

## ORTHODONTIC MANAGEMENT OF CLASS II DIVISION 1 MALOCCLUSION WITH EXTRACTION OF COMPROMISED ALL FIRST PERMANENT MOLARS: A CASE REPORT

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### ABSTRACT

The first permanent molar (FPM) is commonly subject to significant compromise which may arise due to caries or endodontic complication, or from developmental anomalies such as hypoplasia. Compromised teeth with questionable prognosis may result in short and long-term clinical dilemmas. This case report describes an orthodontic treatment of 16 year old female patient, presented with extracted all FPMs with crowding of upper and lower arch with proclination. Extraction space was closed by retraction of upper anteriors and mutual space closure of lower arch. The functional occlusion and smile aesthetics were improved.

### KEY WORDS

**Compromised, first permanent molar, orthodontic, IZC bone screw**

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### INTRODUCTION

The first permanent molar (FPM) has been reported to be the most caries prone tooth in the permanent dentition. More than 50% of children over the age of 11 years have some caries experience in this tooth.<sup>1</sup> In addition to this, the FPM has also been commonly found to be significantly hypoplastic, with approximately 6% of children having hypoplasia in one or more first permanent molars.<sup>2</sup>

Orthodontic cases involving the extraction of the first permanent molars are usually more technically demanding compared with conventional premolar extraction or non-extraction treatment. However, it could be argued that many patients would benefit from extraction of compromised FPMs due to their questionable long-term prognosis. A decision to electively extract healthy premolar teeth for orthodontic purposes may not be justifiable in these cases.

There are many factors to consider before extracting any FPM, which will be outlined in detail. Cases involving extraction of FPMs are frequently associated with protracted orthodontic treatment and more complicated mechanics. However, appropriate timing of FPM extractions can greatly facilitate and simplify subsequent fixed appliance orthodontic treatment. As with any form of dental treatment, the cost-benefit perspective of FPM extraction and subsequent fixed appliance orthodontic treatment must be carefully evaluated.

### Clinical evaluation and indications for FPM extraction

The first permanent molar is rarely the tooth of choice for extraction prior to orthodontic treatment. However, there are various clinical situations in which extraction of FPMs should be considered:<sup>3-14</sup> extensively carious FPMs; hypoplastic FPMs; heavily restored FPMs where premolars are perfectly healthy; apical pathoses or endodontically treated FPMs; crowding at the distal aspect of the arches and third molars of reasonable form and in reasonable position; skeletally divergent malocclusions (dolichofacial vertical pattern); and anterior open bite malocclusion.

When a FPM with poor prognosis is identified, several questions become apparent:<sup>15</sup>

- (1) Is the compromised FPM worth saving, especially if it requires endodontic and extensive restorative treatment?
- (2) Should the compromised FPM be extracted as soon as possible, or should it be temporarily restored and extracted later?
- (3) If the prognosis of one FPM is poor, is extraction of the other FPMs required?

The answers to these questions are not always straightforward. Firstly, the situation varies between the maxilla and mandible. In addition to this, the extent of crowding, the presenting malocclusion and the stage of dental development may all influence the clinical management of these cases.

The final treatment plan may also require adjustment if any permanent teeth are absent, severely displaced, of doubtful prognosis or if other pathology is evident. Therefore, it is imperative that a comprehensive examination of the entire dentition is performed, in addition to consideration of the individual patient's circumstances. If the patient will require or desire orthodontic treatment in the future, the timing and extraction pattern should be tailored to achieve the optimal outcome for that individual patient.

## CASE REPORT

A 16-year-old female patient came to the Department of Orthodontics & Dentofacial Orthopaedics with a chief complaint of forwardly placed upper front teeth and irregularly arranged upper and lower front teeth. There was no contributory medical history. In dental history all first permanent molars were extracted because of caries.

Extra Oral examination, revealed convex facial profile with a mesoprosopic facial type. Lips were incompetent with an inter-labial distance of 5 mm. Face was apparently symmetrical with a normal chin and mento-labial sulcus. She had no pain or crepitus on temporo-mandibular joint examination. Upon further clinical examination, no deviation on opening and closing of mandible was observed. (Fig1A-C)

Intra-oral examination, revealed the presence of all erupted permanent teeth including third molars, with the absence of all permanent first molars. Mild crowding in upper anterior region moderate crowding of lower arch with lingually blocked 44, distolingual rotation of 33 and 43. She also had class II canine relationship on both side with overjet of 6mm and overbite of 4.5mm. The maxillary and mandibular incisors were having mild proclination. The maxillary dental midline was coincident with the





facial midline, with lower arch midline shifted towards right by 0.5 mm to the upper arch dental midline. (Fig 2A-E.) The arch forms were ovoid for both the maxilla and mandible. The gingiva appeared normal. The size and shape of tongue were normal too.

On Radiographic examination, the panoramic radiograph showed a complete permanent dentition with missing of all first permanent molars. There was mesial tipping of posterior teeth in the missing first molars position. The bony borders of the mandible and maxilla were normal. The temporomandibular joint appeared normal, with a normal size and shape of the condylar head and glenoid fossa. The lateral cephalogram confirmed the Class II skeletal base with average growth pattern (Fig.3A-B)

## DIAGNOSIS

A 16 year old female patient with class II skeletal bases with average growth pattern. She had proclined upper and lower incisors with moderate crowding.

### Problem list

1. Class II skeletal base
2. Proclined upper and lower incisors
3. Crowded upper and lower arch
4. Distolingual rotation irt. 33, 43
5. Blocked out 44
6. Large overjet and overbite
7. Incompetent lips

### Treatment objective

1. Alignment of upper and lower teeth
2. Closing of extraction space
3. Correction of deep bite
4. Correction of overjet
5. Achieve normal axial inclination
6. Achieve lip competency
7. To improve overall aesthetic and function

## Proposed treatment plan

A pre-adjusted edgewise appliance 0.022 in  $\times$  0.028 in slot of MBT prescription was employed.

### Steps:

1. Level and align the arches.
2. Alleviate crowding between dental units.
3. closing of space and intrusion of upper anterior teeth by infra zygomatic crest (IZC) bone screw
4. lower space closure by normal active tie back with minimum anchorage protocol
5. Finish and detail the occlusion.

Proposed retention strategy: bonded lingual retainers for lower canine to canine and upper wrap around retainer

## TREATMENT PROGRESS

The treatment was commenced with a preadjusted edgewise appliance 0.022 in  $\times$  0.028 in slot of MBT prescription. The initial alignment was done using 0.012 in, 0.014 in nickel-titanium wires. The teeth were allowed to unravel, and arch development was continued till placement of 0.019 in  $\times$  0.025 in stainless steel working archwires in both arches. Placement of IZC bone screw for retraction of maxillary anterior teeth was done. Finishing and detailing was carried out with bending and settling elastics. The active treatment had successfully been completed within 24 months. On the day of debonding, upper wrap around and lower fixed retainer was given. Patient was asked to come for regular check up every 6 weeks (Fig.4-A-E).

## TREATMENT RESULT

The upper and lower arch were properly aligned with closing of space was done. Ideal overjet and overbite were also achieved. Class I canine relationship with a functional occlusion were





**Fig.4-A**



**Fig.4-B**



**Fig.4-C**



**Fig.4-D**



**Fig.4-E**



**Fig.5-A**



**Fig.5-B**



**Fig.5-C**



**Fig.5-D**



**Fig.5-E**



**Fig.5-F**



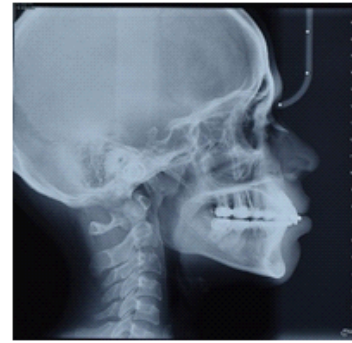
**Fig.5-G**



**Fig.5-H**



**Fig.5-I**



**Fig.5-J**

**TABLE-1**

Cephalometric value	pre	post
SNA(degree)	83.5	82
SNB(degree)	79.5	79
ANB(degree)	4	3
WITS(mm)	0	1
UI-NA(degree)	31	23
UI-NA(mm)	8	5
LI-NB(degree)	27.5	24
LI-NB(mm)	5.5	4
UI-SN(degree)	113	107
IMPA(degree)	101	97
NA perp A(mm)	1.5	1
NA perp POG(mm)	2	2
FMA(degree)	20	19
LAFH(mm)	50	49
INTERINCISAL ANGLE (degree)	119	125
Y AXIS(degree)	58	58
NASOLABIAL ANGLE (degree)	87.5	102

established. The panoramic film demonstrated root parallelism was achieved. The cephalometric radiograph analysis has shown significant change in dental parameter. The treatment goals and objectives were accomplished, and the patient and her parents were pleased with the final result (Fig.5 A-J), (table-1).

## DISCUSSION

This case report demonstrated a very pleasing treatment outcome, with an effective orthodontic correction of the pretreatment Class II division 1 malocclusion. The 16 and 26 extraction spaces were closed, with no reopening of these extraction spaces occurring post-treatment.<sup>16-17</sup> the patient had class II skeletal base with class II canine relation and large overbite. So in this case maxillary space closure was done by using IZC bone screw to utilise almost total extraction space by retracting the anterior teeth. As the retraction was done by bone screw, there was also

intrusive force vector which was helpful in this case to correct deep overbite. But in lower arch, space closure was done by using minimum anchorage approach which was helping to camouflage the class II canine correction.

Compromised first permanent molars with poor long term prognosis are commonly associated with both short and long-term clinical dilemmas. Numerous clinical and radiographic factors must be carefully evaluated. The need for compensating and balancing extractions and the timing of any required extractions can differ greatly according to the dental development of the patient, the amount of intra-arch crowding, the skeletal and buccal segment relationships, and the amount of anterior overjet and overbite.<sup>18</sup>

Depending on the individual case, the ideal time for removal of compromised lower FPMs can be as early as 8–9 years of age, but generally around 10 years of age. Therefore, it is highly recommended that a specialist orthodontic opinion be sought as soon as possible after detection of a compromised FPM.

Although comprehensive fixed appliance orthodontic treatment may not be commenced for a number of years in some cases, an early orthodontic consultation can provide case-specific information with respect to the need and timing of FPM and other associated extractions. Timely and appropriate extractions can greatly facilitate any future fixed appliance orthodontic treatment and the quality of the treatment result.

Conventional orthodontic treatment may not always be the acceptable or preferred treatment option for the compromised all first permanent molars extraction and space closure. In majority of adult cases interdisciplinary approach with replacement of the first permanent molars can be the appropriate approach. If extraction was done long before or extraction due to periodontal reason, instead of orthodontic space closure replacement will be the ideal approach.

Furthermore, each individual case should be evaluated on its own merits, it should not be generalised to all cases.

## CONCLUSIONS

Extraction of compromised FPMs and subsequent comprehensive orthodontic treatment may not always be the preferred treatment option. However, if the prognosis of any FPM is poor and a significant malocclusion exists, removal of any compromised teeth in conjunction with orthodontic treatment can provide rewarding outcomes in several different areas.

It must be emphasized that each individual case should be evaluated on its own merits, and not every case will be suited to extraction of FPMs. Despite this, extraction of compromised FPMs has the potential to provide significant advantages from the cost-benefit perspective in carefully selected cases. This treatment option does warrant serious consideration in any case where the long-term prognosis of such teeth is questionable, and especially if future fixed appliance orthodontic treatment is deemed to be desirable.

## REFERENCES

1. Todd JE, Dodd T. Children's Dental Health in the United Kingdom. London: Office of Population Censuses and Surveys, 1983.
2. Seow WK. Clinical diagnosis of enamel defects: pitfalls and practical guidelines. *Int Dent J* 1997;47:173-182.

3. Sandler PJ, Atkinson R, Murray AM. For four sixes. *Am J Orthod Dentofacial Orthop* 2000;117:418-434
4. Bradbury AJ. A current view on patterns of extraction therapy in British health service orthodontics. *Br Dent J* 1985;159:47-50.
5. Wilkinson AA. The first permanent molar again. *Br Dent J* 1940;8:269-84.
6. Salzmann JA. A study of orthodontic and facial changes and effects on dentition attending the loss of first molars in five hundred adults. *J Am Dent Assoc* 1938;25:892-905.
7. Mills JRE. Principles and practice of orthodontics, 2nd edition, New York: Churchill Livingstone; 1987. p. 123-5.
8. Daugaard-Jensen I. Extraction of first molars in discrepancy cases. *Am J Orthod* 1973;64:115-36.
9. Houston WJB, Stephens CD, Tulley WJ. A textbook of orthodontics, 2nd edition, Oxford: John Wright; 1992. p. 196-9.
10. Stepovich ML. A clinical study on closing edentulous spaces in the mandible. *Angle Orthod* 1979;49:227-33.
11. Hom BM, Turley PK. The effects of space closure of the mandibular first molar area in adults. *Am J Orthod* 1984;4:457-69.
12. Mitchell L. An introduction to orthodontics, Oxford, England: Oxford University Press; 1996. p. 26-8.
13. Williams R, Hosila L. The effect of different extraction sites upon incisor retraction. *Am J Orthod* 1976;69:388-410.
14. Orton H, Carter NE. Initial management of first molar extraction cases. *J Clin Orthod* 1988;22:230-8.
15. Williams JK, Gowans AJ. Hypomineralised first permanent molars and the orthodontist. *Eur J Paediatr Dent* 2003;4:129-132.
16. Ventä I, Ylipaavalniemi P, Turtola L. Clinical outcome of third molars in adults followed during 18 years. *J Oral Maxillofac Surg.* 2004; 62: 182- 185.
17. Ventä I, Murtomaa H, Turtola L, Meurman J, Ylipaavalniemi P. Clinical follow-up study of third molar eruption from ages 20 to 26 years. *Oral Surg Oral Med Oral Pathol.* 1991; 72: 150- 153.
18. DC-V Ong, JE Bleakley Compromised first permanent molars: an orthodontic perspective *Australian Dental Journal* 2010; 55: 2-14