Non-extraction Treatment of Impinging Overbite with Severe Crowding and a Straight Profile

Abstract

Non-extraction treatment is a challenging option for adults with severe crowding and a straight profile, particularly when complicated with an impinging deep overbite, and lingually inclined incisors in both arches. This multifactorial malocclusion with a Discrepancy Index (DI) of 14, was initiated treated with relatively simple mechanics: anterior and posterior bite turbos with early light and short Class II elastics (2 oz). Subsequently, lip protrusion was controlled with extra-alveolar (E-A) anchorage by retracting both arches with miniscrews placed in the infrazygomatic crests and mandibular buccal shelves. Progress records were assessed at 19 months to plan the final stage of active treatment. Bite turbos, intermaxillary elastics, and E-A skeletal anchorage resulted in an excellent correction in 23 months, as documented by a Cast Radiograph Evaluation (CRE) of 19 as well as a Pink & White (P&W) dental esthetic score of 3. (Int I Ortho Implantol 2014;35:80-100)

Key words:
Deep bite, palatal impingement, crowding, extra-alveolar miniscrews, osseous anchorage, whole arch distalization, infrazygomatic crests, buccal shelves

History and Etiology

A 32-year-and-8-month-old female was referred by her dentist for orthodontic consultation. The chief concerns were impinging overbite and crooked teeth. The patient was eager to have the problem corrected. Pre-treatment facial photographs (*Fig. 1*) showed a relatively straight profile with a retrusive lower lip. Intraoral photographs (*Fig. 2*) and study models (*Fig. 3*) revealed bilateral Class I molar relationship, 100% impinging deep overbite with retro-inclined upper and lower incisors, severe crowding, and a square arch form. Mild periodontitis was noted in the maxillary anterior region.

The etiology of the malocclusion was inadequate development of arch width to accommodate the adult dentition. This is a common problem in developed countries because children tend to eat a refined diet that does not require sufficient biting strength to fully develop the jaws in width.[1] Since the patient maintained lip competence during the mixed dentition phase, the incisors were tipped lingually creating an impinging deep overbite. Furthermore the canines were blocked out because they are the last permanent teeth to erupt.

The cephalometric and panoramic radiographs document the pre-treatment condition (*Fig. 7*) and the post-treatment results (*Fig. 8*). The superimposed cephalometric tracings before and after treatment are shown in Fig. 9. The correction of this difficult malocclusion was facilitated by assessing progress records, which were collected about 4 months prior to the anticipated finish.

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Fig. 1: Pre-treatment facial photographs
A relatively straight profile with a retrusive lower lip

Fig. 4: Post-treatment facial photographs
Lower lip profile was slightly more protrusive, resulting in a more balanced profile

Fig. 2: Pre-treatment intraoral photographs

Fig. 5: Post-treatment intraoral photographs

Fig. 3: Pre-treatment study models (casts)
Intraoral photographs (Fig. 2) and study models (Fig. 3) revealed bilateral Class I molar relationship, 100% impinging deep overbite with retro-inclined upper and lower incisors, severe crowding, and a square arch form.

Fig. 6: Post-treatment study models (casts)
Post-treatment intraoral photograph (Fig. 5) and study model (Fig. 6) document the final alignment.

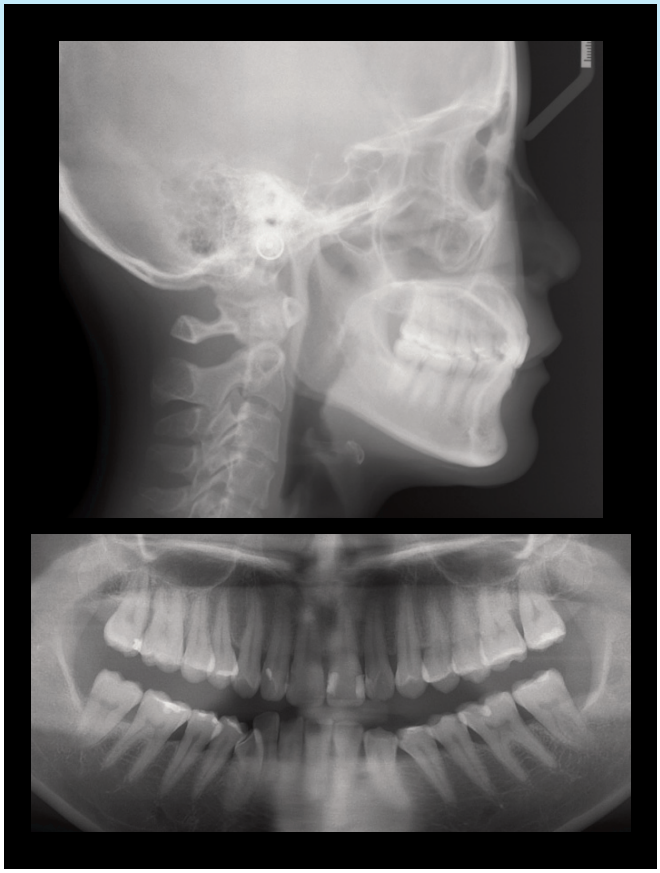


Fig. 7:
Pre-treatment lateral cephalometric and panoramic radiographs. The panoramic film showed missing four third molars, mild alveolar bone loss. The lateral cephalometric radiograph showed skeletal Class II, normal mandibular plane angle, 100% deep impinging overbite, as well as retro-inclined upper and lower incisors.

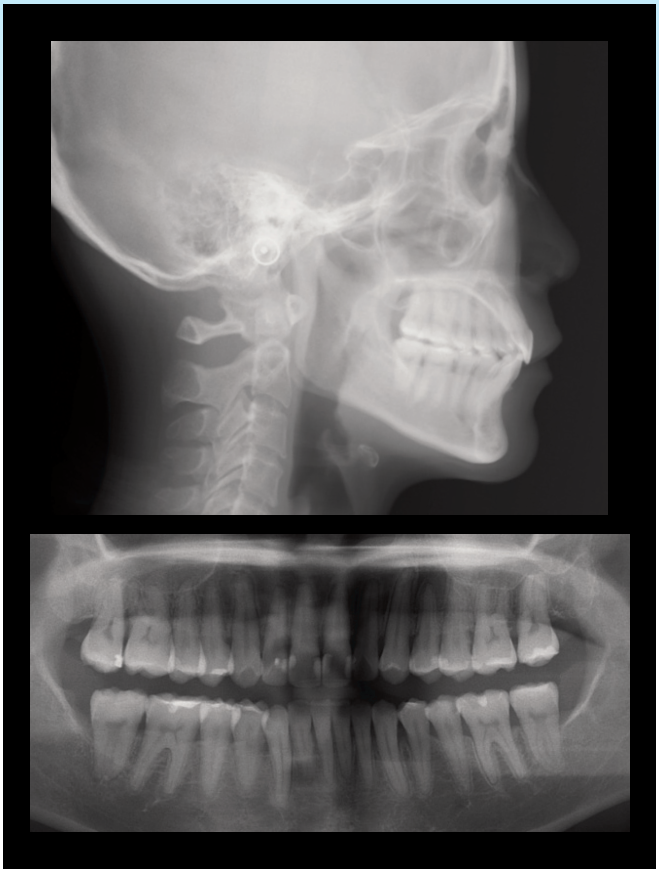


Fig. 8:
Post-treatment lateral cephalometric and panoramic radiographs. Both of them showed a harmonic arrangement of the teeth.

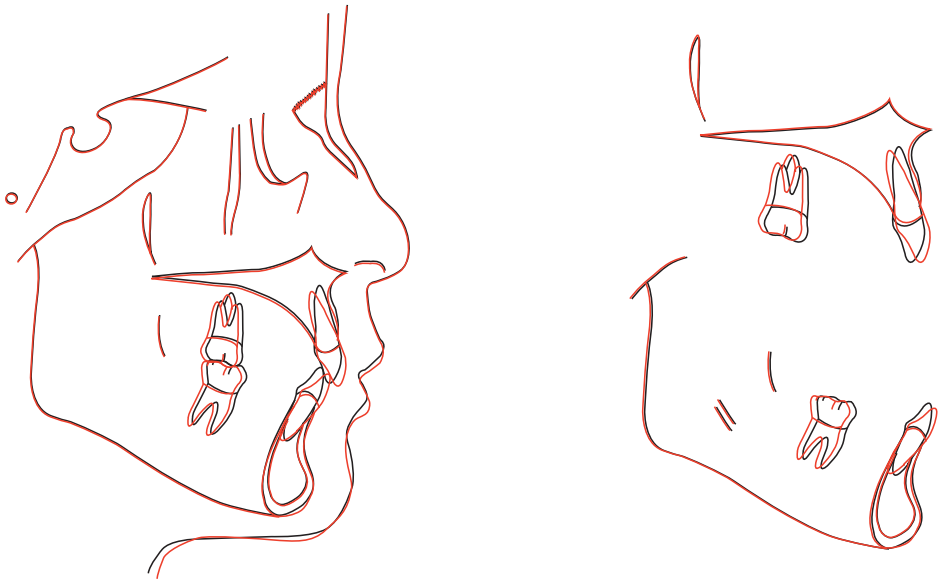


Fig. 9:
Cephalometric tracings are superimposed on the anterior cranial base, maxilla and mandible: start is black and finish is red. Both upper and lower incisors had increased axial inclination of 9°. Both upper and lower molars were retracted. No skeletal change was found. Lower lip profile was slightly protrusive, resulting in a more balanced facial profile.

Diagnosis

1. Angle Classification: Bilateral Class I molar relationship

2. Tooth Size Arch Length Discrepancy:
   - Maxillary: *6 mm*
   - Mandibular: *9 mm*

3. Facial: Straight profile with a retrusive lower lip

4. Radiographic\Cephalometric
   - Skeletal: Class II pattern (*SNA 78°, SNB 74°, ANB 4°*), normal mandibular plane angle (*SN-MP 33°*)
   - Dental: 100% deep impinging overbite; retro-inclined upper and lower incisors (*Fig. 10*)

5. Radiographic\Panoramic: Mild alveolar bone loss

6. Radiographic\Other: Square arch form

The American Board of Orthodontics (*ABO*) Discrepancy Index (*DI*) was 14 as shown in the subsequent worksheet.[2]

Fig. 10:
Deep overbite: lingually tipped upper and lower incisors

Specific Objectives of Treatment

1. Maxilla (*all three planes*):
   - A - P: *Maintain*
   - Vertical: *Maintain*
   - Transverse: *Maintain*

2. Mandible (*all three planes*):
   - A - P: *Maintain*
   - Vertical: *Maintain*
   - Transverse: *Maintain*

3. Maxillary Dentition:
   - A - P
     a. Molars: *Retract*
     b. Incisors: *Increase axial inclination*
   - Vertical:
     a. Molars: *Maintain*
     b. Incisors: *Maintain*
   - Intermolar Width: *Increase*
   - Intercanine Width: *Decrease*
   - Buccolingual Inclination: *Maintain*

4. Mandibular Dentition:
   - A - P
     a. Molars: *Maintain*
     b. Incisors: *Slightly increase axial inclination*
   - Vertical:
     a. Molars: *Retract*
     b. Incisors: *Intrude*
   - Intermolar Width: *Slightly increase*
   - Intercanine Width: *Decrease*
   - Buccolingual Inclination: *Maintain*

5. Facial Esthetics: Maintain

6. Other: Periodontal maintenance every 3 months

Treatment Plan

Non-extraction treatment is recommended. Place posterior bite turbos to allow bonding of all teeth in both arches, and use light short Class II elastics (*2 oz*) during the initial alignment phase. Anterior bite turbos on both upper central incisors. Interproximal reduction of upper and lower dentition as needed. Extra-alveolar (*E-A*) miniscrew anchorage in all posterior segments to retract both arches. Pre-finish records about 6 months before the anticipated completion of active treatment to plan finishing details. Continue Class II elastics as needed and detail the final occlusion. Because the patient's high caries rate, use clear overlay retainers in both arches.

Appliances and Treatment Progress

An .022" slot Damon Q bracket system (*Ormco Corporation, Glendora, CA*) was used. The maxillary arch was bonded first and high torque brackets

Fig. 11: Abnormal wear pattern of the lower incisors.

Fig. 12:
At the start of treatment (0 months), high torque brackets were bonded on the maxillary anterior teeth and the initial archwire was .014" CuNiTi.

were utilized on the anterior teeth; the initial archwire was .014" CuNiTi (*Fig. 12*). After one month of initial leveling and alignment in the maxillary arch, posterior bite turbos on the lower first molars (*teeth #19 and #30*) were used to facilitate the bonding of the lower anterior teeth and to prevent extrusion of the posterior segments. Anterior bite turbos were bonded to the lingual surfaces of the upper central incisors. The lower arch was bonded and low torque brackets were used on the mandibular anterior teeth. The initial lower archwire was an .014" CuNiTi. Drop-in hooks were fitted in the vertical slots of the upper first premolars (*teeth #5 and #12*) to secure early light short elastics (*2 oz shorty Class II elastics*) from the teeth #5 to #30 and #12 to #19. (*Fig. 13*)

In the 3rd month, both posterior bite turbos were decreased in height to accommodate alignment of the arches (*Fig. 14*). After 5 months of active treatment, the upper archwire was changed to .014x.025" CuNiTi, and the anterior segment was ligated with a figure-eight tie with an 0.012" stainless steel (*SS*) ligature to maintain the firm contacts between the anterior teeth.

Fig. 13:
At 1 month, posterior bite turbos were placed on the mandibular first molars (teeth #19 and #30) to facilitate the bonding of the lower anterior teeth and to prevent extrusion of the posterior segments. The mandibular arch was bonded and low torque brackets were used on the mandibular anterior teeth. The initial lower arch was an .014"CuNiTi. Anterior bite turbos were bonded to the lingual surfaces of the upper central incisors. Drop-in hooks were fitted in the vertical slots of the upper first premolars (teeth #5 and #12) to secure early light short elastics (shorty Class II, 2 oz) used from teeth #5 to 30 and 12 to 19.

Fig. 14:
At 3 months, the height of the posterior bite turbos were decreased to accommodate alignment of the arches.

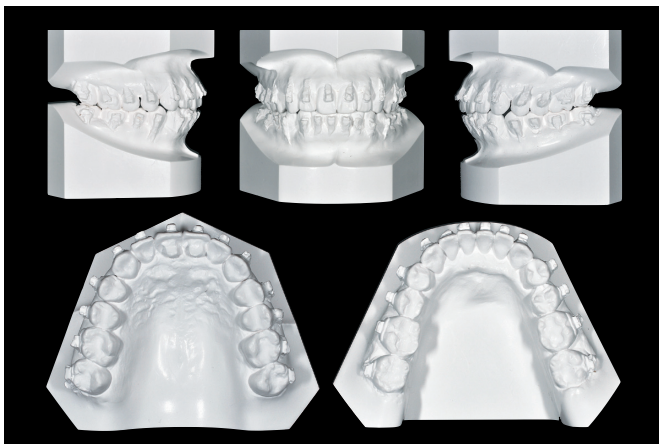
Fig. 15:
At 11 months, five months of progress is shown retracting both arches with E-A bone screws that were placed 6 months into treatment. The retraction force (2oz/side) was delivered with an elastomeric chain.

In the 6th month, the Class II elastics were stopped. Two power chains were used under the upper and lower archwires to consolidate anterior space (*teeth #6 to #11 and #22 to #27*). Four E-A bone screws (*2x12 mm OrthoBoneScrew, Newton's A Ltd.*) were inserted bilaterally into the upper infrazygomatic crests (*IZC*) and lower buccal shelves. Drop-in hooks were fitted in the vertical slot of the upper canines (*teeth #6 & #11*) to secure light power chains (*2 oz*) from the canines to the IZC miniscrews to retract the entire maxillary dentition. Additional light power chains (*2 oz*) were extended from the lower first premolars (*teeth #28 and # 21*) to the head of the mandibular shelf miniscrews to retract the entire mandibular dentition.

The lower archwire was changed to .016" CuNiTi in the 9th month and then to .018" CuNiTi in the 10th month. In the 11th month, the upper archwire was changed to .017x.025" low friction TMA, and an .014x.025" CuNiTi archwire was fitted for the lower arch (*Fig. 15*). Black triangles were noted between the anterior teeth, and interproximal stripping was preformed in both the upper and lower arches (*Fig. 16*).

Fig. 16:
At 11 months, black triangles were reduced with interproximal stripping in both arches. The bracket on tooth #9 (circled) should be repositioned clockwisely to fit root parallelism (green line).

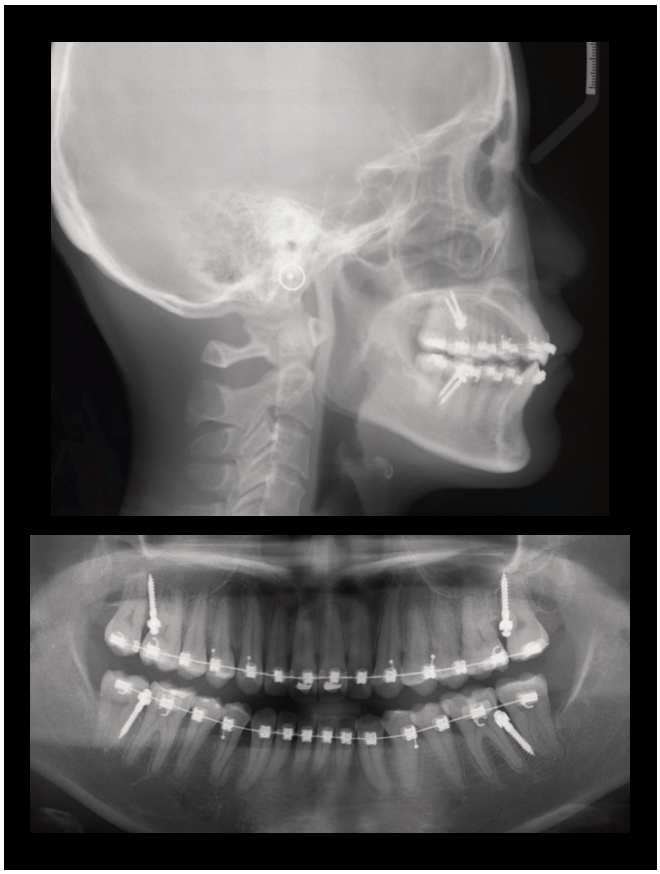
■ *Fig. 17:*
19 months:
interim-treatment facial and intraoral photographs.



■ *Fig. 18:*
19 months: interim-treatment study models (casts). After 19 months of active treatment, interim-treatment progress records were collected. The problems detected were the basis for the detailing plan to achieve an optimal result.

In the 13th month, the lower archwire was changed to .017x.025" low friction TMA, with progression to .016x.025" SS in the 16th month. In the 17th month, the upper archwire was changed to .019x.025" SS.

After 19 months of active treatment, interim-treatment progress records were collected. The dental casts and radiographs were assessed with the ABO Cast-Radiograph Evaluation (*CRE*) which yielded a score of 37. The problems detected were the basis for the detailing plan to achieve an optimal result (*Figs. 17-20*).



■ *Fig. 19:*
19 months: interim-treatment cephalometric and panoramic radiographs

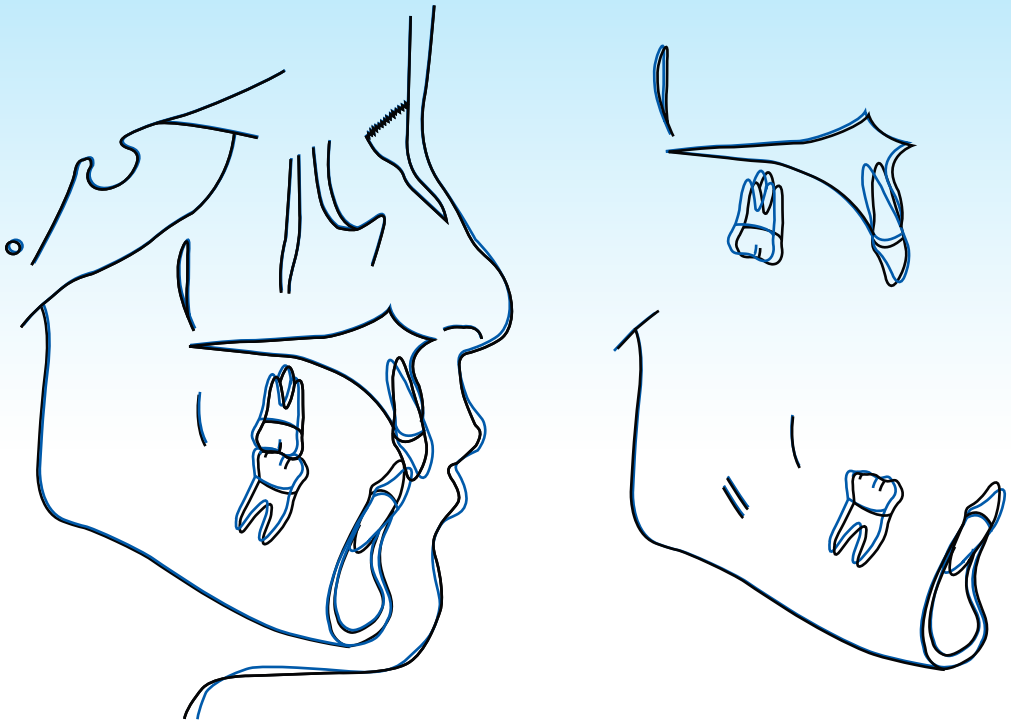


Fig. 20:
19 months: superimposed cephalometric tracings
Axial inclination of upper and lower incisors was increased from 85° to 95° and from 92° to 107° respectively. Both upper and lower molars were retracted. The upper and lower lip relationship to the facial esthetic plane increased from -1 to 1 mm and from -1.5 to 0.5 mm, which formed a more protrusive lip profile. No skeletal change was found.

Interim-Treatment Progress

1. Maxilla (*all three planes*):

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

2. Mandible (*all three planes*):

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

3. Maxillary Dentition:

- A-P
  a. Molars: *Retracted*
  b. Incisors: *Increased axial inclination*
- Vertical:
  a. Molars: *Maintain*
  b. Incisors: *Maintain*
- Intermolar Width: *Increase*
- Intercanine Width: *Decrease*
- Buccolingual Inclination: *Increased*

4. Mandibular Dentition:

- A-P
  a. Molars: *Retracted*
  b. Incisors: *Increased axial inclination*
- Vertical:
  a. Molars: *Maintain*
  b. Incisors: *Intruded*
- Intermolar Width: *Increase*
- Intercanine Width: *Decrease*
- Buccolingual Inclination: *Maintain*

Finishing Treatment Plan

Axial inclination of the upper and lower incisors was increased from 85˚ to 95˚ and from 92˚ to 107˚ respectively (*Fig. 21*). The upper and lower lip relationship to the facial esthetic plane increased from -1 to 1 mm and from -1.5 to 0.5 mm. Additional retraction of both arches with E-A miniscrew anchorage was indicated to control incisor flaring and lip protrusion. Panoramic radiography was used to evaluate dental angulation in order to reposition brackets (*Fig. 22*). Interproximal stripping in both arches was indicated to reduce black interdental spaces, consistent with optimal tooth proportion.

A progress CRE about six months before the anticipated debonding is a proven method for improving treatment quality.[3] (*Figs. 23-26*). A detailed correction plan was generated based on the progress CRE score of 37:

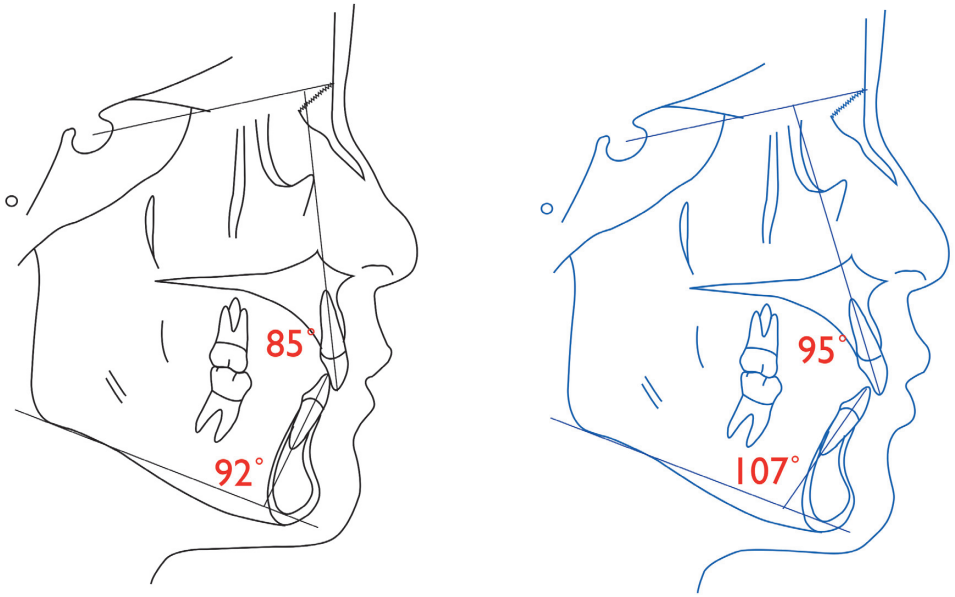


Fig. 21: At 19 months, incisal inclination was increased 10˚ in the upper arch and 15˚ in the lower arch.

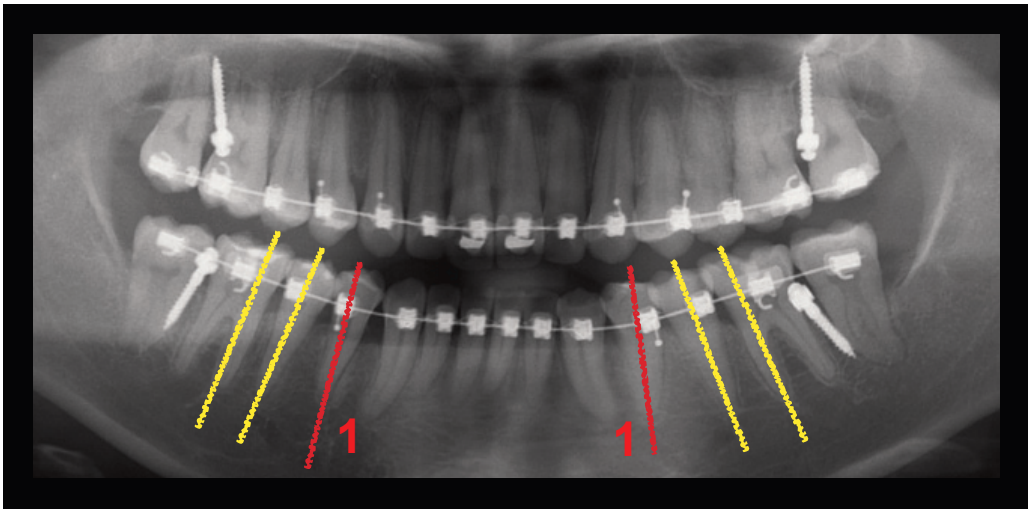


Fig. 22: At 19 months, the interim-treatment CRE for root angulation was 2 points deduction (marked in red).

Fig. 23:
At 19 months, the interim-treatment CRE for marginal ridge discrepancies was 4 points deduction as shown in red. One point is scored for a discrepancy of 0.5-1.0 mm; two points are scored for >1mm.

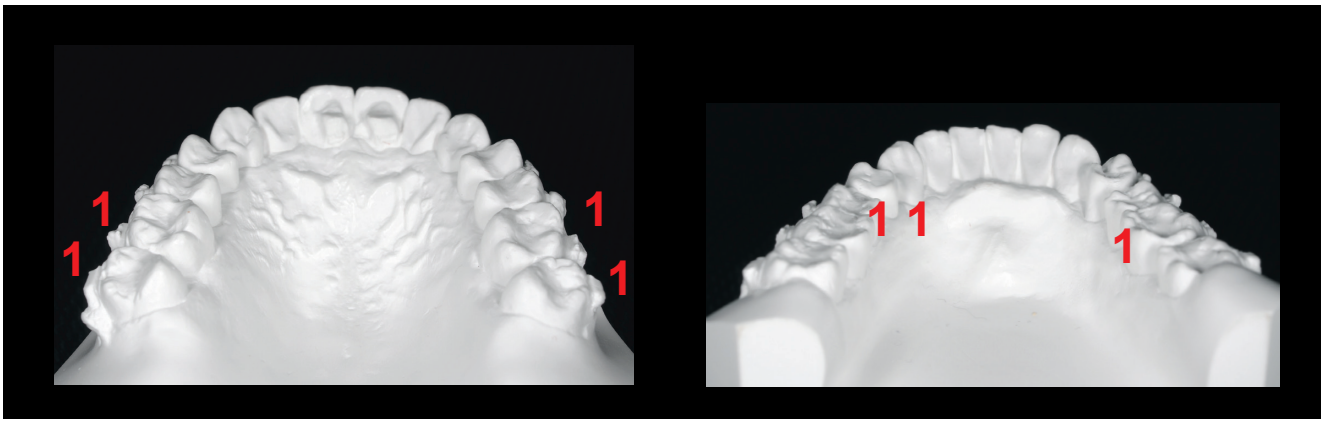


Fig. 24: At 19 months, the interim-treatment CRE for buccolingual inclination was 7 points deduction (red).

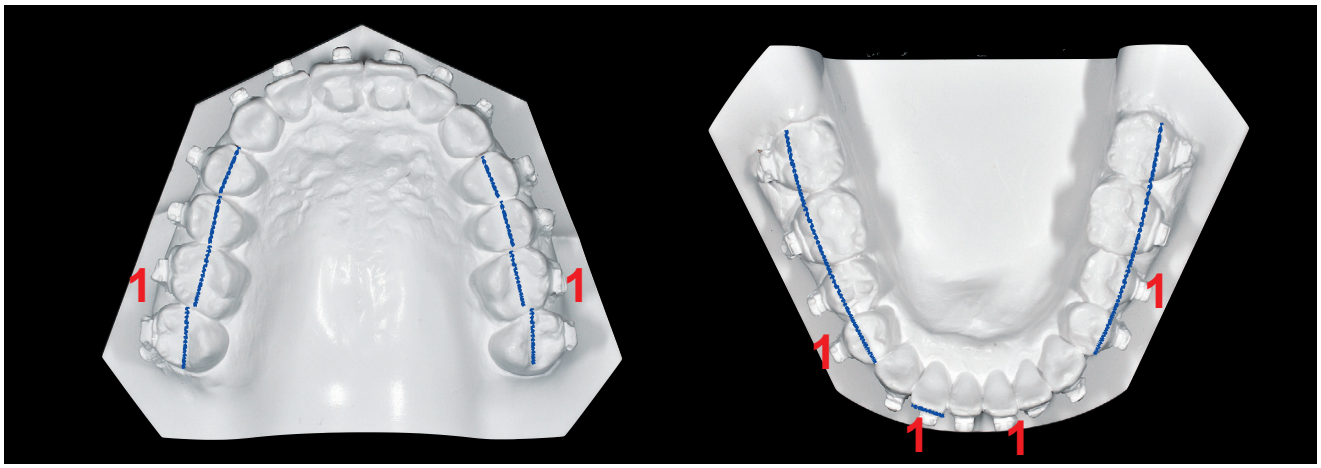


Fig. 25:
At 19 months, the interim-treatment CRE for alignment & rotations was 6 points deduction (red marks). The normal alignment of centric stops in both arches is shown in blue.

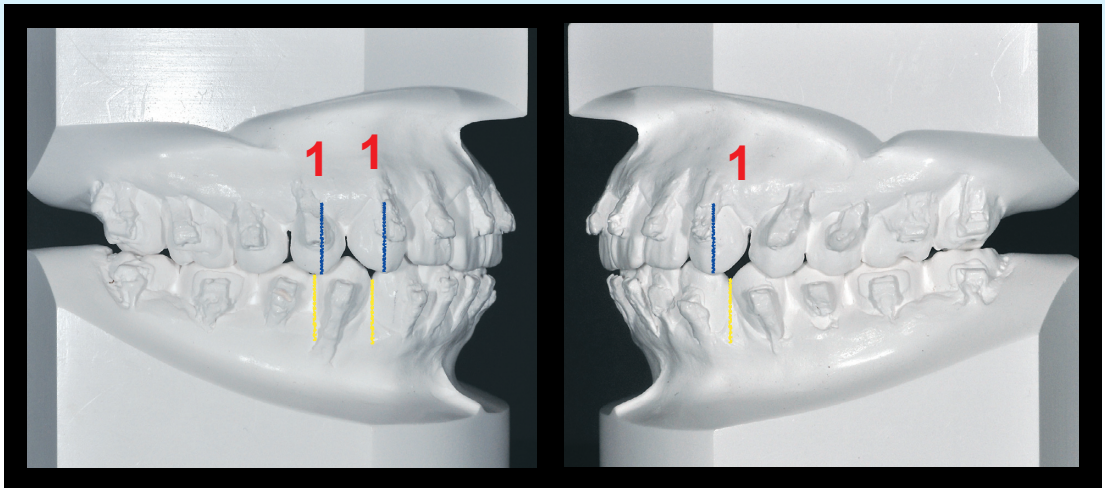


Fig. 26:
At 19 months, the interim-treatment CRE for occlusal relationships was 3 points deduction (red marks). Maxillary cusp tips (blue) should interdigitate with the mandibular embrasures (yellow).

1. Reposition brackets on teeth #21, 28 & 29 to correct marginal ridge discrepancies (*Fig. 23*).

2. Apply progressive upper posterior, buccal root torque to reduce buccolingual inclinations (*Fig. 24*).

3. Detailed bending to correct rotations (*Fig. 25*).

4. Arch coordination to improve occlusal relationships, interdigitation and contacts (*Fig. 26*).

5. Continue bilateral retraction of both arches with E-A miniscrews to reduce incisor flaring and lip protrusion (*Fig. 21*).

Appliances and Treatment Progress Part II

In the 19th month, brackets on teeth #21, 28 & 29 were repositioned and both archwires were changed to .014x.025 CuNiTi. In the 22nd month, a torquing spring was placed on the right canine (*tooth #6*) to move crown palatally and correct 1mm of overjet (*Fig. 27*). At the same appointment, it was noted that distal tipping of the second molars resulted in open occlusal contacts. The upper archwire was sectioned distal to the first molars and vertical elastics (*Chipmunk 1/8", 3.5 oz*) were used on second molars to improve intermaxillary contacts (*Fig. 29*).

Fig. 27:
At 22 months, a torquing spring (circled) was installed on right upper canine (tooth #6) for palatal crown torque to correct 1mm of excessive overjet.

Fig. 28:
Retraction of the entire maxillary dentition with infrazygomatic crest anchorage causes second molars to tip distally, and produces a clockwise rotation of the functional occlusal plane. Open occlusal contacts and a posterior open bite may occur.

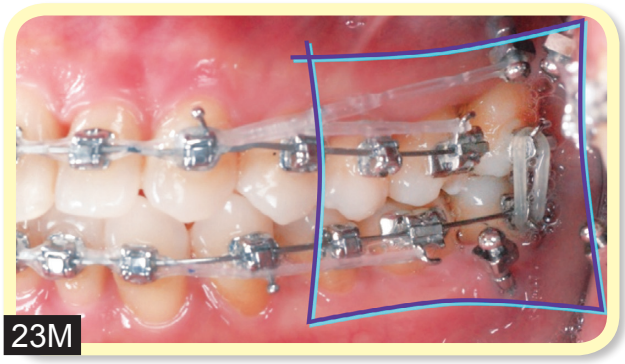


Fig. 29:
At 23 months, one month of the progress is shown the upper archwire was sectioned distal to the first molars, and vertical elastics (Chipmunk ⅛", 3.5 oz) were used to seat the second molar occlusion.

After 23 months of active treatment, all fixed appliances were removed and clear overlay retainers were delivered.

Results Achieved

1. Maxilla (*all three planes*):

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

2. Mandible (*all three planes*):

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

3. Maxillary Dentition:

- Alignment: *Mesial out rotation #2*
- Anchorage: *Retraction of upper posterior segments*
- Incisor Control: *Increased axial inclination*
- A-P: *Retracted*
- Vertical: *Maintain*
- Intermolar Width: *Increase*
- Intercanine Width: *Decrease*
- Marginal Ridges: *Discrepancy on #2*
- Buccolingual Inclination: *Excess axial inclination of #3 and 14*
- Rotation: *within normal limits*

4. Mandibular Dentition:

- Alignment: *4 teeth with minor rotations*
- Anchorage: *Buccal segments retracted*
- Incisor Control: *Flaring*
- A-P: *Retraction of the entire arch*
- Vertical: *Maintain*
- Intermolar Width: *Increase*
- Intercanine Width: *Decrease*
- Marginal Ridges: *Discrepancy on #20 and 29*
- Buccolingual Inclination: *Maintain*
- Rotation: *Mesial-in tooth #30*

5. Facial Esthetics:

- Lower lip profile was slightly more protrusive, resulting in a more balanced profile

6. Superimpositions:

- Axial inclination increased 9˚ for the upper and lower incisors, resulting in an interincisal angle improvement of 18˚
- Both upper and lower posterior segments were retracted
- No skeletal changes were noted
- Lower lip profusion was improved, resulting in a relatively straight facial profile that was well balanced

Retention

Fixed retainers were contraindicated due to the patient's high caries rate. Upper and lower clear overlay retainers were provided with instructions to wear them full time for the first 6 months and nights only thereafter. The patient was instructed in home care and maintenance to prevent recurrence of the periodontal problems. Longterm periodontal follow-up is recommended.

Final Evaluation of Treatment

The finish ABO CRE score was 19 points which was considered excellent for this challenging malocclusion. Major discrepancies were noted in two categories: alignment/ rotations (*5 points*) and buccolingual inclination (*5 points*). Both could be improved with more precise bracket positioning and additional progressive root torque in the buccal segments.

Routine periodontal care and periodic maintenance were adequate for arresting the periodontitis and preserving the periodontium. Although longterm stability may be challenging, the treatment approach was appropriate for meeting the functional and esthetic needs of the patient. She was quite pleased with the results.

Discussion

It is challenging to achieve optimal function and esthetics in patients with severe crowding, a relatively straight profile, and retrusive lower lip. The patient preferred a non-extraction approach. There are three important biomechanics issues for avoiding unesthetic bimaxillary protrusion and incisor flaring:

1. Torque selection:

   Mandibular anterior low torque brackets helped control anterior tipping (*flaring*) during alignment.

2. E-A miniscrew anchorage:

   In the 6th month of treatment a miniscrew was placed in each posterior quadrant and 2 oz of traction was applied to each fixture to retract all four buccal segments to provide space to resolve anterior crowding.

3. Interproximal stripping.

   In the 11th month interproximal reduction (*IPR*) was performed to provide space to resolve crowding and reduce black triangles in the incisal regions, consistent with maintaining good tooth proportions.

When retracting both arches with E-A miniscrew anchorage, it is important to carefully monitor the posterior occlusion and lower facial height because the plane of occlusion may rotate (*Fig. 28*). [4,5,6] The patient's habitual lip competence was a negative factor for severely tipping the incisors lingually, but it was a favorable factor for controlling rotation of the occlusal planes. The latter may be associated with

posterior openbite, anterior deepbite,[7] and posterior mandibular rotation.

Overbite and overjet are dependent on the vertical overlap of the incisors. The term "overbite" applies to gap between the lingual surface of the maxillary teeth and the labial surface of their occluding antagonist. Normally the lower incisal edges contact the lingual surface of the upper incisors, at or slightly gingival to the cingulum. The vertical overlap is either described in millimeters or as the percentage of lower incisor crown length overlapped by upper central incisors. When the teeth are brought into habitual or centric occlusion, the normal overbite is usually 2-3 mm or 30% percent of the clinical crown height of the mandibular incisors.[8]

Deepbite or deep overbite is defined as an excess overlap of the lower incisors by the upper incisors. This is a common form of malocclusion that may jeopardize periodontal support, intermaxillary occlusion or the TMJ. It is customary to diagnose deepbite when the incisors' overlap exceeds one third of the crown height of the lower incisors.[7]

For deep overbite correction, there are four common approaches:

1. Intrude anteriors

2. Flare anteriors

3. Extrude posteriors

4. Combine all of the above (*1-3*)

Molar extrusion is often an unstable approach for correcting deepbite because muscles tend to maintain their original length which tends to intrude the molars, thus contributing to a relapse of the deep overbite.[8,9] Intrusion of anterior incisors is usually a better treatment option for adults. There are several mechanisms to intrude anterior teeth:[10,11]

1. A basearch from molars to incisors delivers an intrusive force at the bracket

2. Utility arches can deliver an intrusive force but the mechanics may be complicated by applying torque at the bracket.

3. Bite turbos combined with early light short elastics.

4. Lever arms combined with orthodontic bone screws.

5. Interradicular orthodontic bone screws in the anterior region.

Different approaches are chosen based on the individual situation. In addition to the mechanics, it is important to be alert to root resorption. According to Burstone,[12] 20gm of force is recommended for intrusion of maxillary anterior teeth to decrease the incidence of root resorption.

For the present patient, the best alternative was to flare and intrude the anterior segments, because the incisors were tipped lingually and there was a good facial profile. Posterior bite turbos on the lower first molars facilitated the bonding of lower

anterior brackets and prevented extrusion of the posteriors. Anterior bite turbos were bonded to the lingual surfaces of the upper central incisors to provide intrusive forces on the incisors. The impinging overbite was corrected with anterior bite turbos, early light short elastics and pre-torqued brackets. This relatively simple and efficient approach resulted in correction of the problem in about 23 months without adverse skeletal side effects.

Severe deepbite malocclusions may be associated with periodontal problems due to shearing of the gingival tissues and food impaction. This scenario is associated with marked gingival recession, dentin hypersensitivity, loss of attachment and tooth mobility. The traumatic occlusion of an impinging overbite can accelerate the progression of periodontal disease.[13] The problem is associated with maligned roots in both the sagittal and frontal planes. If the roots in the anterior segments have acceptable axial inclination to the occlusal plane (*third order*), and are parallel to each other in the second order, the anatomical relationship is favorable for sufficient bone between the roots of teeth. Thus, correction of impinging overbite controls the existing traumatic etiology of periodontitis and is expected to render greater resistance to periodontal bone loss in the future.[14-17] However, careful and routine periodontal maintenance is required.

Overall, the result was an excellent outcome for a challenging problem. The patient was well satisfied with the final results. Although esthetics and periodontal health were improved, long-term retention is necessary to insure stability.

CEPHALOMETRIC				
SKELETAL ANALYSIS				
	PRE-Tx	Progress	POST-Tx	DIFF.
SNA°	78°	78°	78°	0°
SNB°	74°	74°	74°	0°
ANB°	4°	4°	4°	0°
SN-MP°	33°	33°	33°	0°
FMA°	24°	24°	24°	0°
DENTAL ANALYSIS				
U1 TO NA mm	2 mm	4 mm	2 mm	0 mm
U1 TO SN°	85°	95°	94°	9°
L1 TO NB mm	4 mm	7 mm	5.5 mm	1.5 mm
L1 TO MP°	92°	107°	101°	9°
FACIAL ANALYSIS				
E-LINE UL	-1 mm	1 mm	0 mm	1 mm
E-LINE LL	-1.5 mm	0.5 mm	-0.5 mm	1 mm

■ Table 1: Cephalometric summary

Conclusion

This case report documents the periodontal and esthetic compromises of an impinging deepbite malocclusion. The dental problem was corrected with relatively simple mechanics, but E-A miniscrew anchorage was required to retract buccal segments in both arches to prevent excessive expansion of the arches and flaring of the incisors.

Acknowledgment

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References

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 14

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 = 0

OVERBITE

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

Total = 5

ANTERIOR OPEN BITE

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

Total = 0

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 = 7

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 = 0

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° _____ x 1 pt. = _____

Total = 0

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	1	x 2 pts. =	2

Identify: Periodontitis

Total = 2

IMPLANT SITE

Lip line : Low (0 pt), Medium (1 pt), High (2 pts) =_____

Gingival biotype : Low-scalloped, thick (0 pt), Medium-scalloped, medium-thick (1 pt), High-scalloped, thin (2 pts) =_____

Shape of tooth crowns : Rectangular (0 pt), Triangular (2 pts) =_____

Bone level at adjacent teeth : ≤ 5 mm to contact point (0 pt), 5.5 to 6.5 mm to contact point (1 pt), ≥ 7mm to contact point (2 pts) =_____

Bone anatomy of alveolar crest : H&V sufficient (0 pt), Deficient H, allow simultaneous augment (1 pt), Deficient H, require prior grafting (2 pts), Deficient V or Both H&V (3 pts) =_____

Soft tissue anatomy : Intact (0 pt), Defective (2 pts) =_____

Infection at implant site : None (0 pt), Chronic (1 pt), Acute(2 pts) =_____

Total = 0

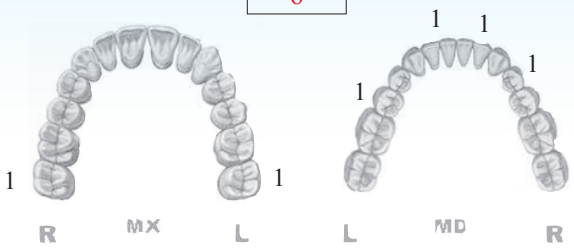
Cast-Radiograph Evaluation

Interim-Treatment Progress

Total Score: 37

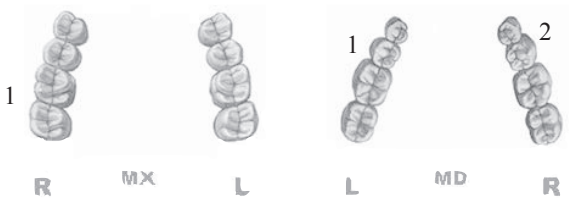
Alignment/Rotations

6



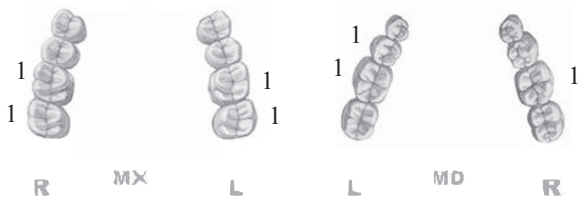
Marginal Ridges

4



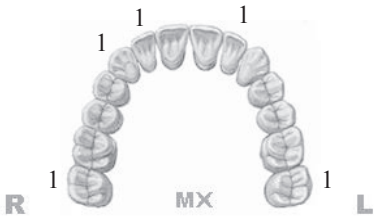
Buccolingual Inclination

7



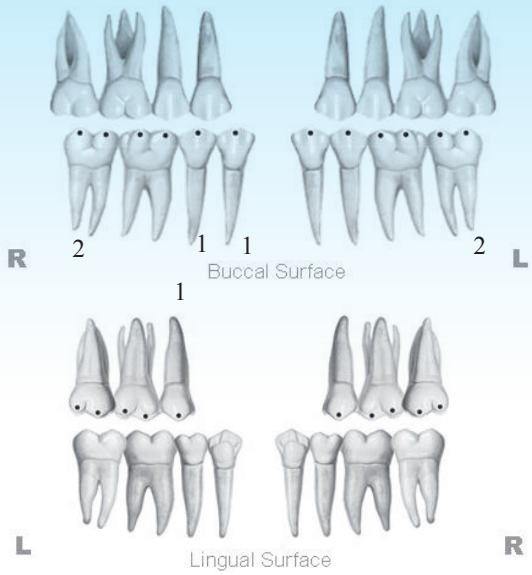
Overjet

5



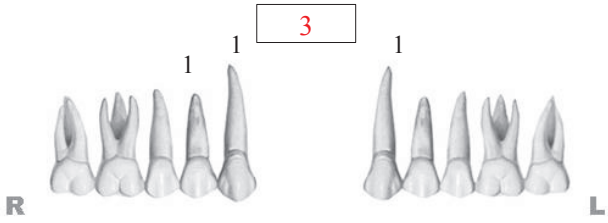
Occlusal Contacts

7



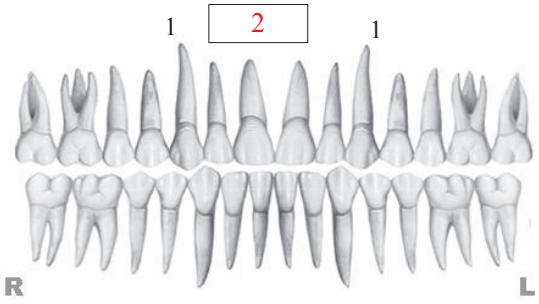
Occlusal Relationships

3



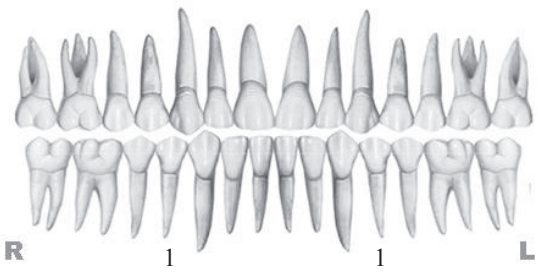
Interproximal Contacts

2



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.

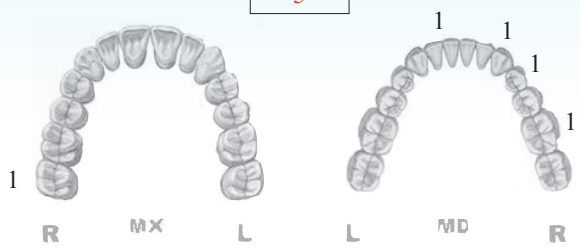
Cast-Radiograph Evaluation

Final Results

Total Score: 19

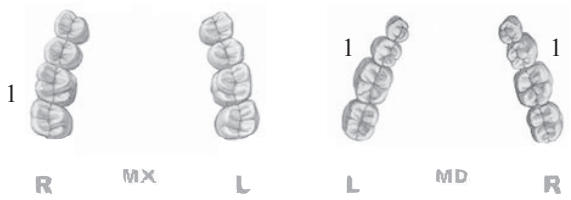
Alignment/Rotations

5



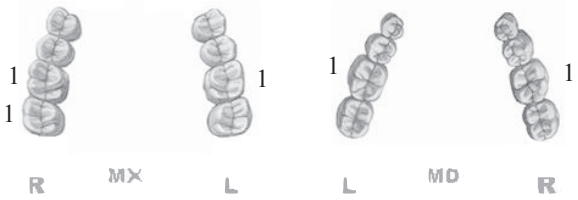
Marginal Ridges

3



Buccolingual Inclination

5

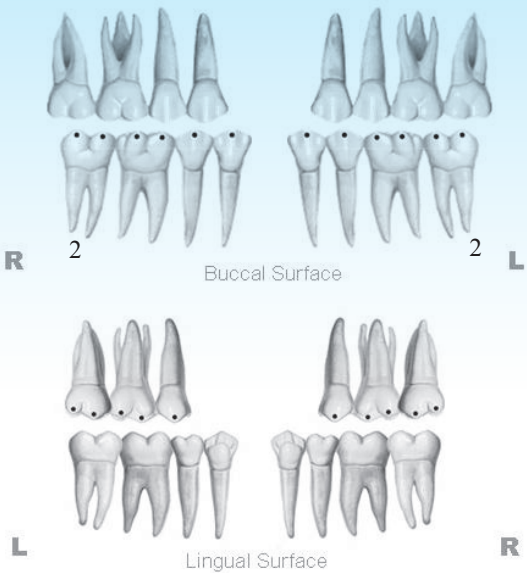


Overjet

1

Occlusal Contacts

4

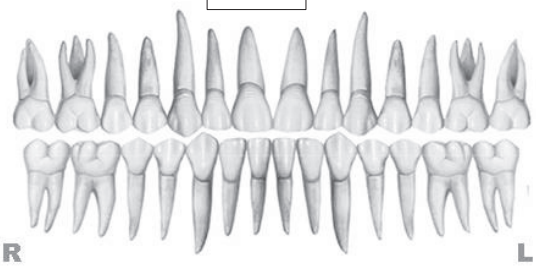


Occlusal Relationships

0

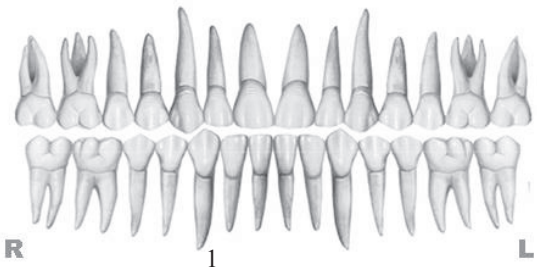
Interproximal Contacts

0



Root Angulation

1



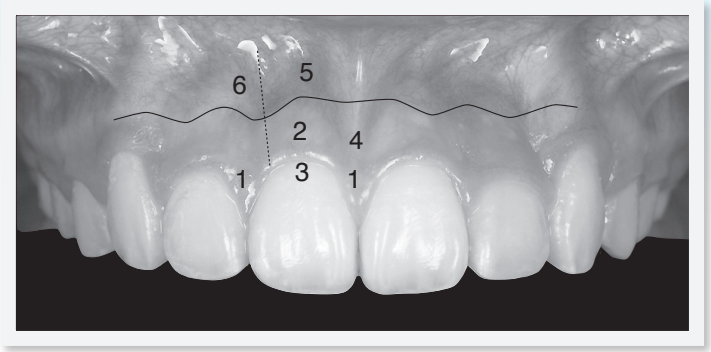
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 3

1. Pink Esthetic Score

Total = 1

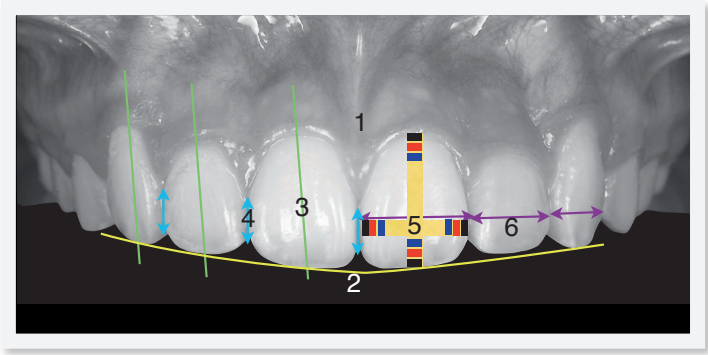


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

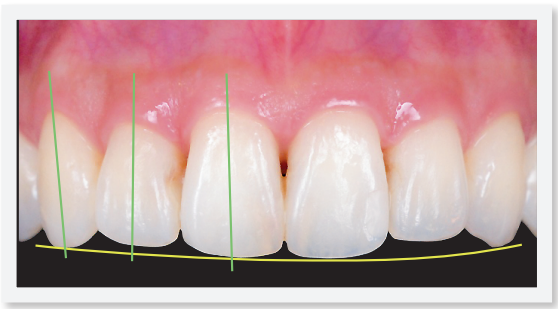
1. M & D Papillae	0	(1)	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	(0)	1	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	(0)	1	2

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