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Abstract

In this case study, the treatment of a female patient with a bimaxillary dentoalveolar protrusion and a Class I malocclusion is evaluated. The patient had her first premolars extracted in order to improve her prognathic profile. The results of the clinical and cephalometric evaluation showed skeletal Class I malocclusion with crowding, convex facial profile, horizontal growth pattern, potentially incompetent lips, average overjet, and overbite. Following fixed orthodontic treatment, the patient's smile, facial profile, and occlusion all significantly improved, along with their confidence and quality of life. This was accomplished by removing the patient's first premolars from the upper and lower arch and retracting the anterior segment. With the use of Fixed Appliance Therapy, correct case selection, good patient compliance, and profile adjustments, treatment benefits were shown.

Keywords: Angle class i malocclusion, premolar extraction, fixed appliance therapy, bimaxillary protrusion

Introduction

Angle Class I malocclusion is characterized by normal anteroposterior molar relationship, which may or may not be accompanied by skeletal changes—in the vertical or transverse planes—or dental changes. Along with addressing tooth irregularity, fixed appliance therapy can considerably change and enhance facial attractiveness. Class I malocclusions occur more than any other kind of malocclusion [1]. The number of adults seeking orthodontic care has considerably increased [2]. Bimaxillary dental protrusion, characterized by pronounced labial inclination of maxillary and mandibular incisors combined with excessive overjet, expose patients to dental trauma and compromise aesthetics [3]. In deciding which teeth to extract for Class I correction the first or second premolars are usually selected due to their location in the dental arch [4]. The correction of Bimaxillary prognathism is a procedure that dates back more than 10 decades. In 1849 Hullihen [5] described a technique for the correction of such a deformity. Since that time refinements of technique and various methods have been described [6].

In this case, a young female patient with moderate crowding and significantly proclined maxillary and mandibular upper teeth was treated for a Bimaxillary dentoalveolar protrusion with a Class I malocclusion by performing extraction of the patient's maxillary and mandibular first premolars. This case's extraction protocol serves as an example of how conventional fixed orthodontic treatment, including the extraction of four premolars, followed by retraction and space closure, can transform a convex, unpleasant facial profile into an orthognathic, pleasing profile.

Case report

Extra oral examination

A 15-year-old female patient presented with the chief complaint of forwardly placed upper front teeth and excessive show of front teeth to the Department of Orthodontics at Pacific Dental College & Hospital, Udaipur, Rajasthan, India. On Extraoral examination, the patient had a convex facial profile, symmetrical face on both sides with potentially incompetent lips, moderately deep mentolabial sulcus and an acute Nasolabial Angle. The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history. On Smiling, there was excessive show of maxillary anterior teeth. The patient had a toothy smile.

Intra oral examination

Intraoral examination shows presence of an average overjet and overbite with the coinciding dental midline. On lateral view the patient shows the presence of Class I incisor relationship, a Class I Canine relationship bilaterally and a Class I molar relationship bilaterally. There was mild crowding in the lower anteriors with mild spacing in upper anteriors and severely protruded upper and lower anterior teeth.

Table 1: Pretreatment cephalometric readings

Parameters	Pre- Treatment
SNA	85
SNB	82
WITS	2
Max. Length	79
Man. Length	95
IMPA	104
Nasolabial Angle	84
U1 TO NA degrees	30
U1 TO NA mm	8
L1 TO NB degrees	32
L1 TO NB mm	5
FMA	28
Y AXIS	60

Treatment goals

Treatment goals included improvement of facial aesthetics, obtaining a balanced labial musculature and a stable occlusion from the functional point of view, maintaining the existing relationship between molars, improvement in the relationship between canines, correction of maxillary incisor protrusion, reduction of overbite and overjet, maintaining healthy teeth.

List of problems

1. Prognathic maxilla and mandible
2. Proclined maxillary and mandibular anterior teeth
3. Crowding in lower anterior region
4. Convex facial profile
5. Retruded chin
6. Decreased Nasolabial angle
7. Potentially Incompetent lips
8. Increased lip strain

Treatment objectives

1. To retract upper and lower anteriors
2. To correct spacing in upper anteriors
3. To relieve crowding in lower anteriors
4. To achieve a pleasing smile and a pleasing profile

Treatment plan

1. Extraction of 14, 24, 34 and 44
2. Fixed appliance Therapy with MBT 0.022-inch bracket slot
3. Initial leveling and alignment with 0.012", 0.014", 0.016", 0.018" Niti archwires following sequence A of MBT
4. Retraction and closure of spaces by use of 0.019" x 0.025" rectangular NiTi followed by 0.019" x 0.025" rectangular stainless steel wires with Boot hooks
5. Final finishing and detailing with 0 014" round stainless steel wires
6. Retention by means of Beggs Wrap-around retainers along with lingual bonded retainers in the upper and lower arch

Treatment progress

Complete bonding & banding was done in maxillary and mandibular arch, using MBT-0.022X0.028" slot. Initially 0.012" NiTi wire was used, which was followed by 0.014, 0.016", 0.018" Niti archwires and then 0.018" SS was placed. Transpalatal Arch (TPA) and Lingual Arch were used for anchorage control. After 7 months of alignment and leveling NiTi round wires were discontinued. Rectangular wire 0.016" x 0.022" NiTi and 0.017" x 0.025" NiTi were placed consecutively in both the arches. Retraction and space closure was then started by use of 0.019" x 0.025" rectangular NiTi followed by 0.019" x 0.025" rectangular stainless steel wires using Boot Hooks. Anchorage was conserved by light retraction forces constantly monitoring the already well settled molar relation. This is the most important step in an Extraction case wherein anchorage conservation is of utmost importance. Retraction and closure of spaces was done with the help of Active Tieback using 0.010" ligature wire and E- module, delivering light continuous forces and replaced after every 4 weeks due to force decay and reduction in its activity. After Space closure in lower arch Bracket repositioning was done and 0.014 NiTi was placed in lower arch. Space closure in upper arch is still being continued. Also, the profile of the patient has improved significantly from being convex to now more Orthognathic with a pleasant and consonant smile arc on smiling. Also, the Nasolabial angle improved significantly.

Discussion

A well-chosen in decidualized treatment plan, undertaken with sound biomechanical principles and appropriate control of orthodontic mechanics to execute the plan is the surest way to achieve predictable results with minimal side effects when treating a moderately crowded Class I malocclusion with extractions of all 1st premolars. Any number of skeletal and dental components combinations may be present in a Class I malocclusion with Bimaxillary Dentoalveolar protrusion. Therefore, determining the aetiology, knowing how Class I malocclusion manifests, and establishing differential diagnoses are essential for its correction.

Angle Class I malocclusion is characterized by skeletal changes—in the vertical or transverse planes—, or dental changes [7]. Bimaxillary dental protrusion, when coupled with excessive overjet, increases patient exposure to dental trauma while compromising aesthetics. When extractions are indicated the choice often falls on premolars due to their strategic position in the transition zone between the anterior and posterior segments. However, other approaches should be considered, especially when the patient presents with caries, extensive restorations, periapical lesions or prostheses [8].

The patient's main concern was that the upper and lower front teeth were positioned too far forward and showed too much. In this instance, the upper and lower front teeth were extensively proclined and there was a clearcut bimaxillary dentoalveolar protrusion. The choice of orthodontic fixed appliances is influenced by a number of variables, which can be divided into clinical and patient factors such as preference, familiarity, and available facilities. Patient variables include patient age and compliance. The patient's convex profile in this case improved as a result of the right execution of all first premolar extraction followed by Fixed appliance therapy. The choice to remove the premolars should be emphasised as being the most significant factor in this situation. After carefully examining the case, analysing all pretreatment cephalometric parameters, and clinically assessing the patient's profile, it was decided to extract the patient's first premolars.

The patient's nasolabial angle was acute, and her profile was convex. All of these findings made it practically necessary to extract all of the first premolars. Neither proximal stripping nor non-extraction could be used to address this scenario. At the current stage of the procedure, extractions effectively changed the patient's profile from convex to more orthognathic. There was improvement in occlusion as well as smile arc, profile and position of chin. Its been a total of 15 months in the treatment which is expected to end soon. Removable Beggs retainers will be delivered to the patient along with fixed lingual bonded retainers in upper and lower arch as a retention protocol.

Fig 1: Pre-treatment – Extra oral & Intra oral photographs

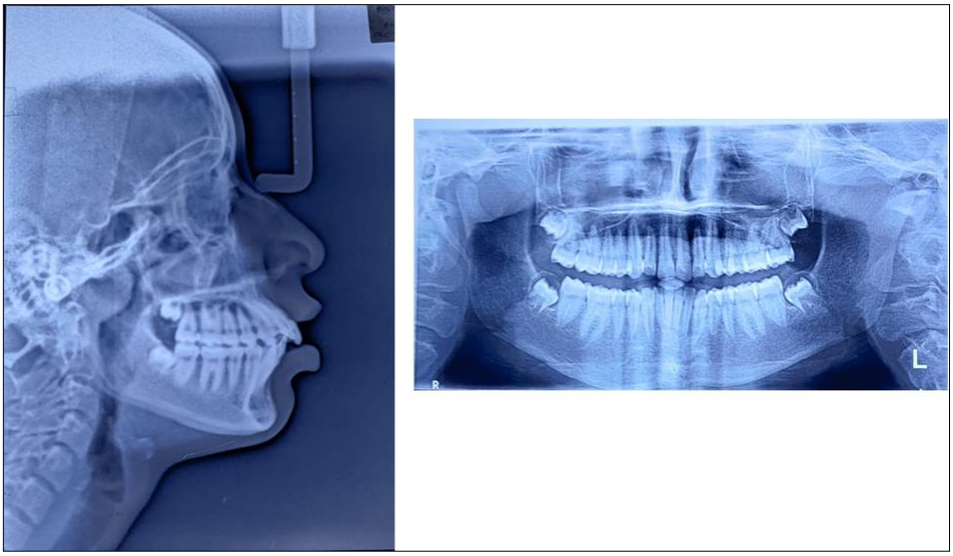

Fig 2: Pre- treatment – Lateral cephalogram & OPG

Fig 3: Mid-treatment – Extra oral & Intra oral photographs

Fig 4: Current status (Upper arch —0.019" x 0.025" SS & Lower arch — 0.014 NiTi)

Conclusion

This case report demonstrates how a bimaxillary dentoalveolar protrusion situation can be treated with the extraction of four premolars using effective simultaneous anchorage preservation and proper use of simplified fixed orthodontic treatment. The pretreatment intended objectives were accomplished. Class I molar relationship was maintained with good tooth intercuspation. Maxillary and mandibular incisors were retracted to treat the prognathic appearance of upper and lower jaw with a resultant decrease in soft tissue procumbency and facial convexity. The patient's smile and profile has improved. The patient's appearance and self-esteem is significantly being improved as the malocclusion is being corrected. The patient is extremely pleased with the progress of the treatment.

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