

**Case report:**

**Utilization of residual space of deciduous second molar to align teeth in a crowded arch**

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**Abstract:**

The decision for utilization of a space of a retained deciduous molar to alleviate crowding in late mixed dentition is one of the critical aspects in orthodontic treatment. Hence, the aim of the treatment here is to use the extraction spaces properly to relieve severe crowding and align both the arches to the point where a stable overjet/overbite exist. This case report presenting a 13-year-old female adolescent with severe crowding in both upper and lower jaw and a convex profile. Although she was initially anxious to extract her teeth to treat her case but also she was looking for desirable results. The case was later treated in a conventional orthodontic approach with extraction of three 1<sup>st</sup> premolars. It was quite challenging to make the best use of the space of missing lower right 2<sup>nd</sup> premolar after extraction of deciduous second molar on that side to relieve severe crowding. However; at the end of the treatment, the patient expressed satisfaction with the results- proper bite, smile and most importantly esthetics. This case report demonstrates successful treatment of an adolescent patient with severe crowding by proper utilization of the extraction spaces.

**Keywords:** Crowding, deciduous molar, extraction, premolars, residual space.

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**Introduction**

Despite the importance of preventive and interceptive orthodontics to prevent or reduce the severity of malocclusions in the permanent dentition,<sup>1</sup> still not all the cases are being treated at an appropriate age for the child. Among the different types of malocclusion, crowding and irregularity are the most prevalent types of malocclusion encountered at various stages of development of the teeth<sup>2-4</sup> and is found more common in females.<sup>5</sup> The severity of crowding may vary depending on various factors. In general, crowding of teeth is caused due to discrepancies in the size of the jaws and teeth size. There are some of the factors, which need to be considered when planning treatment for a crowded

case. The treatment of crowding depends upon age of an individual and severity of crowding.

It is well documented that there is considerable loss in arch length during transition from mixed to the permanent dentition, especially in the mandibular arch.<sup>6</sup> Nevertheless, to align and level the teeth in the arch, space is necessary. Therefore, the question may arise whether use of lingual arch in mixed dentition can maintain the space to align teeth in crowded arch in permanent dentition or it may still need extraction depending on the severity of crowding. To achieve the best results for patients with severe crowding, some cases require extraction to align the teeth in the arch<sup>7</sup> while some may be treated in non-extraction approach<sup>8</sup> using a combination technique.

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For instance, proclination and expansion are more predictable together.<sup>9,10</sup>

### **Case Report**

A 13-year-old adolescent with her mother presented at the orthodontic clinic at BSMMU with a chief complain of crowded teeth and an unpleasant smile. Extra oral examination shows a symmetric face but a convex profile with normal vertical facial height. The temporomandibular were within normal limits and the lips were competent at rest. Intraoral examination revealed a healthy periodontium and no caries. The patient had an Angles Class I molar relation on both side and Class I canine relation on left side but showed mild class III canine relation on right side. The maxillary central incisors exhibit slight angulation to the right and the upper and lower dental midline did not coincide. The dental arches were U shaped and presented 2.5 mm of crowding on the maxilla and 5.5 mm crowding on the mandible with an overjet of 4.5mm in right and 6.5 mm in left central incisor respectively. In addition, the maxillary lateral incisors were tipped lingually and the mandibular right canine was severely displaced buccally out of the arch. Additionally she also has a missing lower right 2<sup>nd</sup> premolar. Cephalometrically, there was a Class I skeletal relationship, and the panoramic radiographs showed the presence of retained right lower deciduous second molar and the successor (mandibular second premolar) was absent.

### **Treatment objectives**

The goal of treatment was to improve function and esthetics by resolving crowding in both arches that was pleasing to the patient. The patient was offered the option of extraction strategy to resolve her crowding. After thorough discussion and undersnading, the patient agreed with extraction protocol to treat her case.

### **Treatment Plan**

- Extraction of the maxillary first premolars and one deciduous molar.
- Alignment and leveling of the arches.
- Retraction of maxillary and left mandibular canines.
- Retraction of premolars and canines on right side of the mandible.
- Retract the maxillary and mandibular incisors using closing loops.
- Use of interarch elastics to have good

interdigitation.

- Final consolidation of the space and
- Settling of the occlusion.
- Debond and retain.

### **Treatment progress**

Given this situation, for Class I molar relation with a severe crowding case, treatment plan included extraction of 1<sup>st</sup> premolars. Since the right lower second premolar was missing, depending on severity of the case, extraction of second deciduous molar and utilization of the space was considered. The patient underwent a fixed orthodontic mechanotherapy with preadjusted fixed appliances (0.018-inch slot) installed in the maxillary and mandibular arches. Leveling and alignment were initiated with 0.012- and 0.014-inch nickel-titanium arch wires of both the arches. At the end of 12 weeks, levelling and alignment was enough to replace upper and lower with 0.014 followed by 0.016-inch stainless-steel arch wires. The stage followed retraction of canine in the lower arch. As the canine started to move, canine retraction initiated in the upper arch. A lingual arch in mandible was placed on banded first molars to enhance the anchorage.

Once alignment, levelling and canine retraction was achieved, the maxillary and mandibular arch was consolidated with rectangular 0.016 Ni-Ti for a period of 3 weeks to allow for interarch correction while providing stability to intra-arch units. Anterior retraction was accomplished using 0.016×0.022 " stainless steelwire with closing loops in the upper arch and for mandibular incisor retraction 0.016" stainless steel wire with helical loops was undertaken. A stepwise activation of 1-2 mm was done every month to close the extracted tooth space. When all the spaces were closed, intermaxillary elastics were prescribed to achieve good interdigitation.

At the same time, utmost care was taken to prevent an undesirable mesial drift or rotation of the maxillary/mandibular molars. As this treatment with premolar extractions requires anchorage conservation and in order to reinforce our anchorage, we used additional wire framework.

After the closure of the extraction space, the extraction site was stabilized with a figure of eight ligation between the molars. A 0.016 x 0.022 nickel titanium arch wire was placed to level the arch, followed by the placement 0.014 stainless steel wires for the occlusal settling, following which the case was debonded and a fixed upper and lower lingual bonded retainer was given.

**Table 1: Cephalometric readings**

Measurements	Pre treatment	Post treatment	Follow up	Mean
SNA	82°	80°	79°	82°
SNB	79°	78°	77°	80°
ANB	3°	2°	2°	2°
U1-NA (degree)	28°	23°	24°	23°
U1-NA (mm)	8.5mm	4 mm	5 mm	4mm
L1-NB (degree)	20°	22°	23°	25°
L1-NB (mm)	4mm	5 mm	4 mm	4mm
FMA	31°	31°	29°	25°
FMIA	62°	61°	61°	65°
IMPA	87°	89°	89°	90°
Interincisal angle	128°	131°	130°	130°

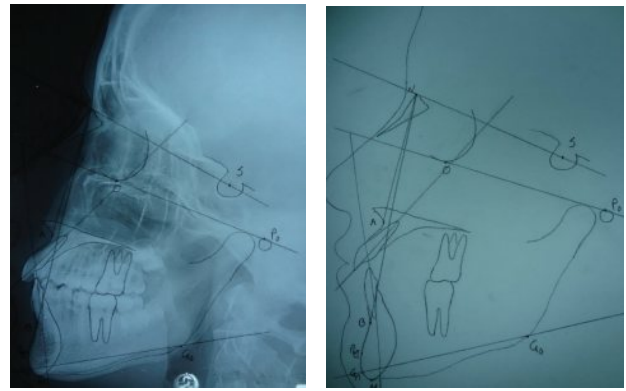


Fig 3: Initial cephalometric radiograph



Fig 4: Final facial and intra oral photographs



Fig 1: Initial facial and intra oral photographs



Fig 5: Final panoramic radiograph



Fig 2: Initial panoramic radiograph

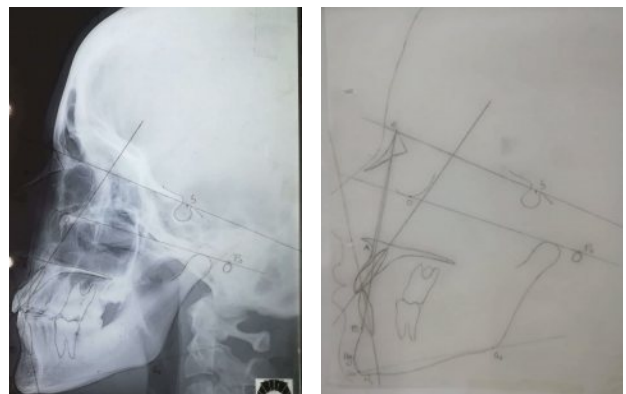


Fig 6: Final Cephalometric radiograph



Fig 7: Follow up after 4 years; Facial and Intra-oral photographs



Fig 8: Follow up panoramic radiograph

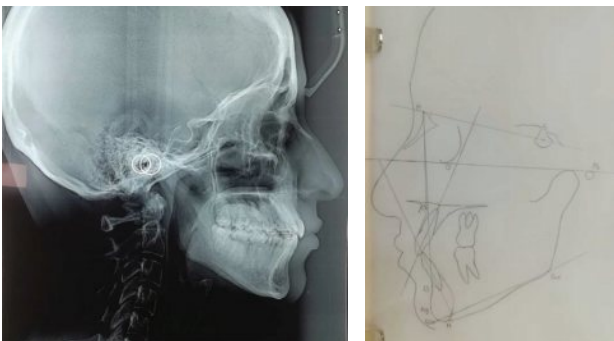


Fig 9: Follow up cephalometric radiograph

### **Discussion**

Crowding is the most common problem faced to the orthodontic clinicians and a number of extraction and non-extraction strategies can obtain the space necessary for alignment of the teeth. By starting treatment in mixed dentition stage with the intention to use leeway space may help a clinician to complete treatment in a non-extraction procedure. The decision for same crowded condition in permanent dentition may change and dictate an extraction therapy.<sup>2</sup> In this case, we chose an extraction method to resolve

crowding in an adolescent patient with all permanent 1<sup>st</sup> premolars teeth except in the right lower; where we decided to extract the retained second deciduous molar and utilize the space for a missing second premolar. The challenging part over here was to make a decision whether retaining the deciduous molar or extracting the adjacent first premolar would give better results to align the crowded teeth. However, depending on the age of the patient, severity of crowding, the amount of space available and the overall orthodontic evaluation, our treatment plan included extraction of the primary teeth and resolve crowding on that side. Our treatment strategy was not consistent with other studies where it mentioned retention and treatment for an infraoccluded primary teeth.<sup>11-13</sup> There was no sign of infraocclusion of primary molar in our case.

But, our concern was that if the primary molar with its missing successor premolar was to be retained for a prolong time it may, however, have some adverse effect on occlusal development. The most common consequence is infraocclusion of the primary molar, which may bring more frequent clinical problems. According to other studies,<sup>14,15</sup> infraocclusion causes reduction in the arch length due to the tipping of adjacent teeth and in some unilateral cases, the midline can be shifted towards the side of the infraoccluded primary molar.<sup>16</sup> In addition, there is an increase susceptibility in dental caries and periodontal problems<sup>17</sup> and overeruption of the opposing teeth, which makes treatment more complicated later.<sup>18</sup>

As part of our treatment, we use lingual arch with the intended purpose of achieving maximum anchorage in the mandibular arch. As described by Nance<sup>19</sup>, the lingual arch is commonly used by many orthodontist still today. It has been well documented that to achieve an optimal result, the best time to use the lingual arch is in the mixed dentition stage to preserve the leeway space for eruption of premolars, because it can provide space for alignment of teeth in cases with mild crowding.<sup>2,3</sup> This type of appliance shows efficiency on the maintenance of the lower arch perimeter, preventing mesial movement of molars and at the same time resisting lingual incisor inclination.<sup>20</sup> Whenever possible the proper goals of orthodontic treatment; i.e. facial balance, functional occlusion and stability of the treatment should be attained. Nevertheless, the ultimate objectives

cannot be always achieved because of the severity of the orthodontic problems.<sup>21</sup> In this case, because of the severity of crowding and risk of infraocclusion of the primary molar, the lingual arch was installed after extraction of the deciduous teeth. Thus, it provided greater benefits; reinforced anchorage and prevented mesial migration of molars while the residual space was utilized to retract first premolar and canines subsequently. At the same time supported from any unwanted lingual movement of lower incisors. Different type of malocclusion management needs different strategies to achieve successful balanced and functional occlusion.<sup>22-30</sup>

**Conclusion:**

A well-chosen individualized treatment plan executed with an appropriate control of the orthodontic mechanics helps to achieve predictable results with minimal side effects. Extractions of the premolars, if they are undertaken after a proper diagnosis, lead

to remarkable dental changes, satisfactory facial aesthetics and a pleasant smile. Because of her age, initially the patient was a bit frantic lacking self-esteem but later, the patient and her parents were quite satisfied with the results, regarding both facial and dental aspects.

**Conflict of Interest:**

None

**Author Contributions:**

Intellectual content and design: KN, NA, RG, SM  
Conception, analysis interpretation and drafting of manuscript: KN, NA, RG, SM and MKA

Technical and logistic support: KN, NA, RG, SM

Conception, design and provision of patient: KN, NA, RG, SM

Critical revision and final approval of article: KN, NA, RG, SM and MKA

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