Crowding, Protrusion and Scissors Bite: Extractions and Extra-Alveolar Bone Screws

Summary

A 16 year female presented with marked functional and esthetic deficits secondary to crowded, asymmetric malocclusion with bimaxillary protrusion and incomplete, bilateral posterior buccal cross-bite (scissors bite). The Discrepancy Index (DI) was 29 for this severe malocclusion. All four first premolars were extracted to resolve crowding and lip protrusion. The buccal crossbites were corrected with trans-arch elastics anchored by extra-alveolar (E-A) OrthoBoneScrews (OBSs) placed in the mandibular buccal shelves, bilaterally. Alignment was achieved with a passive self-ligating appliance and bite turbos. This severe malocclusion was corrected with only 21 months of active treatment. Outcomes for the pleasing result were a Cast-Radiograph Evaluation of 24, and a pink & white dental esthetics score of 4. Follow-up records one year after treatment documented the stability of the result. (Int J Orthod Implantol;39:54-70)

Key words:
Self-ligating fixed appliance, bilateral buccal crossbite, bite turbos, bone screw anchorage, mandibular buccal shelf.

History and Etiology

A 16-year-3-month girl presented with concern about decreased masticatory function due to lingual tipping of her posterior teeth, lip protrusion, and a small maxillary midline diastema with a black triangle (*Figs. 1-3*). The facial profile (*convexity*) was good, but there was a bimaxillary protrusion with a particularly prominent lower lip. Neither the medical nor dental histories were contributory. Moreover, there was no evidence of contributing oral habits or temporomandibular dysfunction. The patient was treated to an acceptable result, as shown in Figs. 4-9. The diagnosis, treatment and outcomes for this challenging malocclusion are discussed in detail.

Diagnosis

Skeletal:

- Class I (*SNA 90 °, SNB 88 °, ANB 2°*)
- Low mandibular plane angle (*SN-MP 30°, FMA 23°*)
- Condylar heads symmetric in length and position (*Fig. 10*)

Dental:

- Mandibular dental midline was 2mm to the left of the facial and maxillary midlines.
- Small maxillary midline diastema with a black triangle
- Bilateral Class I canine and molar relationships

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Fig. 1: Pre-treatment facial photographs

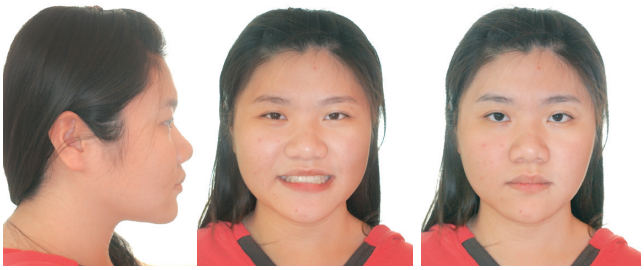


Fig. 4: Post-treatment facial photographs

Fig. 2:
Pre-treatment intraoral photographs revealed severe crowding and buccal crossbite

Fig. 5:
Post-treatment intraoral photographs

Fig. 3: Pre-treatment study models (casts)

Fig. 6: Post-treatment study models (casts)

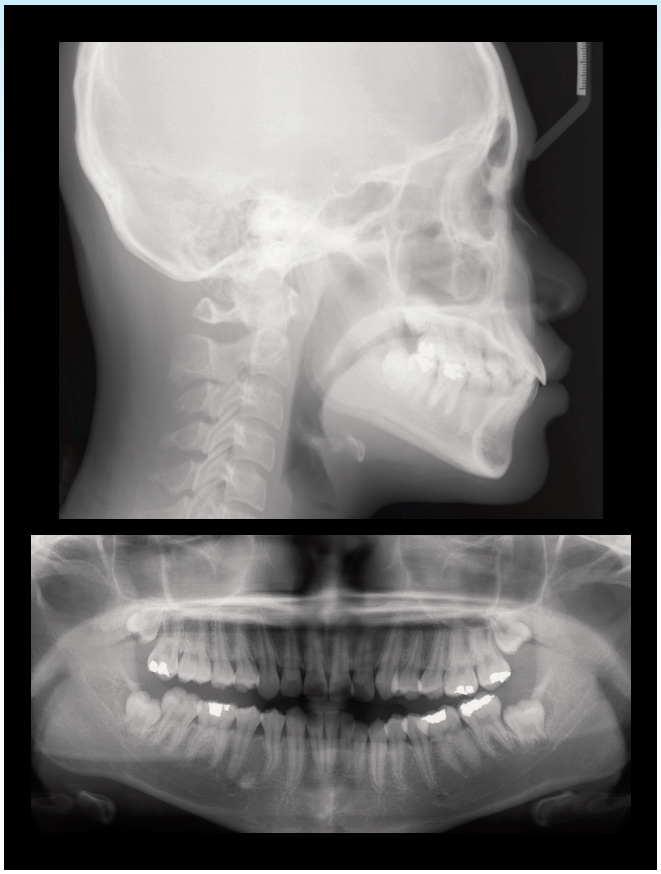


Fig. 7:
Pre-treatment cephalometric and panoramic radiographs show the crowded dentition and four un-erupted 3rd molars.

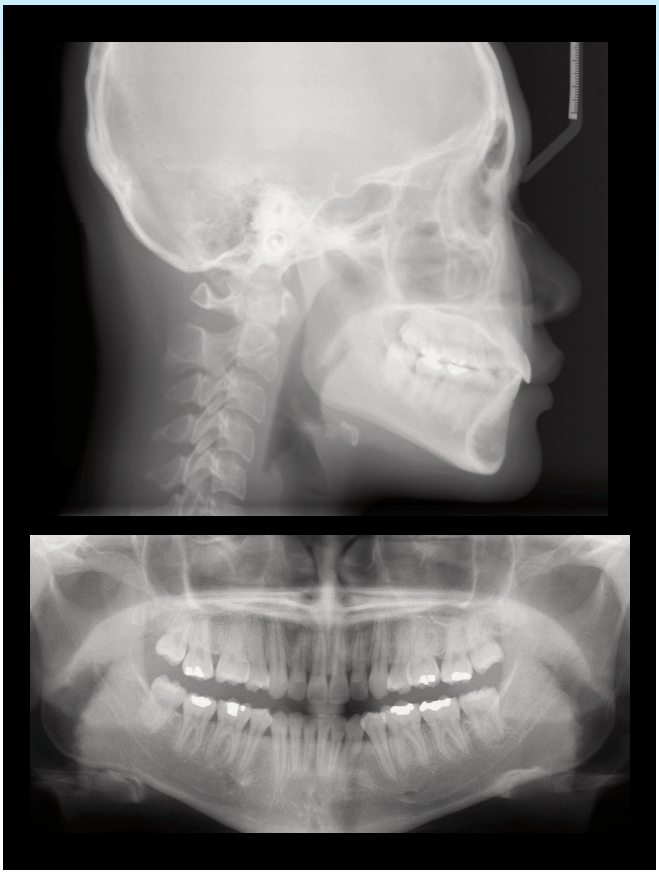


Fig. 8:
Post-treatment cephalometric and panoramic radiographs document the alignment of the dentition and change in facial profile after extracting four premolars and closing space.

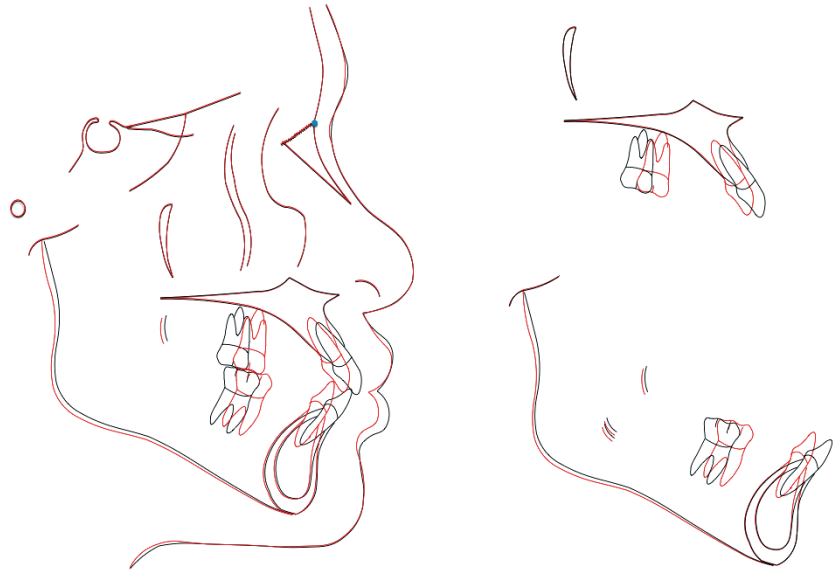


Fig. 9:
Superimposed tracings of pre-treatment (black) and post-treatment (red) cephalometric radiographs show the retraction of the incisors and protraction of the buccal segments in both arches.

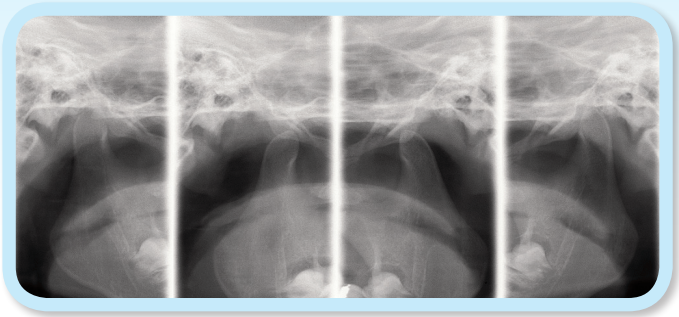


Fig. 10:
The morphological symmetry of the condyle heads is documented for the open (two center views) and closed (two outer views) positions, for the left and right condyles, respectively.

- Lingual crossbite of the maxillary left lateral incisor (#10)
- Buccal crossbite of three molars: *one on the right (#2), and two on the left (#14 &15)*

Facial:

- Lower lip protruded

The American Board of Orthodontics (*ABO*) Discrepancy Index (*DI*) was 29

Specific Objectives of Treatment

1. Resolve maxillary and mandibular crowding.

2. Correct bilateral buccal crossbites.

3. Achieve an ideal overjet and overbite relationship.

Maxilla (*all three planes*):

- A - P: *Maintain*
- Vertical: *Maintain*
- Transverse: *Maintain*

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	90°	90°	0°
SNB°	88°	88°	0°
ANB°	2°	2°	0°
SN-MP°	30°	29°	1°
FMA°	23°	22°	1°
DENTAL ANALYSIS			
U1 TO NA mm	7 mm	5 mm	2 mm
U1 TO SN°	115°	112°	3°
L1 TO NB mm	9 mm	3 mm	6 mm
L1 TO MP°	106°	95°	11°
FACIAL ANALYSIS			
E-LINE UL	-0.5 mm	0 mm	0.5 mm
E-LINE LL	2 mm	-0.5 mm	2.5 mm

Table 1: Cephalometric summary

Mandible (*all three planes*):

- A - P: *Maintain*
- Vertical: *Maintain*
- Transverse: *Maintain*

Maxillary Dentition:

- A - P: *Retract incisors*
- Vertical: *Intrude incisors*
- Inter-molar/Inter-canine Width: *Maintain*

Mandibular Dentition:

- A - P: *Retract incisors and decrease their axial inclination*
- Vertical: *Maintain*
- Inter-molar/Inter-canine Width: *Maintain*

Facial Esthetics:

- Reduce lower lip protrusion

Treatment Plan

1. Extract all four first premolars (#*5, 12, 21, 28*) to resolve crowding (*Fig. 11*) .

2. Reduce bimaxillary protrusion to improve lip profile.

3. Place an extra-alveolar (*E-A*) OrthoBoneScrew® (*Newton's A, Hsinchu City, Taiwan*) in each buccal shelf of the mandible (*Fig. 11*) to serve as anchorage for elastics to correct the lingually tipped molars (#*18, 19 and 31*).

4. Intermaxillary elastics to correct the sagittal discrepancy.

5. Detail occlusion with finishing bends and settling elastics.

6. Retention with clear overlay retainers in both arches.

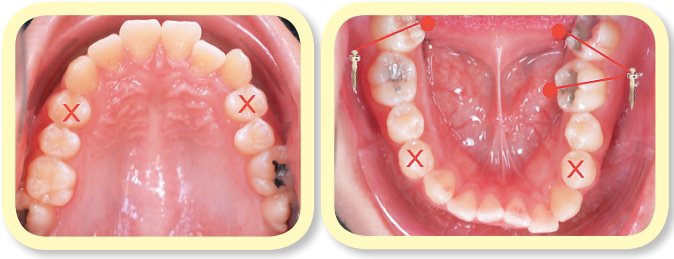


Fig. 11:
The treatment plan was to relieve crowding in both arches by extracting all four first premolars (X). Extra-alveolar bone screws were placed the mandibular buccal shelves, lateral to the molars, to provide anchorage for intrusion and alignment of the lingually tipped mandibular molars (right).

Appliances and Treatment Progress

A .022" slot Damon Q® passive self-ligating (*PSL*) bracket system (*Ormco, Glendora, CA*) was selected. High torque brackets were bonded on the maxillary incisors and the arch was aligned with an .014" CuNiTi archwire (*Fig. 12*). Bite turbos, constructed with Fuji II® glass ionomer cement, were placed on the occlusal surfaces of the lower left lateral incisor and canine (#*22* & #*23*) to facilitate correction of the crossbite of the maxillary left lateral incisor (#*10*). One month later, when the crossbite (#*10*) was corrected (*Fig. 13*), the anterior bite turbos were removed, and occlusal bite turbos were bonded on the lower first molar (#*30*) and the lower left second premolar (#*20*). Standard torque brackets were then bonded on all mandibular teeth, except the second molars, and an .014" CuNiTi archwire was placed. At the same appointment, buttons were bonded on the lingual surfaces of the mandibular left 1st molar (#*19*), and both lower second molars (#*18 & 31*). Cross elastics (*Chipmunk 1/8" 3.5oz*) were applied to correct the posterior crossbites bilaterally.

In the 4thmonth of treatment, an OrthoBoneScrew® (*OBS*) (*2x12mm, Newton's A, Taiwan*) was inserted in each mandibular buccal shelf, lateral to the second molars (*Fig. 14*). Power chains were stretched between the miniscrews and the lingual buttons on the mandibular second molars. The occlusal height of the bite turbos on teeth #20 and 30 were increased to avoid contact between the OBSs and the maxillary dentition. The power chains anchored by the OBSs, began to efficiently up-right the lower second molars in three dimensions (*Fig. 15*).

In the 5th month of treatment, an .014x.025" CuNiTi

Fig. 12:
At the start of treatment (0M) an .022" slot Damon Q® bracket system was bonded on the upper arch and a bite turbo was bonded on the lower left lateral incisor and canine. See text for details.

Fig. 13:
One month into treatment (1M), the crossbite of the maxillary left lateral incisor (#10) was corrected, so the bite turbos on #22 and 23 were removed, and new ones were placed on the occlusal surface of #20 and 30. Standard torque brackets were bonded on the mandibular teeth, except second molars, and a .014" CuNiTi archwire was placed. Buttons were bonded on the lingual surfaces of #18, 19 and 31 for the attachment of crossbite elastics.

Fig. 14:
Fours months into treatment (4M), two Orthobonescrews® (2x12mm, Newton's A, Taiwan) were installed bilaterally in the buccal shelves. Power chains were stretched bilaterally between the bone screws and the lingual buttons on the tipped second molars.

archwire was placed on the upper arch and then changed to .017x.025" TMA in the 7th month. A upper anterior ligature from canine to canine was applied to maintain the alignment and prevent space from opening. In all four quadrants, power chains from the canines to hooks on the ipsilateral first molars were activated to retract the anterior segments until the first premolar spaces were closed.

In the 8th month, all the bite turbos and OBSs were removed and brackets were bonded on the lower second molars. An .016" CuNiTi archwire was placed on the lower arch and changed to an .014x.025" CuNiTi archwire in the 9th month (*Fig. 15*). Power chains were applied between the lower canines to avoid any space forming over the lower anterior segment. In the 9th month (*Fig. 15*), bite turbos were placed on the palatal surfaces of the upper central incisors (#*8 & 9*) to maintain the vertical relationship between the upper and lower incisors. At 10 months, the posterior cross elastics were stopped.

In the 11th month, the upper wire was changed to .016x.025" SS, and the following month the lower wire was changed to .017x.025" TMA. In the 12th month, power chains were reactivated to complete space closure in all four quadrants.

In the 15thmonth, an .016x.025" SS archwire was placed on the lower arch. L-type elastics (*Bear 1/4" 4.5oz*) were applied from the upper canines to the lower second molars, bilaterally. The paths of the elastics were positioned gingival to the bracket on the lower first molars (*Fig. 16*).

Fig. 15:
In the 9th month (9M), bite turbos were bonded on the lingual surfaces of the maxillary central incisors to establish the desired vertical relationship as space was closed in all buccal segments. A power chain was applied between the lower canines to prevent space from opening.

Fig. 16:
In the 17th month of treatment (17M), L-shape elastics (Bear ¼" 4.5 oz) were applied bilaterally (two center views), from the upper canines to lower second molar, by passing the elastics gingival to the lower first molar brackets.

In the 17th month, the L-type Class II elastics were continued. Proximal enameloplasty was performed on the four upper incisors. Torque springs were applied bilaterally on the lateral incisors to decrease their labial root torque (*Fig. 16*).

Bracket repositioning was performed repeatedly throughout the treatment as shown in the sequential panoramic films. Wire bending was performed to detail the occlusion during the final stages of the treatment. The panoramic radiograph in Figure 8 shows apparent axial inclination problems between the lower canines and second molars. Since this discrepancy was not apparent clinically (*Figs. 5-6*), these axial inclination "*problems*" were deemed to be artifacts.[1]

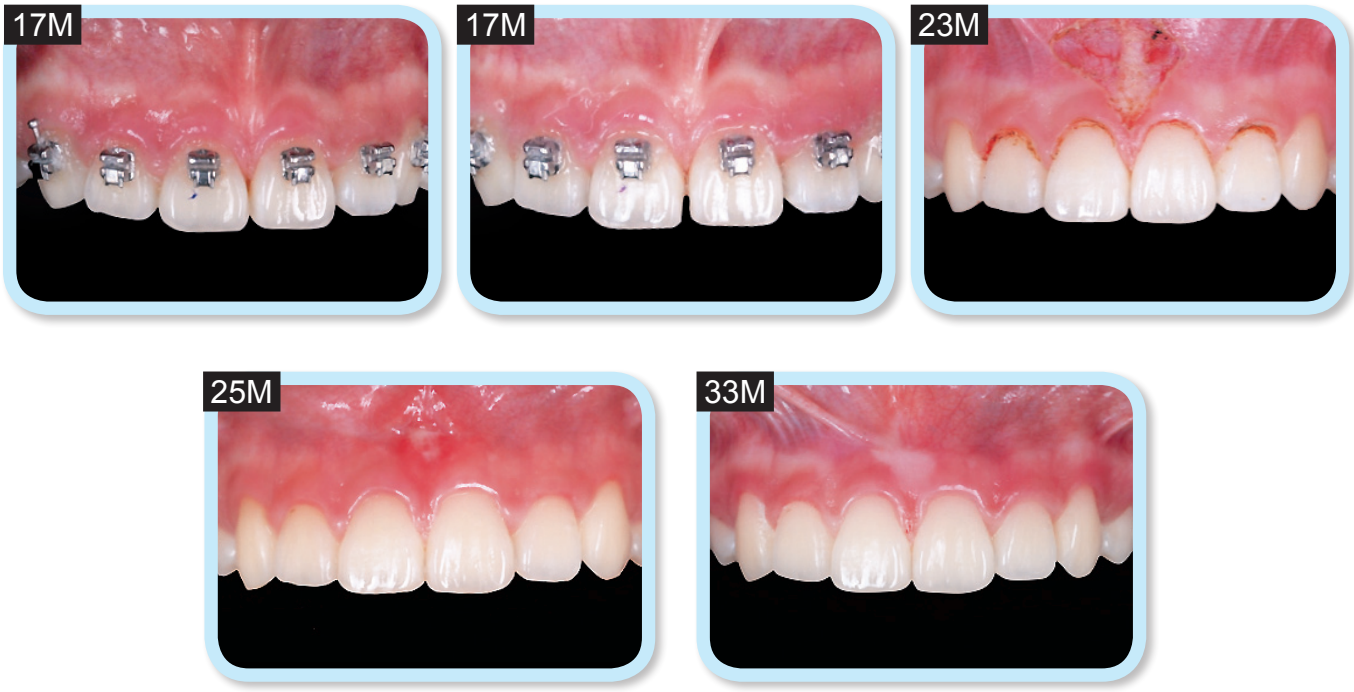
After 21 months of active treatment, the appliances were removed and retainers were delivered for both arches.

In the 23rd month, two months after debonding, the labial frenum was removed with a diode laser to help prevent reopening of the contact between the bilateral upper central incisors (*Fig. 17*).

Results Achieved

Maxilla (*all three planes*):

- A - P: *Maintained*
- Vertical: *Maintained*
- Transverse: *Maintained*



■ *Fig. 17:*
From 17-33 months (as marked), the maxillary labial frenum (17M, left) was shown to blanched as the lip was elevated (17M, right). After the diastema was closed, the frenum was removed with a diode laser (23M). Healing was progressing at 25 months (25M), and no scarring was noted at 33 months (33M).

Mandible (*all three planes*):

- A - P: *Maintained*
- Vertical: *Maintained*
- Transverse: *Maintained*

Maxillary Dentition

- A - P: *Retraction of incisors and protraction of the buccal segments*
- Vertical: *Maintained*
- Inter-molar/Inter-canine Width: *Crowding corrected with first premolar extraction*

Mandibular Dentition

- A - P: *Retraction of incisors and protraction of the buccal segments*
- Vertical: *Maintained*
- Inter-molar / Inter-canine Width: *Crowding corrected with first premolar extraction*

Facial Esthetics: Lower lip retracted

Retention

Clear overlays were delivered for both arches. The patient was instructed to wear them full time for the first 6 months and nights only thereafter. Instructions were provided for the home hygiene and maintenance of the retainers.

Final Evaluation of the Treatment

The patient was pleased with the result, particularly with regard to masticatory function and facial harmony (*Fig. 4*). Post-treatment intraoral photographs and study casts (*Figs. 5-6*) show a Class I molar and canine on the right side, with Class II canine and Class I molar relationships on the left side. The dental and facial midlines were coincident. Cephalometric measurements are presented in Table 1. Superimpositions of tracings (*Fig. 9*) demonstrate the retraction of the incisors and protraction of the buccal segments to close the first premolar extraction spaces. The lower lip was retracted to relieve the lip protrusion and produce the lip balance that the patient expected. The upper incisor to SN angle was decreased from 115 to 112°, and the lower incisor to the mandibular plane angle was reduced from 106 to 95°.

The ABO Cast-Radiograph Evaluation (*CRE*) score was 24 points. The major discrepancies were occlusal relationships (*7 points*), marginal ridges (*6 points*), axial inclination of the lower canines relative to second premolars (*2 points*), overjet (*5 points*), and arch alignment (*4 points*). The CRE could be corrected from 24 to 22, because the two points deducted for lower canine axial inclinations are probably an artifact.[1] Those alignment problems are not evident on the finish records (*Figs. 5 and 6*). Distortion of axial inclinations in the cuspid area of both arches is a common artifact on panoramic radiographs. Overall, the excellent dental alignment (*CRE 22*), midlines (*Fig. 5*), and facial profile (*Fig. 18*) were pleasant outcomes for both the patient and clinician.

Discussion

The etiology of scissor bite is usually the ectopic eruption of the maxillary molars to the buccal

Fig. 18:
1 year after treatment a full set of records was obtained. Note the excellent facial esthetics and stability following correction of this severe crowded malocclusion (DI 29) in a skeletally mature female.

of their lower molar antagonists. The problem is most common in the second molar region and is frequently bilateral. First molars are the second most common site, and occasionally the whole buccal segment is involved.[2]

Treatment of scissors bite may involve intermaxillary cross-elastics, full fixed appliance, bite turbos, transpalatal arch and/or lower lingual arch. All of these mechanics may induce undesirable side-effects: 1. extrusion of second molars in one or both jaws, 2. undesirable decrease in overbite or even a frank openbite, 3. clockwise rotation of the mandible, and 4. premature occlusal contacts (*Fig. 19*).

Furthermore, when molars are extruded, marginal ridge discrepancies are probable. If intermaxillary elastics are used, patient cooperation is a critical factor because crossbite correction may result in periods of uncomfortable occlusal contact.

Treating scissor bites with miniscrews is increasingly popular because it is less invasive than surgery and does not require as much cooperation as intermaxillary elastics.[3,4,5] Park, Yun et al.[6] corrected

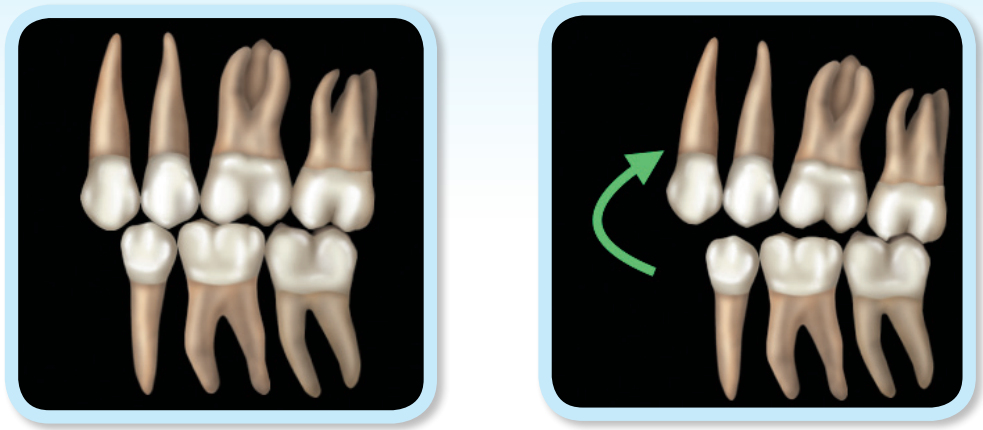


Fig. 19:
Two drawings demonstrate a common complication of posterior scissors bite correction when the extrusion of molars is not controlled by bone screws. A normal Class I occlusion (left) can develop an anterior openbite (right) when the buccal crossbite correction is attempted with conventional mechanics. The scenario is as follows: 1. extrusive forces on the second molars in both jaws, 2. undesirable decrease in anterior overbite, 3. clockwise rotation of the mandible, and 4. premature contact of second molars (right), and 5. an anterior openbite with lip incompetence.

scissors bite by intruding the upper and lower second molars with buccal and lingual traction, anchored with miniscrews. Rotation of molars may be a problem if there is a sagittal component to the intrusive forces.

In addition to temporary anchorage devices (*TADs*), efficient management of scissors bite requires bite turbos to avoid occlusal interferences and prevent undesirable rotations. Opening the bite facilitates the control of applied moments and forces. OBSs are more efficient for molar intrusion than interradicular miniscrews because they are not placed between the roots of teeth. OBSs and bite turbos provide optimal TAD mechanics for correction of scissors bite with minimal complications (*Figs. 14-16*).

The present patient was treated by extracting all four first premolars. A nonextraction option was considered which would have involved en masse retraction of the buccal segments in both arches to reduce lip protrusion.[7-11] However, the severe lingual tipping of the molars imposed anatomic limitations for placing TADs at the start of treatment. The desired positions for OBS anchorage to retract both arches would probably have impinged on the roots of the lower molars. Another option was to reposition the OBSs after the scissors bite was corrected, and then retract both arches, but that approach would result in an excessively long treatment time.

Management of the maxillary midline diastema (*black triangle*) was a priority for the patient, so a careful diagnosis and treatment plan was indicated. Biopsy specimens demonstrate that a frenum may contain collagen tissue, elastic fibers, and striated (*skeletal*) muscle fibers.[12] According to the site

of the attachment, Mirko et al.[13] suggested four classifications for frenum tissue: mucosal, gingival, papillary, or papillary penetrating. In the present patient, the gingiva blanched, between the upper central incisors, when the upper lip was retracted (*Fig. 17*). This type frenum is classified as papillary penetrating, which presents a risk for the diastema reopening after it is closed orthodontically. A frenectomy is best performed after closing the diastema because surgical removal of the frenum before orthodontics may result in scar tissue that obstructs space closure.[14]

There are several options for the labial frenectomy procedure: V-shaped incision,[15] Z-plasty incision,[15] or diode lasers (*Nd:YAG, Er:YAG, or CO2*).[16,17] Patients experience markedly less bleeding with laser oblation, compared surgery by lasers, and there is no need for sutures or periodontal dressings.[16] Compared to surgery with a scalpel, laser frenectomy involves less discomfort, minimal swelling,[18] and fewer functional complications.[19,20] Furthermore, less analgesics are required postoperatively.[20] Carefully considering all the options, the labial frenum was removed by laser oblation after the maxillary diastema was closed (*Fig. 17*).

Follow-up evaluation one year later, revealed that the overall result was stable and the diastema had remained closed (*Fig. 18*). Figure 19 demonstrates some of the complications associated with conventional orthodontics correction, without OBSs. The patient was very pleased with the relatively short treatment time (*21 mo*) and excellent result associated with the current innovative approach: extractions, bite turbos and E-A OBSs.

Conclusion

Using extra-alveolar bone screws and bite turbos provided optimal mechanics for correcting a bilateral scissors bite. This innovative method was consistent with an overall excellent resolution of a challenging, asymmetric malocclusion. Premolar extractions and space closure were an efficient solution for resolving the bimaxillary protrusion in a timely manner. Bimaxillary retraction with bone screws to correct bimaxillary protrusion would have increased treatment time for the present patient, because they could not be placed in an optimal location initially.

Acknowledgment

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References

1. Owens AM, Johal A. Near-end of treatment panoramic radiograph in the assessment of mesiodistal root angulation. Angle Orthod 2008;78(3):475-481.
2. Nagato T. Use of palatal miniscrew anchorage and lingual multi-bracket appliances to enhance efficiency of molar scissors-bite correction. Angle Orthod 2008; Vol.79, No.3:577-584.
3. Kuroda S et al. Clinical use of miniscrew implants and orthodontic anchorage: success rates and postoperative discomfort. Am J Orthod Dentofacial Orthop 2007;131:9-15.
4. Jung MH, Kim TW. Biomechanical considerations in treatment with miniscrew anchorage. Part 1 The sagittal plane. J Clin Orthod 2008 Feb;42(2): 79-83.
5. Nakamura A, Teratani T, Itoh H, Sugawara J, Ishikawa H. Photoelastic stress analysis of mandibular molars moved distally with the skeletal anchorage system. Am J Orthod Dentofacial Orthop 2007;132:624-9.
6. Park HS et al. Uprighting second molars with micro-implant anchorage. J Clin Orthod 2004;38:100-103.
7. Lin JJ. Creative Orthodontics: blending the Damon system & TADs to manage difficult malocclusions. 2nd ed. Taipei: Yong-Chieh; 2010. P. 209-226.
8. Chang CH, Roberts WE. Stability of mini-screws on buccal shelves: a retrospective study of 1680 mini-screw insertions by the same orthodontist. Int J Orthod Implantol 2013;30:76-78.
9. Chang CH, Roberts WE. A retrospective study of the extra-alveolar screw placement on buccal shelves. Int J Orthod Implantol 2013;32:80-89.
10. Chang CH, Liu SS, Roberts WE. Primary failure rate for 1680 extra-alveolar mandibular buccal shelf miniscrews placed in movable mucosa or attached gingiva. Angle Orthod 2015 (Accepted Jan 20, 2015 In Press).
11. Kuroda S, Yamada K, Deguchi T, Kyung HM, Yamamoto TT. Class II malocclusion treated with miniscrew anchorage: comparison with traditional orthodontic mechanics outcomes. Am J Orthod & Dentofacial Orthop 2009 Mar;135(3):302-309.
12. Ross RO, Brown FM, Houston GD. Histological survey of the frena of the oral cavity. Quintessence Int 1990;21:233-237.
13. Mirko P, Miroslav S, Lubor M. Significance of the labial frenum attachment in periodontal disease in man. Part I. Classification and epidemiology of the labial frenum attachment. J Periodontol 1974;45:891-894.
14. Edwards J. The diastema, the frenum and the frenectomy: A clinical study. Am J Orthod 1977;71(5):489-508.
15. Kahnberg KE. Frenum surgery. A comparison of three surgical methods. Int J Oral Surg 1977;6:328-333.
16. Epstein SR. The frenectomy: a comparison of classic versus laser technique. Pract Periodontics Aesthet Dent 1991;3:27-30.
17. Bornstein MM, Suter VG, Stauffer E, Buser D. The CO2 laser in stomatology. Part 1 [In German]. Schweiz Monatsschr Zahnmed 2003;113:559-570.
18. Desiate A, Cantore S, Tullo D, Profeta G, Grassi FR, Ballini A. 980 nm diode lasers in oral and facial practice: current state of the science and art. Int J Med Sci 2009;6:358-364.
19. Haytac MC, Ozcelik O. Evaluation of patient perceptions after frenectomy operations: A comparison of carbon dioxide laser and scalpel techniques. J Periodontol 2006;77:1815-1819.
20. Kara C. Evaluation of patient perceptions of frenectomy: A comparison of Nd:YAG laser and conventional techniques. Photomed Laser Surg 2008;26:147-152.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 27

OVERJET

0 mm. (edge-to-edge)	=	
1 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	3 pts.
7.1 – 9 mm.	=	4 pts.
> 9 mm.	=	5 pts.

Negative OJ (x-bite) 1 pt. per mm. per tooth =

Total = 4

OVERBITE

0 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	3 pts.
Impinging (100%)	=	5 pts.

Total = 7

ANTERIOR OPEN BITE

0 mm. (edge-to-edge), 1 pt. per tooth
then 1 pt. per additional full mm. per tooth

Total = 1

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

CROWDING (only one arch)

1 – 3 mm.	=	1 pt.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	4 pts.
> 7 mm.	=	7 pts.

Total = 1

OCCLUSION

Class I to end on	=	0 pts.
End on Class II or III	=	2 pts. per side _____ pts.
Full Class II or III	=	4 pts. per side _____ pts.
Beyond Class II or III	=	1 pt. per mm. additional _____ pts.

Total = 0

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 6

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

Each degree < -2° _____ x 1 pt. = _____

Each degree > 6° _____ x 1 pt. = _____

SN-MP

≥ 38° = 2 pts.

Each degree > 38° _____ x 2 pts. = _____

≤ 26° = 1 pt.

Each degree < 26° _____ x 1 pt. = _____

1 to MP ≥ 99° = 1 pt.

Each degree > 99° 7 x 1 pt. = 7

Total = 8

OTHER (See Instructions)

Supernumerary teeth	_____ x 1 pt. =	_____
Ankylosis of perm. teeth	_____ x 2 pts. =	_____
Anomalous morphology	_____ x 2 pts. =	_____
Impaction (except 3rd molars)	_____ x 2 pts. =	_____
Midline discrepancy (≥3mm)	@ 2 pts. =	_____
Missing teeth (except 3rd molars)	_____ x 1 pts. =	_____
Missing teeth, congenital	_____ x 2 pts. =	_____
Spacing (4 or more, per arch)	_____ x 2 pts. =	_____
Spacing (Mx cent. diastema ≥ 2mm)	@ 2 pts. =	_____
Tooth transposition	_____ x 2 pts. =	_____
Skeletal asymmetry (nonsurgical tx)	@ 3 pts. =	_____
Addl. treatment complexities	_____ x 2 pts. =	_____

Identify:

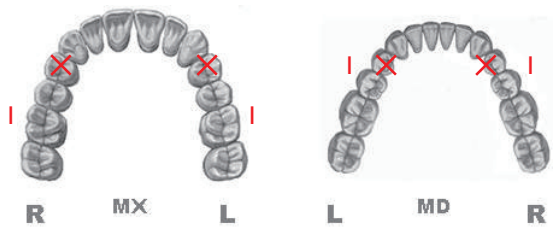
Total = 0

Cast-Radiograph Evaluation

Total CRE Score 24

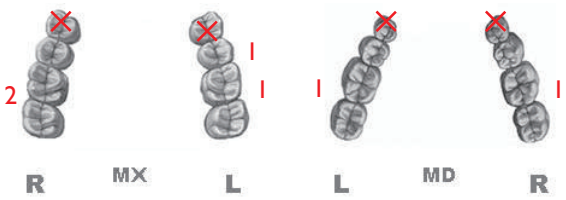
Alignment/Rotations

4



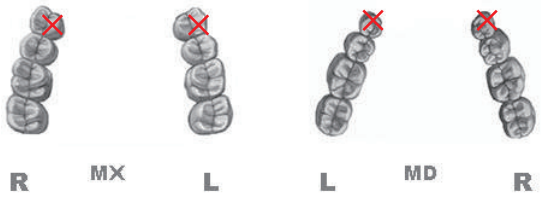
Marginal Ridges

6



Buccolingual Inclination

0

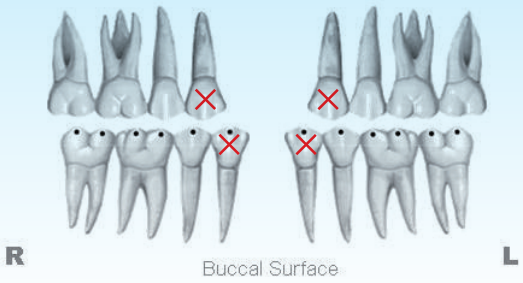


Overjet

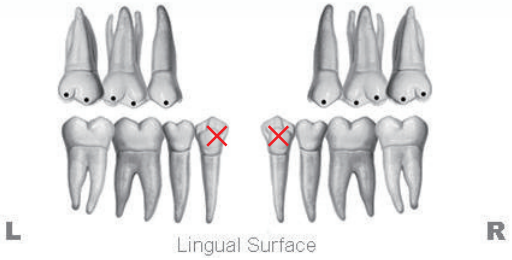
5

Occlusal Contacts

0



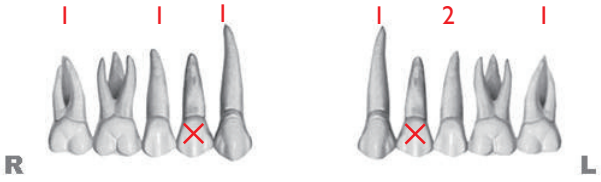
Buccal Surface



Lingual Surface

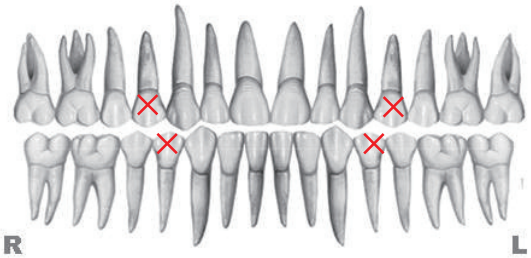
Occlusal Relationships

7



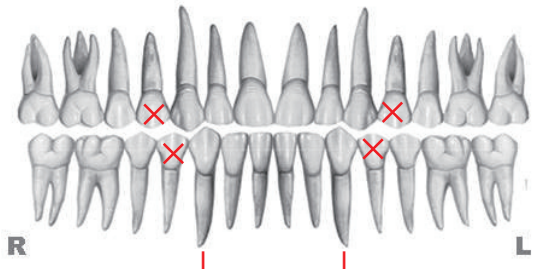
Interproximal Contacts

0



Root Angulation

2



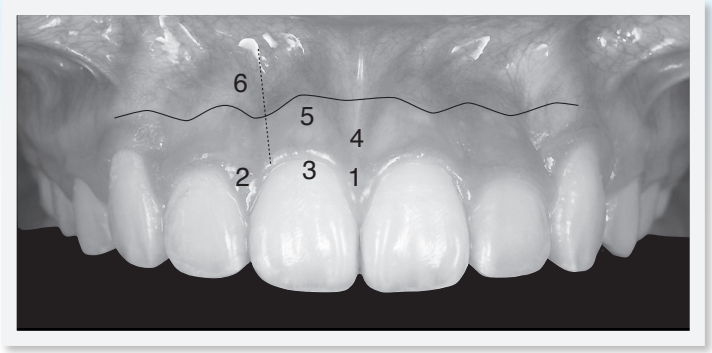
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score (Before Surgical Crown Lengthening)

Total Score: = 4

1. Pink Esthetic Score

Total = 2

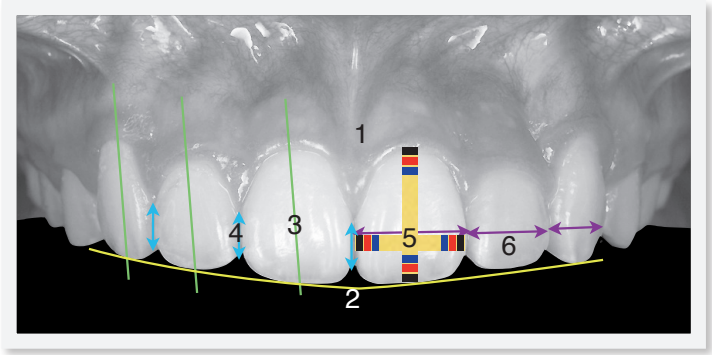


1. M-D Papilla	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

1. M & D Papillae	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	0	(1)	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	0	(1)	2

2. White Esthetic Score (for Micro-esthetics)

Total = 2



1. Midline	0	1	2
2. Incisor Curve	0	1	2
3. Axial Inclination (5°, 8°, 10°)	0	1	2
4. Contact Area (50%, 40%, 30%)	0	1	2
5. Tooth Proportion (1:0.8)	0	1	2
6. Tooth to Tooth Proportion	0	1	2

1. Midline	(0)	1	2
2. Incisor Curve	0	(1)	2
3. Axial Inclination (5°, 8°, 10°)	0	(1)	2
4. Contact Area (50%, 40%, 30%)	(0)	1	2
5. Tooth Proportion (1:0.8)	(0)	1	2
6. Tooth to Tooth Proportion	(0)	1	2