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Orthodontic Treatment With Extraction in Moderate Crowding Using The Edgewise System - A Case Report

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Abstract

Introduction: Dental crowding is a common malocclusion resultingfrom a mismatch between tooth size and arch dimensions, with moderate forms frequently requiring orthodontic intervention. Fixed orthodontic appliances, particularly the edgewise system, offer controlled three-dimensional tooth movement and are widely used to manage space discrepancies. In cases where arch-tooth size imbalance is significant, premolar extraction may be indicated to create adequate space and achieve functional and esthetic improvement **Case Report:** A 23 years-old women came to RSGMP UH with chief complaint want to improve her teeth that were crowded . intraoral examination revealed class I canine and molar relationship, deep palate and 1 mm shift of the mandibular dental midline to the right. At the beginning of the treatment, four first premolars were extracted to correct moderate crowding and improve the facial profile. After that, edgewise bracket slot 0,22 was bonded. The next step was levelling and alignment procedure with multiple loops. **Conclusion:** The management of moderate crowding using the edgewise fixed orthodontic system with first premolar extractions proved effective in correcting dental irregularities, improving the facial profile, and establishing functional occlusion. Sequential leveling, alignment, space closure, and retraction sucesfully resolved crowding and midline deviation, leading to stable post-treatment results supported by appropriate retention

Keywords: Moderate crowding, edgewise, tooth extraction

INTRODUCTION

Dental crowding is a discrepancy between the size of the dentition and the jaw that causes irregularity of the dentition.[1] Dental crowding is one of the malocclusions with a frequency of about 25%.[2] Based on research conducted by Ahamed et al, increased consumption of processed foods has increased the prevalence of crowding which has increased to 60%. [3] The most common etiology of dental crowding is proximal caries in primary teeth which causes mesial shifting of the posterior teeth, leading to a decrease in jaw size. Other causes of crowding include genetics, bad habits, poor dental hygiene and cleft lip and palate.[1] Crowding is classified into three groups, such as mild, moderate and severe according to the amount of overlapping present.[4]

DIAGNOSIS AND ETIOLOGY

A 32-year-old woman came to UNHAS Dental Hospital, Makassar with chief complaint wanting to improve her front teeth that were crowded. Extraoral examination showed that the patient had a symmetrical face with mesoprosopal face

type and mesochepalic head shape he patient had incompetent lips and a convex facial profile. On smiling, there was a wide buccal corridor.

Intraoral examination revealed good oral hygiene and healthy gingiva. There was moderate crowding in the maxilla and mandible.

Observation of occlusion revealed a class I canine and molar relationship with an overjet of 2.5 mm and an overbite of 1 mm. Spee curves on both sides were normal (right 1 mm and left 1 mm). Space requirement analysis using Lundstrom Analysis showed a discrepancy of -1 mm in the maxillary arch and -5 mm in the mandibular arch.

Functional examination does not show any abnormalities in the temporomandibular joint. There was no deviation during mouth opening and closing movements.

Lateral cephalogram analysis showed a class I skeletal malocclusion (ANB 5^0), upper lip position 1 mm in front of the E-Line and lower lip position 0.5 mm in front of the E-Line.

Fig 1. Initial intraoral photograph before treatment (source: Personal Documentation)

TREATMENT OBJECTIVES

Treatment objectives include: (1) to improve the facial profile, (2) to correct moderate crowding in the maxillary and mandibular arches, (3) to correct the mandibular dental midline shift, (4) to eliminate dental crowding in the mandibular arch, and (5) to achieve optimal overjet and overbite.

TREATMENT ALTERNATIVES

Orthodontics alone without surgery Treatment in this patient could be corrected with (1) Temporary Anchorage Devices (TAD) in both jaws for simultaneous retraction of the anterior teeth, (2) Extraction of the four first premolars using conventional techniques. Both treatment alternatives were explained to the patient, but the patient refused to have TADs inserted because they were too invasive. So it was decided that the second treatment chosen was conventional fixed orthodontic treatment with extraction of the first premolar.

TREATMENT PROGRESS

Based on the examination and analysis, the patient was planned to be treated with fixed orthodontics with extraction. After the patient agreed and signed the informed consent, the treatment started with the installation of fixed orthodontic appliances using edgewise slot 0.022 brackets. All first and second molar teeth were fitted with molar bands and tubes. In the initial stage, levelling and alignment procedures were performed with NiTi 0.014 to NiTi 0.016 x 0.022 wires. After levelling and alignment had reached wire 0.06 x 0.022, space closing was performed on the maxilla using a power chain on teeth 12,11,21,22. After the four anterior teeth were tight, en masse retraction was then performed with T loop wire SS 0.016 x 0.022. During the en masse retraction process, the patient was instructed to use class II elastics to achieve class I C and M relationships and also as reinforced anchorage during the retraction process.

Table 1. Cephalometric analysis pre and post treatment

Parameter	*Norm (mean ± SD)*	*Pre*	*Post*
Horizontal skeletal			
SNA (°)	82±2	81	85
SNB (°)	80±2	76	82
ANB (°)	2±2	5	3
Wits appraisal (mm)	1±1	3.5	3.5
Convexity (°)	0±5	9	9
Vertical Skeletal			
Y axis (°)	54.9±4	60	60
SN-mandibular plane (°)	32±3	33	3
FMA (°)	25±3	24	24
Dental Analysis			
U1-NA (mm)	4±2	8	3
U1-NA (°)	22±7	32	20
L1-NB (mm)	4±2	12	5.5
L1-NB (°)	25±3	40	30
Interincisal Angle(°)	135±10	101	134
Facial Analysis			
E-Line upper lip (mm)	1±2	1	-1
E-Line lower lip (mm)	0±2	0.5	-0.5
Nasolabial Angle (°)	102±8	103	109

After optimal occlusion was obtained, finisihing and occlusal adjustment were performed followed by stabilization of the dentition. After 3 years of active treatment, the orthodontic appliances were removed and fixed retainers were placed on the maxilla and mandible.

Fig 2. Intraoral photograph after treatment (Source: Personal Documentation)

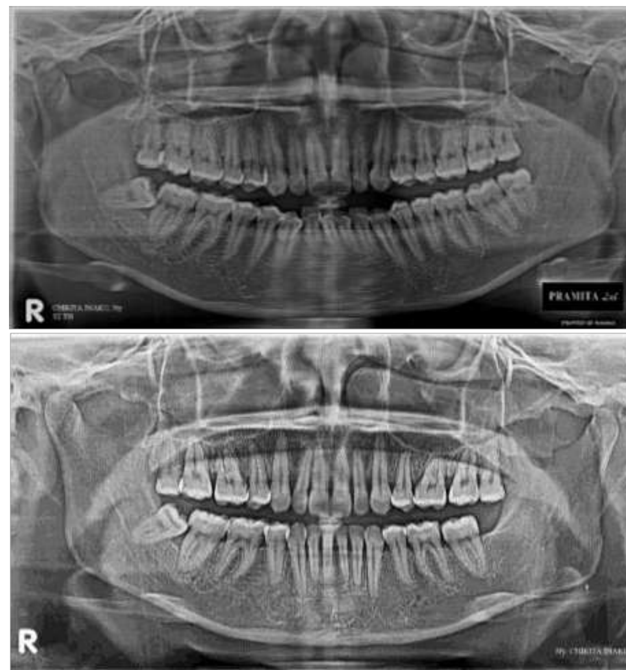

Fig 3. Panoramic radiograph (A) before and (B) after treatment (Source: Personal Documentation)

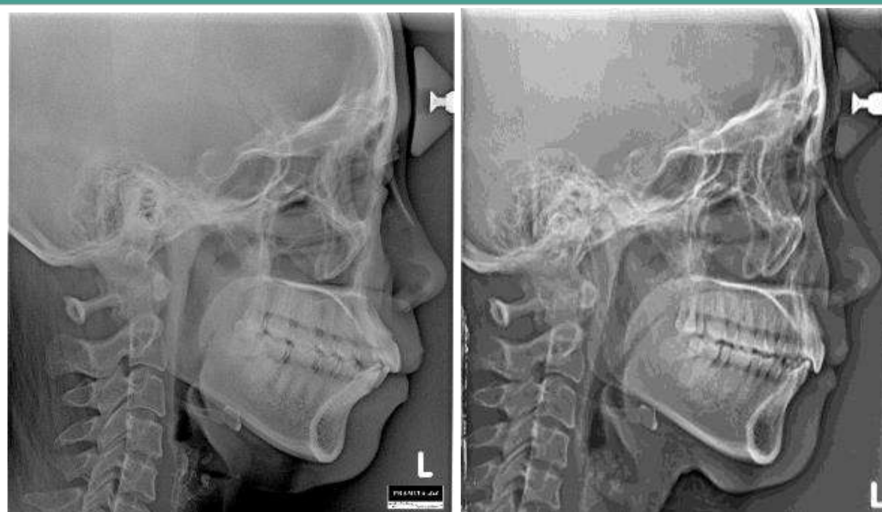

Fig 4. Lateral cephalogram (A) before and (B) after treatment (Source: Personal Documentation)

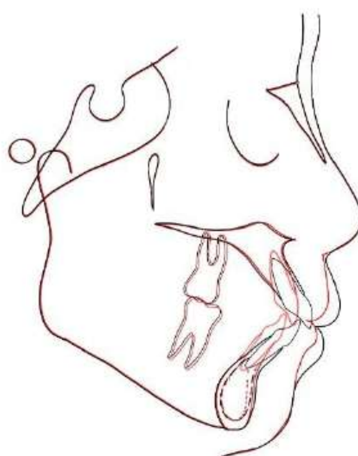

Fig5. Lateral superimpose before (black line) and (red line) after treatment

DISCUSSION

Based on its severity, crowding is categorized into: mild, moderate and moderate. Mild crowding if the dental discrepancy ranges from 1-3 mm, moderate crowding if the discrepancy ranges from 3.1-5 mm and severe crowding if the dental discrepancy is above 5.1 mm. [5]

The patient has a class II C and M relation with moderate crowding in the mandibular arch. The moderate crowding in this patient was due to the discrepancy between the jaw arch and dental arch.

Class I treatment with crowding includes several alternatives: interproximal reduction (stripping), expansion, derotation, uprighting, distalization and extraction. Extraction of all four premolars is usually indicated in moderate to severe crowding of the labial segment to create space for crowding correction.[6]

Garib et al reported that the prevalence of reopening of the extraction space was 13.7% and was experienced by 30.2% of patients who received extractions of all four premolars. The tendency of relapse increases in the first year after the appliance is removed and slowly decreases up to five years after treatment.

CONCLUSION

Fixed orthodontic treatment in cases of class I malocclusion with moderate crowding can be done in several ways, namely interproximal reduction, expansion, derotation, uprighting, distalization and extraction. In this case, extraction of the first premolar was chosen to correct the patient's facial profile.

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