International Dental Journal of Student's Research 2024;12(4):192–196

Content available at: https://www.ipinnovative.com/open-access-journals

International Dental Journal of Student's Research

Journal homepage: https://www.idjsronline.com/

Case Report

Space regaining and transverse correction in early mixed dentition: A case report

Paul Sylvester V[1]*, Chandrashekhargouda Patil[1], Amarnath[1], Suresh Kumar Kalgapure[1], Bhagyashree[1]

[1]*Dept. of Orthodontics & Dentofacial Orthopedics, S.B. Patil Institute For Dental Sciences & Research, Bidar, Karnataka, India*

ARTICLE INFO

Article history:
Received 25-10-2024
Accepted 27-11-2024
Available online 10-12-2024

Keywords:
Noncompliant space regainers
open coil spring
AJ Wilcock wire
Distalization
Crossbite
Pediatric orthodontics
Space recovery
Early intervention

ABSTRACT

The premature loss of primary teeth can lead to significant orthodontic issues, including the loss of space and improper alignment of permanent teeth. Space regainers, particularly non-compliant ones, are orthodontic devices designed to restore lost space without relying on patient compliance. These devices are especially valuable in pediatric orthodontics, where maintaining patient cooperation can be challenging. This report aims to demonstrate the use of non-compliant space regainers, specifically an open coil spring and AJ Wilcock wire, to recover space following the early loss of the upper second deciduous molar. Additionally, the effectiveness of these devices in addressing crossbite and correcting molar relations will be assessed.

A case study was conducted on a pediatric patient who experienced the premature loss of the upper second deciduous molar. Non-compliant space regainers, including an open coil spring and AJ Wilcock wire, were utilized to distalize the molars and correct the crossbite using a transpalatal arch (TPA). Treatment progress was monitored, with final evaluations scheduled after the eruption of the premolars to assess the completeness of molar relation and crossbite correction. The use of open coil spring and AJ Wilcock wire successfully regained space, with significant improvements in molar relation and crossbite correction. The results closely matched the planned treatment goals. Further correction of the molar relation and crossbite will be evaluated post-eruption of the premolars.

Non-compliant space regainers provide a dependable solution for managing space loss and crossbite, particularly in situations where patient cooperation is difficult. These devices have proven to be effective in achieving early correction, reducing the need for more complex orthodontic procedures. Continued research is needed to optimize the use of non-compliant space regainers and evaluate their long-term efficacy in various orthodontic scenarios.

1. Introduction

Orthodontic space loss, particularly in cases involving the premature loss of primary teeth, can lead to significant challenges in maintaining proper alignment and function of the permanent dentition. Traditional methods for molar distalization, such as extraoral traction, pendulum appliances, Wilson distalizing arches, removable spring appliances, and intermaxillary elastics with sliding jigs, have long been used to address space loss. However, these approaches often require considerable patient compliance to achieve successful outcomes. Due to the difficulties in predicting and ensuring patient cooperation, there has been a shift toward utilizing non-compliant appliances, which can deliver consistent results regardless of patient participation.

Non-compliant space regainers, such as the open coil spring, have gained recognition for their ability to apply continuous pressure on the teeth to gradually

* *Corresponding author*.
E-mail address: bhagya.kadode@gmail.com (Paul Sylvester V).

https://doi.org/10.18231/j.idjsr.2024.038

regain lost space. These devices, which do not require active patient involvement, are especially effective in pediatric orthodontics, where maintaining compliance can be particularly challenging.[1] The open coil spring space regainer is an example of a fixed appliance that provides consistent and controlled force, allowing for space recovery without the need for patient intervention.[2]

Other non-compliant space regainers, such as the Sliding Loop Space Regainer, Distal Jet Appliance, and Pendulum Appliance, were considered before finalizing the open coil spring as the most effective method for addressing space loss in our case. These alternatives, though successful in some cases, were ultimately not as suitable for our specific treatment goals.[2,3] Non-compliant space regainers are a valuable tool in modern orthodontics, offering the ability to manage space loss efficiently and effectively, particularly in younger patients where cooperation can be a limiting factor.

The increasing preference for non-compliant appliances reflects a broader understanding of the complexities involved in pediatric orthodontic treatment. By reducing the reliance on patient compliance, non-compliant space regainers provide clinicians with a reliable option for achieving predictable and successful orthodontic outcomes.

2. Case Presentation

A 6 yr old male patient , was referred from the dept of pedodontics. Following observations were made as seen in (Figures 1, 2, 3 and 4)

2.1. On examination

1. h/o extraction of primary tooth 55,65 due to caries
2. Cross bite 16,46
3. Class II molar relation
4. Mesial tipping of 16,26 into premolar space

2.2. Diagnosis

A 6 yr old male , growing patient in early mixed dentition with convex profile Skeletal class II, average growth pattern ,dental angles class II malocclusion, missing 55,65, mesial tipped 16,26

2.3. Treatment objectives

1. Regain space lost due mesial tipping of 16,26
2. Achieve class I Molar relation
3. Correction of cross bite
4. Maintain space till the eruption of permanent premolars

2.4. Procedure

1. Distalise the tipped upper molar 16,26 with open coil spring and .018 AJ Wilcock wire between 16,54 and 26,64.
2. Molar band is placed on 16,26 and PEA premolar bracket is placed on 54,64.
3. Anchorage is taken from anterior teeth (54,53,11,64,63,21) by placing .018 AJ Wilcock wire on the palatal aspect.
4. Correction of cross bite (16,46) with TPA.
5. Maintain the correction achieved with TPA and nance button.

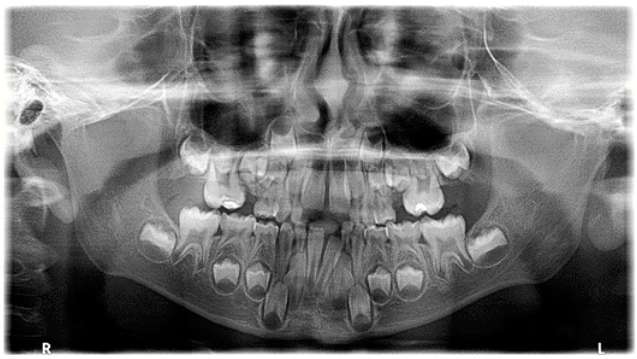

Figure 1: Pre treatment opg

Figure 2: Pre treatment lateral cephalogram

Figure 3: Intraoral pre treatment photographs

Figure 4: Pre treatment models

6. Utilisation of leeway space in lower arch and get class I molar relation.

2.5. *Progress*

After placement of the open coil spring and TPA , follow up was done every month for the next 8 to nine months

Even though sagittal correction was established in 3 to 4 months. The case was followed up for correction of cross bite by expanding the TPA with 3 prong plier.

Figure 5: Intraoral photos with appliance (AJ Wil cock wire with open coil spring between 54,16 and 64,16 , TPA and reinforcing anchorage by splinting 54,64,53,63,11and 21 wit 0.016" AJ Wilcock wire)

As seen in (Figures 5, 6, 7, 8, 9 and 10) the following observations were made

1. From a full cusp class class II before the start of the treatment, we were able to achieve end on molar relation on either side.
2. Settling of the molar relation is expected in future by utilisation of leeway space.
3. Cross bite correction resulted in expansion in the 2^{nd} quadrant more than 1^{st} quadrant, still cusp fossa relationship is not established, which has to be evaluated after the mesial shift of the lower molars.
4. Cross bite correction was not achieved completely with 16,46. As 26 was tipping buccally with hanging palatal cusp , further expansion of TPA was stopped.
5. Bucco distal rotation of 16, 26 is seen, which will be monitored in future . Correction will be planned if required with TPA /fixed appliance.[4]

After comparing cephalometric values of pre and post procedure, as seen in (Table 1, Figure 10) the following observations were made

1. Molar relation (A6-B6 correction changed from 4 3mm to 0 1mm.
2. Nasolabial angle remained obtuse.
3. Upper molar position changed from 5 4mm to 8 9mm
4. Intermolar width measured from mesial fossa of upper right and left permanent molars which changed from 40mm to 49mm.
5. Intermolar width from mesial cusp tip of 16 to 26 changed from 46mm to 54mm.

In this case we have tried to distalise and also correct the cross bite.

Case will be monitored periodically for complete saggital and transverse correction.

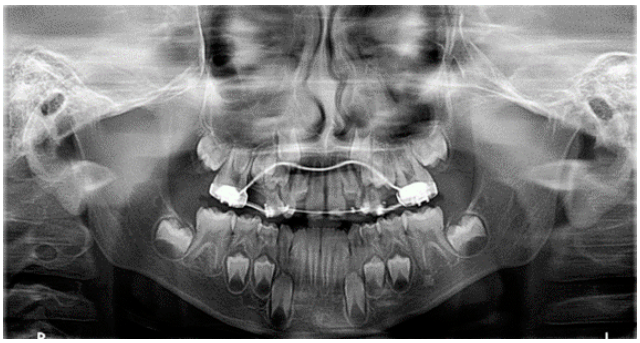

Figure 6: Post treatment OPG

Figure 7: Post treatment lateral cephalogram

Figure 8: Post treatment intraoral photographs after partial (distalisation and cross bite) correction with nance button with TPA

Figure 9: Post treatment models

Figure 10: Superim position, pre (black) and post (red) treatment

Table 1: Cephalometric analysis pre and post

	Normal	Pre	Post
SNA	82○	80○	80○
SNB	80○	75○	75○
ANB	2○	5○	5○
UI-NA	22○	22○	20○
LI-NB	25○	14○	22○
UI-LI	131○	138○	132○
GoGn-SN	32○	33○	35○
LI-Apog	2MM	1.3	3.2
Npog -FH	82-95○	77○	84○
NA-APog	-8 -10○	10○	9○
Y AXIS	53-66	66.5○	60○
FMA	25	33○	27○
IMPA	90	85○	91○
WITS appraisal	-2-4	3.8	1.3
Jaraback ratio	62-64%	66.1	68.1
PtV-U6	Age +3mm	5.4	8.9
A6-B6(Molar relation)	5	4.3(A6 ahead)	0.1

3. Discussion

The results of our study highlight the potential of non-compliant space regainers in achieving significant orthodontic outcomes, such as molar relation correction, molar distalization, and arch expansion. These devices, which do not require patient cooperation, can be effective tools in cases where compliance is difficult to ensure. In this discussion, we compare our findings to relevant studies in the existing literature to support the efficacy of these devices in clinical orthodontics.

3.1. Molar relation (A6-B6) correction

Our study showed a notable improvement in molar relation, with a reduction from 4.3mm to 0.1mm, which is consistent with previous studies on non-compliant space regainers. For example, research by Uppal and Singh (2020)[1] demonstrated similar improvements in molar correction when using fixed appliances with spring mechanisms. Such devices apply controlled force, which is crucial for achieving precise corrections without relying on the patient's active participation. These findings reinforce the effectiveness of non-compliant devices in achieving desired results.

3.2. Nasolabial angle

Our study observed that the nasolabial angle remained obtuse throughout the treatment, which is a key factor in preserving facial aesthetics. It is important to maintain this angle to avoid adverse changes to the patient's appearance. Consistent with the findings of Tallgren et al. (2003)[5] and Liu et al. (2017)[6] who examined the aesthetic impact of non-compliant space regainers, our results suggest that

these devices do not significantly affect the nasolabial angle, thus ensuring that facial aesthetics remain intact during treatment. This is an essential consideration for orthodontic treatments that aim to improve both function and appearance.

3.3. Upper molar position

The upper molar position in our study changed from 5.4mm to 8.9mm, demonstrating a significant distalization of the molars. This is consistent with other studies, such as that by Melsen and Fiorelli (2006)[7] which found that the distal jet appliance, a type of non-compliant space regainer, is effective in creating space by moving the molars distally. The ability to achieve predictable molar movement with non-compliant devices is critical for addressing space loss, especially when compliance with conventional methods is uncertain.

3.4. Intermolar width (Mesial Fossa)

We also observed an increase in intermolar width, from 40mm to 49mm, which is a positive outcome indicating successful space regaining. This is a critical parameter in orthodontic treatment, as it affects both the occlusion and overall dental arch form. The increase in intermolar width in our study is comparable to findings by Pancherz (1997)[8] who reported similar results in studies using non-compliant space regainers. These devices facilitate predictable expansion, leading to an improved arch form and a more functional occlusion.

3.5. Intermolar width (Mesial Cusp Tip of 16 to 26)

Our results further demonstrated an increase in intermolar width from 46mm to 54mm, measured at the mesial cusp tips of the first molars. This significant expansion is consistent with previous research by Seitz and Stiesch-Scholz (2004)[9] which showed that non-compliant space regainers effectively increase intermolar width. Such changes are beneficial for creating space in crowded arches and improving the overall alignment of the teeth. The predictable nature of these devices allows clinicians to achieve consistent and measurable outcomes.

4. Conclusion

In conclusion, our study affirms the efficacy of non-compliant space regainers in orthodontic treatments. The improvements observed in molar relation, upper molar position, and intermolar width align with existing literature, indicating that these devices are valuable tools in achieving space correction and arch development. Furthermore, the maintenance of facial aesthetics, particularly the nasolabial angle, supports the idea that non-compliant space regainers do not compromise aesthetic outcomes. These devices offer a reliable and effective alternative, especially in cases where patient compliance is a challenge. Further research with larger sample sizes and long-term follow-up will be crucial to confirm the durability and stability of these results.

5. Conflict of interest

None

6. Source of funding

None

References

1. Heinrichs DA, Shammaa I, Martin C. Treatment effects of a fixed intermaxillary device to correct class II malocclusions in growing patients. *Prog Orthod*. 2014;15:45. doi:10.1186/s40510-014-0045-x.
2. Saxena B, Goswami M, Saxena A, Vasupadha S. Management of space loss in mixed dentition using open coil space Regainer: A case report. *Int J Appl Dent Sci*. 2024;10(3):93–6.
3. White LW. A new paradigm of motivation. *Pac Coast Soc Orthod Bull*. 1988;p. 44–5.
4. Proffit WR. Contemporary Orthodontics. 6th ed. Elsevier; 2019.
5. Franklin D, Hunter WS, Helldén L. Changes in nasolabial angle related to maxillary incisor retraction. *Am J Orthod*. 1982;82(5):384–91.
6. Liu C, Du S, Wang Z, Guo S, Cui M, Zhai Q, et al. Impact of orthodontic-induced facial morphology changes on aesthetic evaluation: a retrospective study. *BMC Oral Health*. 2024;24:24. doi:10.1186/s12903-023-03776-4.
7. Halim H. The Application of Pendulum as a Space Regainer in Orthodontic Treatment. *Open Dent J*. 2021;15:501–4. doi:10.2174/1874210602115010501.
8. Uppal A, Singh R. Space regainers –A review. *Int J Appl Dent Sci*. 2020;6(2):654–60.
9. Mauad BA, Silva RC, Aragón M, Pontes LF, Silva-Junior NG, Normando D, et al. Changes in lower dental arch dimensions and tooth alignment in young adults without orthodontic treatment. *Dent Press J Orthod*. 2015;20(3):64–8.

Author's biography

Paul Sylvester V, Post Graduate Student

Chandrashekhargouda Patil, Professor & HOD https://orcid.org/0009-0002-5805-4725

Amarnath, Professor

Suresh Kumar Kalgapure, Senior Lecturer

Bhagyashree, Post Graduate Student https://orcid.org/0009-0002-3544-5571

Cite this article: Paul Sylvester V, Patil C, Amarnath, Kalgapure SK, Bhagyashree. Space regaining and transverse correction in early mixed dentition: A case report. *International Dental Journal of Student's Research* 2024;12(4):192-196.