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

IP Indian Journal of Orthodontics and Dentofacial Research

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

Case Report

Segmented arch technique for the correction of crowding in Angle s Class I malocclusion – A case report

Greeshma P P[1,*], Muhamed Shaloob KM[1], Mohamed Nayaz VP[1], Muhamed Raheesh[1], Junaid Ali[1]

[1] *Dept. of Orthodontics, Merchant logo MES Dental College, Perintalmanna, Kerala, India*

ARTICLE INFO

Article history:
Received 11-03-2022
Accepted 22-04-2022
Available online 30-05-2022

Keywords:
Segmented arch technique
Tloop
Crowding

ABSTRACT

A 13year old male patient presented with buccally erupted maxillary and mandibular canines, upper and lower anterior proclination, and Class I molar relationship. First premolar extraction with maximum anchorage protocol was planned to correct the crowding. Segmental arch mechanics with T-loop (0.017 × 0.025" TMA) were used to correct the buccally erupted canines. At the end of treatment patient's soft tissue profile and smile improved significantly. Crowding and proclination of maxillary and mandibular arch were corrected and class I molar relationship was maintained.

1. Introduction

Segmented arch mechanics provide a better-controlled tooth movement than archwire-guided tooth movement. Segmented arch technique was first proposed by Burstone in 1962.[1] In SAM the dental arch is divided into three segments, one anterior (incisors and canines) and two posteriors (teeth posterior to extraction site) segments. In cases that need maximum anchorage preparation canine teeth are retracted first into the extraction space and then retraction and alignment of incisors are performed. Loop mechanics or non-friction techniques are used for retraction. By varying the angulations of power arms and position of T-loops movements of both anterior and posterior segments can be controlled. A combination of segmented arch mechanism and power arms would produce high M/F without generating friction and vertical forces, thereby allowing efficient and controlled tooth movement.[2–4]

2. Case Report

A 13year old male patient presented in the Department of Orthodontics with the chief complaint of irregularly placed upper and lower front teeth and associated problems of speech, chewing and esthetics. His medical and dental history was not significant.

On Extraoral examination, he had mesocephalic head form, mesoprosopic facial form, incompetent lips, apparently symmetrical and orthognathic face, convex profile, acute nasolabial angle. Incisor exposure at rest was 5mm and on smiling full crown with 2mm gingival exposure was there. On Intraoral examination, the patient had Angle's Class I malocclusion, crossbite in relation to 24, buccally erupted 13,23,33,34,43. Overjet was 7mm and overbite was 4mm. The lower dental midline was shifted to left by 2mm from the facial midline.

Carey's and arch perimeter analysis showed 9 mm of crowding in the mandibular arch and 10 mm of tooth material excess in the maxillary arch. Cephalometric analysis indicated a Class II skeletal pattern (ANB 6º) with prognathic maxilla (SNA 86º) and normal mandible (SNB

* *Corresponding author.*
E-mail address: greeshmavik@gmail.com (Greeshma P P).

https://doi.org/10.18231/j.ijodr.2022.020

80º), normal growth pattern (Jarabak ratio 65), proclined upper and lower anterior teeth (UI-NA angle 40º, UI-NA linear 9mm, LI-NB angle 40º, LI-NB linear 11mm).

2.1. Treatment objectives

Treatment objectives included:

1. Improved facial profile
2. Creating space for correction of crowding through extraction
3. Correct maxillary and mandibular anterior crowding
4. Correct proclination of upper and lower anteriors
5. Alignment of arches
6. Correcting the lower dental midline to coincide with facial midline.

2.2. Treatment plan

Since the patient had only mild skeletal discrepancy, Orthodontic management of the malocclusion was decided. The treatment plan involved extraction of upper and lower first premolars with maximum anchorage protocol. To reinforce anchorage TPA was planned in the upper arch and a lingual arch was planned in the lower arch. Retraction was planned using sectional T loop mechanics and finishing of occlusion with intermaxillary elastics.

2.3. Treatment progress

This case was treated using Hybrid Segmental Mechanics with the extraction of all four first premolars with segmental retraction of canines using T -loop retraction spring leveling and alignment using continuous arch sliding mechanics. Pre-adjusted edgewise appliance 0.022” x 0.028” slot MBT prescription (Ormco mini 2000 brackets) was used. TPA and lingual arch were used for the anchorage reinforcement. Initially, posterior teeth were aligned. After alignment and leveling of anchor teeth, sectional 0.019 × 0.025" stainless steel archwires placed in posterior segments and segmented 0.017 × 0.025" titanium molybdenum alloy (TMA) T-loop were used between the bracket of ectopic canine and accessory molar tube. At subsequent appointments, the T-loop was activated by 3 mm. The distal arm was pulled and cinched distal to the first molar to activate it. The canines started moving distally, and complete retraction of individual canines was achieved in a period of 6 months.

After individual canine retraction, alignment, and levelling in both dentitions was accomplished with the following archwire sequence:

1. 016" nickel titanium archwires
2. 0.016 × 0.022" nickel titanium archwires
3. 0.017 × 0.025" stainless steel archwires
4. 0.019 × 0.025" stainless steel archwires

Fig. 1: Pre-treatment photographs

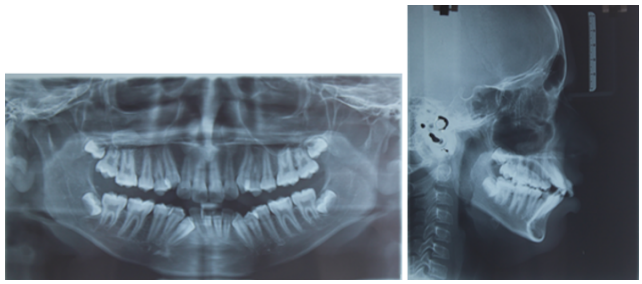

Fig. 2: Pre-treatment radiographs

Fig. 3: Treatment progress

Fig. 4: Post treatment photographs

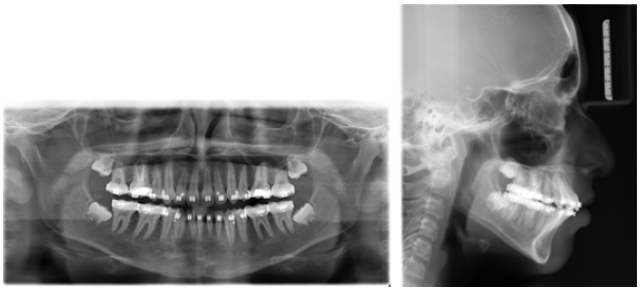

Fig. 5: Post treatment radiographs

Table 1: Comparisonbetween pre-treatment and post-treatment cephalometric values

Variable	Pre-Treatment Values	Post-Treatment Values
Sagittal Skeletal Relationships		
SNA (°)	83	83
SNB (°)	80	80
ANB (°)	3	3
Wits Appraisal (mm)	4	3
Vertical Skeletal Relationship		
Maxillary-Mandibular Plane Angle(°)	28	28
Upper Anterior Facial Height(mm)	58	58
Lower Anterior Facial Height(mm)	65	66
Jarabak Ratio	65	65
Maxillary Length(mm)	96	96
Mandibular Length(mm)	117	117
Dental Base Relationship		
Upper Incisor to NA(mm)	10	5
Lower Incisor to NB(mm)	11	7
Upper Incisor to SN Plane(°)	124	115
Upper Incisor to Maxillary plane(°)	50	57
Lower Incisor to Mandibular plane(°)	100	96

2.4. Treatment results

Overall a satisfactory occlusion and facial esthetics was achieved. The patient's soft tissue profile was improved. Maxillary and mandibular arch crowding and proclination were corrected which results in significant improvement in patient's smile. Class I molar relation is maintained throughout the treatment with good buccal occlusion. Overjet and overbite were reduced to 3mm and 2 mm respectively. Upper and lower dental midlines were coinciding with facial midline. The inclination of the upper incisors to the NA plane had decreased from 40 to 28 degrees, whereas the inclination of the lower incisors to the NB plane had decreased from 40 to 29 degrees. In both the upper and lower arches, the panoramic radiographs revealed acceptable root parallelism.

3. Discussion

T–loop is an effective means to achieve desired tooth movement by differential moments between anterior and posterior segments. TMA, which was introduced by Burstone and Goldburg in 1980, showed a low load-deflection ratio compared to stainless steel. The T-loop works by creating differential moment between the front and posterior portions. Desired tooth movements can be achieved by changing the angulations of alpha and beta bends, by changing the T-loop position, or by altering the T-loop dimension. These mechanics produce no friction which helps with anchorage control during extraction space closure. T-loop when used as a retraction spring it offered distal traction force on the canines, a moment for anti-distal tipping as well as torque control of the canine.

4. Conclusion

Segmented arch mechanics with T-loop is very useful in correcting the severe crowding that needs maximum anchorage. T-loop offers differential moments in the anterior and posterior segments which precisely control the tooth movements.

5. Conflict of Interest

The authors declare no relevant conflicts of interest.

6. Source of Funding

None.

References

1. Burstone CJ. The rationale of the segmented arch. *Am J Orthod*. 1962;48:805–22. doi:10.1016/0002-9416(62)90001-5.
2. Choy K, Pae EK, Kim KH. Controlled space closure with a statically determinate retraction system. *Angle Orthod*. 2002;72(3):191–8.
3. El-Bialy T. Segmented and sectional orthodontic technique: review and case report. *J Health Spec*. 2013;1(2):90–6.
4. Park YC, Choy K, Lee JS. Lever-arm mechanics in lingual orthodontics. *J Clin Orthod*. 2000;34(10):601–5.

Author biography

Greeshma P P, Post Graduate Student

Muhamed Shaloob KM, Professor

Mohamed Nayaz VP, Senior Lecturer

Muhamed Raheesh, Senior Resident

Junaid Ali, Former Post Graduate Student

Cite this article: Greeshma P P, Muhamed Shaloob KM, Mohamed Nayaz VP, Raheesh M, Ali J. Segmented arch technique for the correction of crowding in Angle s Class I malocclusion – A case report. *IP Indian J Orthod Dentofacial Res* 2022;8(2):117-120.