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Management of Midline Deviation with Unilateral Extraction and Mesialization with Delta Loop - A Case Report

Dr. Teena Purohit[1], Dr. Gaurav Sharma[2], Dr. Vatsal Singhvi[3], Dr. Garima Mewara[4], Dr. Sona Budaniya[5]

Department of Orthodontics and Dentofacial Orthopaedics, Vyas Dental College, RUHS, Jodhpur, India.

Corresponding Author: Garima Mewara

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ABSTRACT

Midline deviation in younger ones is one of the unaesthetic orthodontic problems which does not go away on its own and needs orthodontist's attention, often resulting from factors such as premature loss of primary teeth and insufficient arch length. Various treatment strategies, including midline elastics, unilateral extractions, and dental expansion, are employed to correct these deviations. This article presents a case of 22-year-old female with dental midline shift in upper arch towards the left side. Both upper and lower arches were moderately crowded on the same side with palatally blocked out upper left lateral incisor. Lower left canines were positioned lingually, with the presence of an over-retained primary canine (73). The treatment plan followed was unilateral premolar extraction on the left side in both the arches and to mesialize the posterior segment so as to not make the shift worse. The closure of the space was achieved through the use of delta loop mechanics, which allowed for regulated tooth movement and effective anchorage control.

Keywords: Midline deviation, unilateral extractions, unilateral mesialization, delta loop, palatally placed incisor, crowded arches.

INTRODUCTION

Midline deviations are a common and challenging issue frequently encountered by orthodontists; these deviations can occur in various types of malocclusions and often result in an unaesthetic facial appearance. Typically, the dental arch becomes crowded on the side toward which the midline has shifted such cases are particularly difficult to treat because a straight facial profile may not support the decision to extract teeth yet crowding cannot be effectively resolved without extractions. Dental asymmetries often necessitate unilateral extractions which tend to cause the upper midline to shift toward the extraction side [1,2].

The primary goal of orthodontic treatment is to achieve optimal alignment of the teeth with the facial structures to ensure balance harmony and aesthetic appeal while preserving all dental units is ideal especially for maintaining facial symmetry. Several studies have shown that extractions may be necessary to achieve stable and effective correction of certain malocclusion [3].

CASE REPORT

A 22-year-old female visited the department with concerns about misaligned teeth in

both her upper and lower jaws. On extraoral examination she exhibited a straight facial profile, a typical nasolabial angle, a deep mentolabial sulcus and lips that closed naturally without strain. Intraoral assessment revealed a bilateral class I molar relationship while the canine relationship could not be determined. On either side, the patient had a normal overjet and an overbite of 3 mm, there was irregular alignment of the anterior teeth in both upper and lower arches. Tooth 22 was palatally placed and teeth 33 and 43 were located lingually, crossbite was present involving teeth 22 and 32 and a retained primary tooth 73 was found between teeth 32 and 34. (Figure 1)

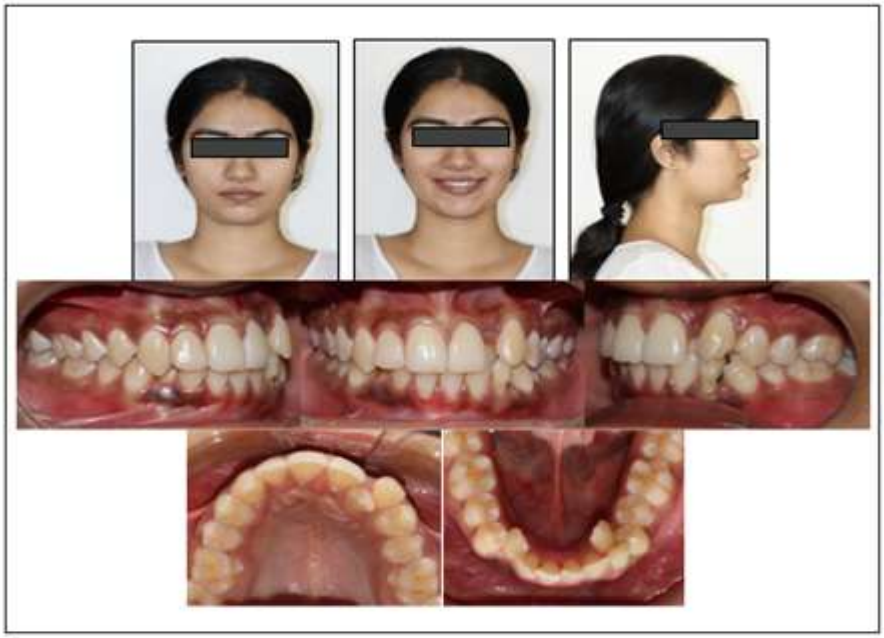


FIGURE 1: EXTRAORAL AND INTRAORAL PRE-TREATMENT PHOTOGRAPHS

The lateral skull radiograph revealed correct anatomical positioning of the upper and lower jaws relation to sella-nasio(s-n) plane individual exhibited a facial growth type that varied from average to slightly decreased in vertical dimension. (Figure 2)
The OPG radiograph shows that the third molars (18, 28, 38, 48) are impacted [4].

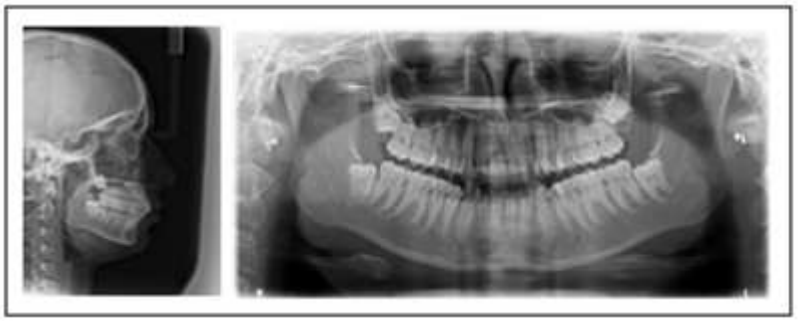


FIGURE 2: PRE-TREATMENT RADIOGRAPH

PROBLEM LIST

- Crowding with upper and lower anteriors
- Palatally placed 22
- Lingually placed with 33 and 43
- Cross bite with 22 and 32
- Deviated midline
- Deep mentolabial sulcus

TREATMENT OBJECTIVES [4]

- Establishment of proper leveling and alignment of upper and lower arches.

- Correction of upper and lower anterior crowding
- Correction of cross bite.
- Establishment of proper axial inclination
- Establishment of proper occlusion

TREATMENT PLAN

Pre- adjusted edgewise MBT prescription with 0.022″slot.

TREATMENT PROGRESS

Treatment initiated with extraction of over retained deciduous teeth along with first premolar of left upper and lower side. Initial levelling and alignment started in sequence 0.012 niti till 0.018 niti then 0018 AJ wilcock (AJW) wire placed along with open coil spring to create enough space for palatally placed 22 in a month, enough space was created to align the incisor in the arch. Lower bonding and alignment started with the same wire sequence for 6 months followed by the use of rectangular wires 19x25 stainless steel, some extraction space in both the arches were used to align the anterior teeth, remaining space was closed by mesialization of the posterior teeth on left side.

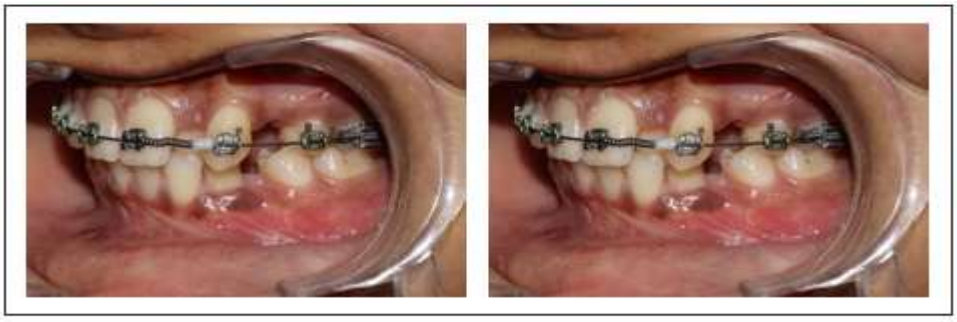


FIGURE 3: OPEN COIL SPRING

FIGURE 4: INTRAORAL TREATMENT PROGRESS

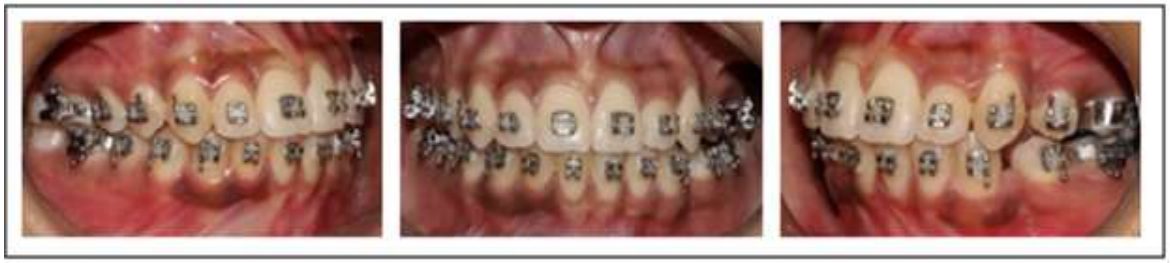
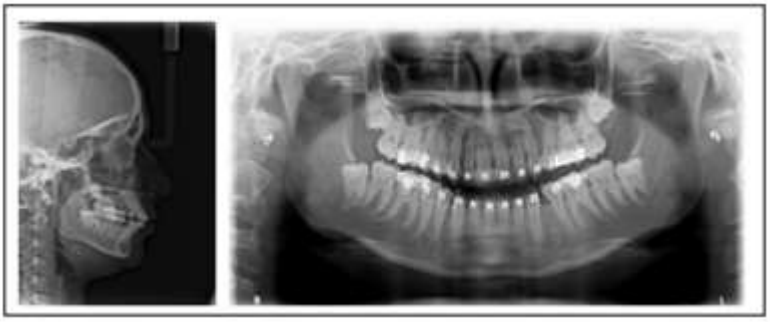


FIGURE 5: INTRAORAL RADIOGRAPHS (IN TREATMENT PROGRESS)



Fabrication of Delta loop was done using 17x25″ Beta titanium wire. This loop exhibited no reactive forces in the vertical direction, indicating good geometric stability along the line of activation [5]. The right side in both the arches were consolidated to act as an anchorage unit. It took 3 months to close the space completely. Vertical settling elastics were given for next 8 weeks to achieve good functional occlusion.

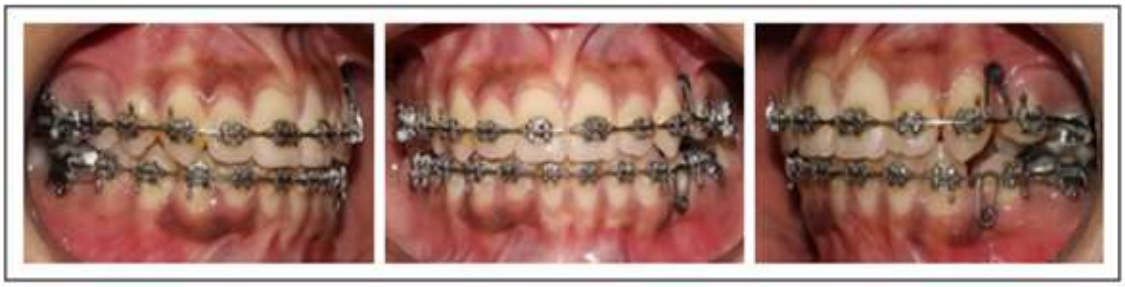


FIGURE 6: DELTA LOOP INTRAORAL PHOTOGRAPHS

RESULT

Maintaining proper alignment, along with preserving the average overjet and overbite and retaining the Class I molar relationship bilaterally, contributed to the successful achievement of the treatment objectives. Class I canine relationships were now noticeable on both sides. Both arches had appropriate alignment and occlusion, as well as full space closure.

FIGURE 7: EXTRAORAL AND INTRAORAL POST-TREATMENT PHOTOGRAPHS

The post treatment cephalometric evaluation showed that there were positive changes in following angles: SNA and SNB were increased by 1° each, UI-SN improved by 5° and IMPA reduced by 10 °, mentolabial sulcus angle improved by 13°. All variations are within normal range.

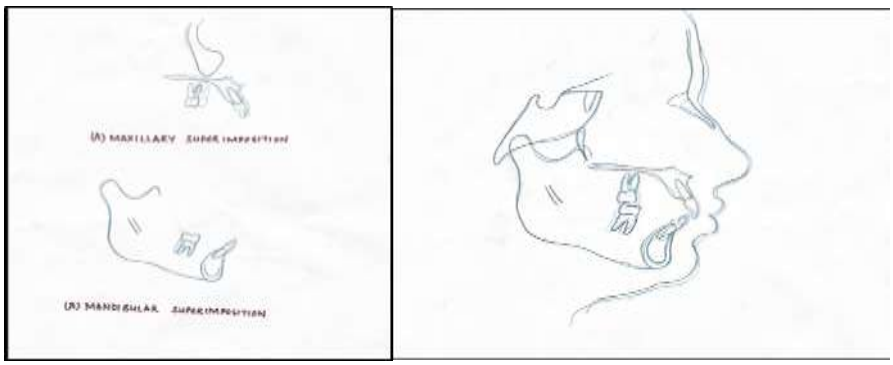


FIGURE 8: SUPERIMPOSITION OF PRE AND POST LATERAL CEPHALOGRAMS

DISCUSSION

Addressing dental asymmetries can be challenging, often resulting from inaccurate diagnosis and a improperly designed treatment approach [4,6].

Midline deviation is a common concern in orthodontics, marked by the misalignment of the dental midlines in the upper and lower arches with the facial midline, leading to both aesthetic and functional challenges. Achieving ideal correction requires thorough assessment of the patient's three midlines: facial, upper dental, and lower dental [7]. In cases of midline deviation, the extraction of a single premolar is occasionally suggested as a remedy, especially when the discrepancy is uneven and affects one side of the dental arch. Unilateral extraction treatments have been shown, however, to treat asymmetric occlusions successfully without the introduction of a cant in the occlusal plane [8]. A key benefit of unilateral extraction is that it allows treatment mechanics to progress more symmetrically, minimizing potential side effects [8,9,10]. The choice to remove a unilateral premolar in these situations involves a complicated combination of factors, such as the extent of the midline shift, the cause of the deviation, and the patient's overall orthodontic objectives.

The asymmetric extractions facilitated the correction of midline deviation and addressed anterior crowding, promoting unilateral movement of the posterior teeth without the need for intermaxillary elastics, achieving occlusal stability and producing a favorable outcome for the patient's profile [1,4]. Additional advantages consist of preserving current molar alignments, shorter treatment duration, and improved simplicity in midline adjustment without tilting of the occlusal plane [2].

Benefits of Extracting unilateral Premolar for Midline Deviation:

- Enhancement of Symmetry
- Conservation of Tooth Structure
- Consideration of Functionality
- More Conservative Approach to Treatment

The treatment began with the extraction of the over-retained deciduous teeth and first premolars on the left side to create space. Sequential leveling and alignment using NiTi wires (0.012" to 0.018") was performed to begin aligning the anterior segment. Subsequently, an open coil spring was used to address the palatally placed 22, allowing enough space to reposition this tooth into the arch. As the upper arch progressed, similar steps were followed in the lower arch, with initial alignment using smaller wires and gradual transition to rectangular wires (19x25 SS) for better control.

In modern orthodontics, effective and regulated space closure is crucial for achieving optimal treatment outcomes, particularly in cases involving extractions. Loop mechanics offer a dependable and biologically advantageous method for space closure. The delta loop, known for its triangular "Δ"-shaped design, is typically constructed from rectangular stainless-steel wires such as 0.016" × 0.022" or 0.017" × 0.025", making it compatible with most pre-adjusted edgewise appliances. In this case, the delta loop was fabricated using 0.017" × 0.025" beta titanium (TMA) wire, it prevented undesired tooth movement by securing the posterior segments and allowing regulated movement of the posterior teeth. The posterior segments were consolidated to function as efficient anchorage units throughout the three months needed to finish space closure. This technique ensured proper alignment of the anterior segment while maintaining a stable bilateral Class I molar relationship.

CONCLUSION

Unilateral extractions can result in favorable aesthetic outcomes while ensuring a stable occlusion that positively affects the dentomaxillary system. It must be carried out with caution to avoid midline shifts and the onset of arch asymmetry during asymmetric or unilateral extraction

procedures. A narrower and more posteriorly displaced arch form on the extraction side, along with a deviated maxillary midline toward the extraction side of the arch, are the usual outcomes of unilateral maxillary extraction treatment [5]. In this case, a perfect Class I occlusion was achieved, improving the aesthetic appeal of the smile while maintaining the patient's attractive and visually appealing profile. [2]. This case underscores the importance of individualized treatment planning, where both functional and aesthetic considerations are taken into account. The decision to incorporate unilateral extractions was key in achieving a balanced and stable result, ensuring that the treatment was not only effective in terms of alignment but also maintained the patient's facial symmetry.

Declaration by Authors

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REFERENCES

1. Lewis PD. The deviated midline. American Journal of Orthodontics. 1976 Dec 1;70(6):601-16.
2. Dahiya G, Masoud AI, Viana G, Obrez A, Kusnoto B, Evans CA. Effects of unilateral premolar extraction treatment on the dental arch forms of Class II subdivision malocclusions. American Journal of Orthodontics and Dentofacial Orthopedics. 2017 Aug 1;152(2):232-41.
3. Adiwirya MS, Purwanegara MK. Orthodontic management of maxillary Canine-first premolar transposition by unilateral extraction. J Dentistry Indonesia. 2019;26(1):44-50.
4. Ciavarella D, Maci M, Guida L, Cazzolla AP, Muzio EL, Tepedino M. Correction of midline deviation and unilateral crossbite treated with fixed appliance. Case Reports in Dentistry. 2023;2023(1):5620345.
5. Rodrigues FR, Borges PC, Luersen MA, Ferreira MD. Three-dimensional analysis of an orthodontic delta spring. Revista Brasileira de Engenharia Biomédica. 2014; 30:248-56.
6. Shroff B, Siegel SM. Treatment of patients with asymmetries using asymmetric mechanics. Seminars in Orthodontics 1998 Sep 1 (Vol. 4, No. 3, pp. 165-179). WB Saunders.
7. Jerrold L, Lowenstein LJ. The midline: diagnosis and treatment. American Journal of Orthodontics and Dentofacial Orthopedics. 1990 Jun 1;97(6):453-62.
8. Struhs TW. Effects of unilateral extraction treatment on arch symmetry and occlusion.
9. Lindauer SJ. Asymmetries: diagnosis and treatment. Seminars in Orthodontics 1998 Sep 1 (Vol. 4, No. 3, pp. 133-133).
10. Burstone CJ. Diagnosis and treatment planning of patients with asymmetries. Semin Orthod. 1998 Sep;4(3):153-64. doi: 10.1016/s1073-8746(98)80017-0.

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