Early Interceptive Treatment for Maxillary Lateral Incisor and Canine Transposition

Abstract

History: *An 8yr-6mo girl was referred for orthodontic evaluation of bilateral blocked-out permanent canines that were labial to the roots of the lateral incisors. The patient and her family preferred an optimal correction without extracting permanent teeth.*

Diagnosis: *Facial convexity and the intermaxillary skeletal relationship were within normal limits (WNL), but the lower lip was retrusive. The crowns of the maxillary incisors were relatively well aligned, but roots of the laterals were displaced distally due to ectopic eruption of the canines on the labial surface. Molar relationships were end-on Class II bilaterally. Caries was noted on the mesial surface of the LL 2nd deciduous molar. The ABO Discrepancy Index (DI) was 29.*

Etiology: *Relatively small deciduous canines (Cs) were associated with deviated paths of eruption for the permanent canines (3s) resulting in ectopic eruption labial to the lateral incisor roots. Interceptive treatment was indicated to avoid transposition and periodontal problems.*

Treatment Plan: *Open space bilaterally in the maxillary canine areas. Extract the upper Cs and retract the ectopically erupted upper 3s into the expanded canine spaces. When the U3s are correctly positioned for eruption, bond a full fixed appliance in both arches, and install bite turbos on the palatal surface of the upper central incisors. Correct interdigitation and overjet with intermaxillary elastics, then detail and finish. Remove appliances and retain with upper 2-2 and lower 3-3 fixed lingual retainers.*

Outcomes: *Following 42 months of continuous mixed and permanent dentition treatment, this severe malocclusion (DI 29) was treated to an initial satisfactory result, as evidenced by an ABO Cast-Radiograph Evaluation (CRE) of 29. Three years later, eruption and settling of the 7s improved the outcome to excellent: CRE 19 points and the Pink & White dental esthetic score was 4.*

Conclusion: *A small upper C and lack of a canine eminence are indications to carefully monitor permanent canine development. If the path of eruption deviates to the mesial, extract the Cs and open space for the 3s. Expand the arch as needed and retract the erupting 3s to prevent transposition, periodontal problems, and the need to extract permanent teeth. (J Digital Orthod 2018;51:66-86)*

Key words:
Lateral incisor-canine transposition, ectopic canine eruption, interceptive treatment, Class II correction, non-extraction

Ectopic eruption of permanent canines may result in impaction, crowding, transposition, and/or periodontal compromise.[1,2] Canine transposition is most common with the first premolar or lateral incisor, but it may also involve the central incisor and second premolar. Compared to other teeth, the permanent maxillary canine (*U3*) has the longest developmental pathway, from the bud stage to full eruption into the oral cavity. Interceptive orthodontic treatment[3] to control genetic and environmental factors is often effective for redirecting an ectopically erupting canine to its normal position.[4,5] The disadvantages of early treatment for canine transposition are a prolonged treatment time of up to 50 months, that may result in a compromised outcome if treatment is terminated prematurely. However, early-treatment routinely decreases the extraction rate compared to late-treatment in the permanent dentition.[6]

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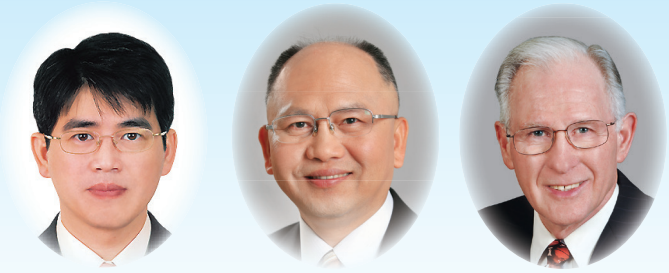


When interceptive therapy begins in the early mixed dentition, continuing mechanics into the permanent dentition involves an extended treatment, so it may be desirable to terminate prior to achieving ideal alignment of the second molars. It is hypothesized that the second molars will erupt and occlude normally if the dentition is ideally aligned from 6-6.

Diagnosis and Etiology

An 8-year-6-month-old girl was referred by her dentist for orthodontic consultation. Her chief concern was the crowded dentition with two blocked-out U3s labial to the lateral incisors (*Figs. 1-3*). Her upper dentition

Fig. 1: Pre-treatment facial and intraoral photographs

appeared to be well-aligned, but two blocked-out canines resulted in palatal movement of the roots of the upper lateral incisors. The retained upper deciduous canines (*UCs*) were relatively small (*Fig. 2*) and no root resorption was noted radiographically (*Fig. 4*). Both U3s were buccally superimposed over the adjacent lateral incisors in the early mixed dentition (*partial transposition*). The molar relationship was a bilateral end-on Class II (*Fig. 3*). The underlying skeletal pattern was WNL (*SNA 83.5°, SNB 79°, ANB 4.5°*), but there was a low mandibular plane angle (*SN-MP=30°*) (*Table 1*). The ABO Discrepancy Index (*DI*) was 29 as shown in the subsequent worksheet (*Fig. 3*).[7]

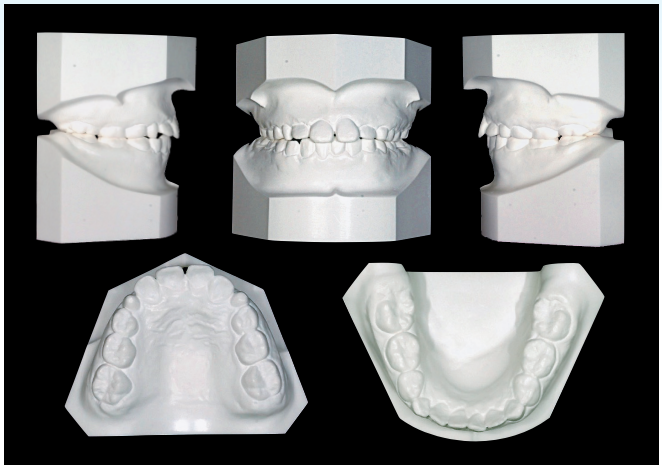


Fig. 2: Pre-treatment dental models (casts)

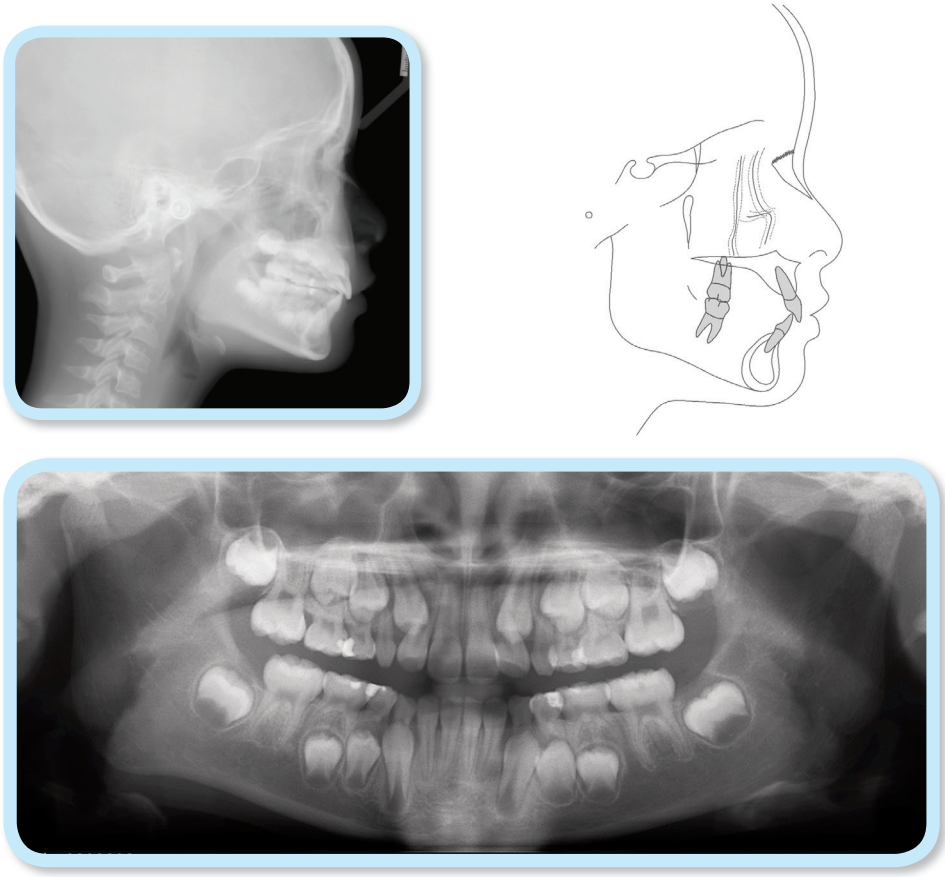
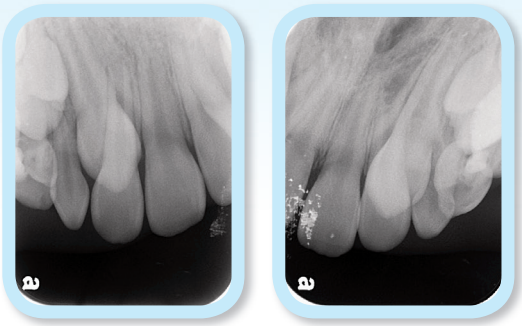


Fig. 3: Pre-treatment lateral cephalometric radiograph with tracing, and the initial panoramic radiograph



■ *Fig. 4:*
Periapical radiographs shows the canines overlapping the laterals.

CEPHALOMETRIC SUMMARY				
SKELETAL ANALYSIS				
	PRE-Tx	POST-Tx	DIFF.	F/U 3y
SNA°(82°)	83.5°	83.5°	0°	83.5°
SNB°(80°)	79°	81°	2°	81.5°
ANB°(2°)	4.5°	2.5°	2°	2°
SN-MP°(32°)	30°	29°	1°	27°
FMA°(25°)	23°	22°	1°	20°
DENTAL ANALYSIS				
U1 To NA mm (4 mm)	2 mm	7 mm	5 mm	7 mm
U1 To SN° (104°)	105°	121°	16°	121°
L1 To NB mm (4 mm)	5 mm	6.5 mm	1.5 mm	6 mm
L1 To MP°(90°)	102°	102°	0°	101°
FACIAL ANALYSIS				
E-LINE UL (2-3 mm)	1 mm	-2 mm	3 mm	-2.5 mm
E-LINE LL (1-2 mm)	1 mm	0 mm	1 mm	-2 mm
%FH: Na-ANS-Gn (53%)	54.6%	54.2%	0.4%	54.1%
Convexity: G-Sn-Pg' (13°)	11°	8°	3°	6°

■ Table 1: Cephalometric summary

Treatment Objectives

Achieve normal expression of facial growth in the anteroposterior, vertical, and transverse directions. Maintain normal buccolingual inclination of the dentition, especially the upper incisors after the protruded lower lip is corrected. Expand the inter-canine and inter-molar distances consistent with the apical base of bone.

Treatment Alternatives

There were three treatment options: 1. Extract upper lateral incisors (*U2s*) or ectopic U3s, retain the UCs, and align the compromised dentition. 2. Extract the UCs, allow the ectopic canines to erupt, and correct the subsequent malocclusion with fixed appliances. 3. In addition to extracting the UCs, open space in the mixed dentition, retract the U3s to their correct sagittal positions, and align the entire dentition as the buccal segments erupt. Option 1 would result in poor esthetics, compromised occlusal function, and the longterm prognosis for the UCs is uncertain. Option 2 involves a longer period with a compromised dentition, requires more steps to reverse the transposed teeth, and may result in a tooth-transposition outcome.[8] Extracting UCs may improve the position of palatally displaced U3s, but has little effect on reversing a transposition.[9] Option 3 focuses on correcting the relative positions of the U3s and the U2s in the early mixed dentition period. The latter requires three integrated procedures: extract the UCs, open space for the U3s, and retract them into the correct position. The normal dental sequence in the anterior segments is retained,

Fig. 5: In the mixed dentition, open coil springs between the U1s and UDs expand the upper arch sagittally and transversely.

until the permanent buccal segments erupt. Intermaxillary finishing is achieved with a full fixed appliance. If Class II mechanics are anticipated, it is wise to consult the patient and parents about the use of bone screws to control the anteroposterior positions of both dental arches.[10] The final result in the early permanent dentition should be monitored for at least three years after treatment to check the eruption of the 7s and evaluate stability of arch expansion during late adolescent growth.

Treatment Progress

For mixed dentition treatment, brackets were bonded on permanent upper central incisors (*U1s*) and first molars (*U6s*), in addition to the deciduous molars, bilaterally. No brackets were bonded on the U2s because their roots were in close proximity to the ectopic U3s. The UCs were retained until the midline diastema was closed between the U1s. U3s were sufficiently erupted to bond labial attachments for elastics to retract them. To correct the overjet, a high torque 0.022-in slot passive self-ligating (*PSL*) appliance Damon Q® bracket system (*Ormco Corp., Glendora CA*) was selected,[11] with an archwire sequence as described in Table 2. The initial archwire of 0.014-in CuNiTi was placed with open coil springs between the U1s and primary first molars (*UDs*) (*Figs. 5 and 6*). A month later, a 0.014x0.025-in CuNiTi wire was inserted for torque control of the upper central incisors. Lip seal exercises were prescribed to restrain the upper anterior segment. Seven months into treatment, a 0.017x0.025-in TMA archwire was placed and adjusted as needed (*Figs. 7 and 8*). Open coil springs continued to increase arch length for

Fig. 6:
Hypothetical Example: *if the lateral incisor is bonded with a bracket, and engaged on the arch wire, it would move labially into the ectopic U3, blocking its distal retraction (blue arrow) as well as risking root resorption.*

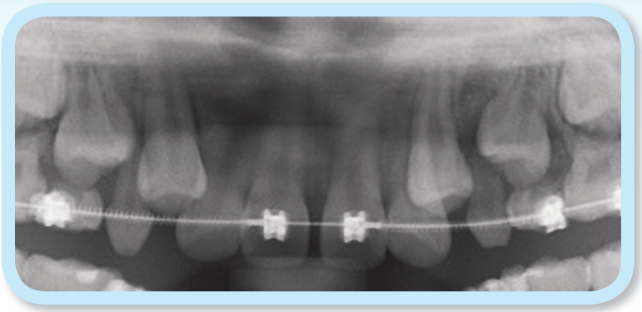


Fig. 7:
In the 6th month, the transposed U3s drifted distally as the arch was expanded.

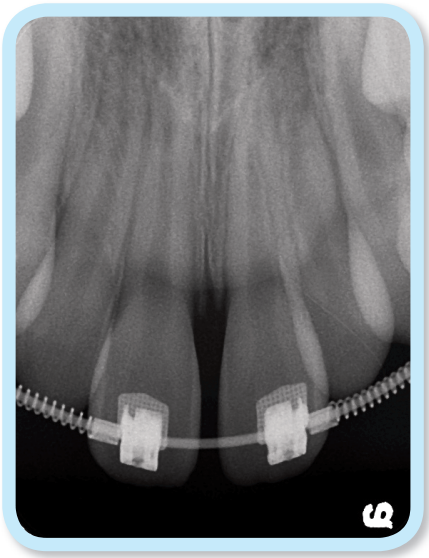
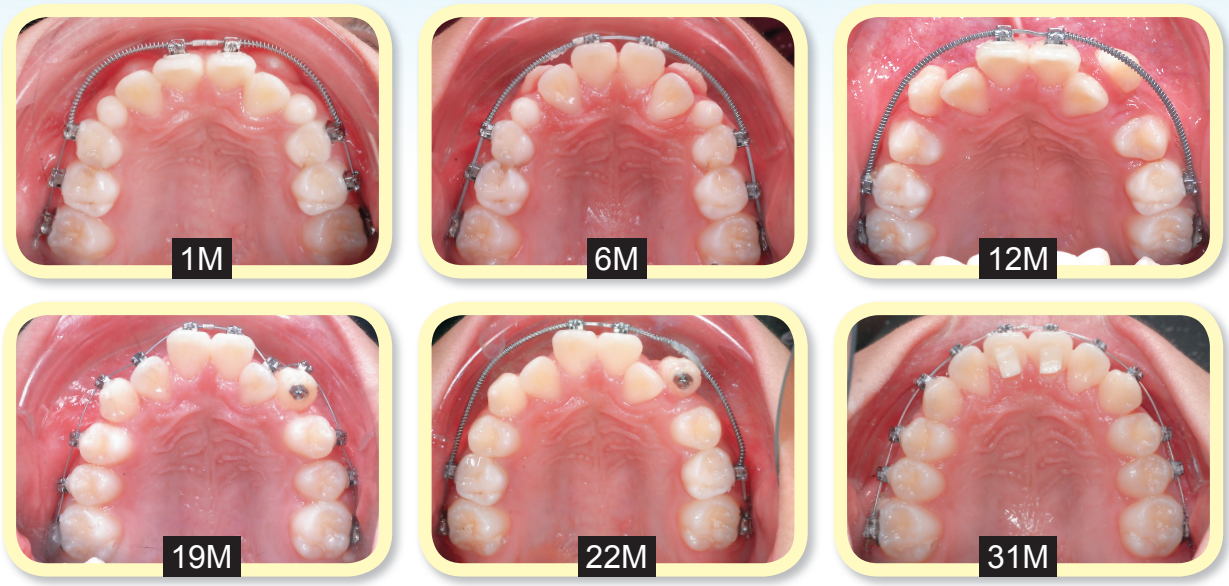


Fig. 8:
After 7 months of treatment, the partial transposition of the U3s was corrected.

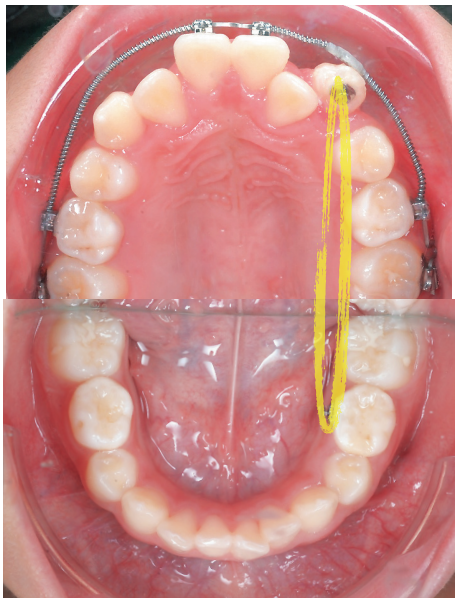
the permanent canines and they were allowed to erupt spontaneously. Due to the space opening required for the U3s, the overjet increased to 7mm (*Fig. 9*). Lip seal exercise instructions were provided to increase labial pressure on the flared teeth. In the tenth month, the UCs were extracted, because they were almost in contact with the U3s. The latter were guided into position with the archwire (*Fig. 10*). In the 19th month, lingual buttons were bonded on

Fig. 9:
Expansion of the upper arch to open space to align the U3s and U2s produced an iatrogenic increase in overjet.

the upper left canine and lower left second primary molar, to receive an intermaxillary elastic to guide the left flared canine into the dental arch (*Figs. 11 and 12*). Two months later, after the upper right primary second molar had exfoliated, a light-cured resin stop for the open coil spring was bonded on the archwire. Five months later, bracket bonding was completed for the entire upper permanent dentition and a 0.014-in CuNiTi archwire was placed (*Fig. 13*). In the 30th month, Damon Q PSL brackets were bonded on the lower dentition, and a 0.014-in CuNiTi archwire was inserted (*Fig. 14*). Bite turbos were bonded on the upper central incisors for deep bite correction



■ *Fig. 10:*
A progressive series of maxillary occlusal photographs document the alignment of the upper arch from 1-31 months (M), and the installation of bite turbos on the palatal surfaces of the U1s. See text for details.



■ *Fig. 11:*
Nineteen months into treatment, light-cured flowable resin on the coil spring engaged the UL3, as it was retracted with an elastic attached to the lingual surface of the LL deciduous molar. See text for details.

(*Fig. 10*). Two months later, a 0.018-in CuNiTi archwire was engaged on the upper dentition for continued leveling. In the 35th month, a 0.014x0.025-in CuNiTi was placed and Class II elastics (*Parrot 5/16-in 2-oz*) were used to retract the UL3 and LLD utilizing drop-in hooks on the canine brackets. The upper and lower anterior segments were tied together with a figure-of-eight ligature. The posterior residual spaces were closed with power chains. Two months later, a new upper 0.017x0.025-in TMA arch wire was placed. The force level of the Class II mechanics was increased from the U3s to lower first molars (*L6s*) with Fox 1/4-in 3.5-oz elastics.

After 37 months of treatment, the 0.019x0.025-in CuNiTi lower arch wire with additional lingual crown torque was used to upright the anterior dentition,

Fig. 12:
A progressive series of left buccal photographs from 1-31 months (M) shows the alignment sequence for the UL3. See text for details.

Fig. 13:
Low torque brackets were bonded on the upper incisors to reduce flaring as the ectopic canines were aligned. See text for details.

Fig. 14:
After 30 months of mixed dentition treatment, a full fixed appliance from 6-6 was bonded on both arches.

and space was closed with power chains. One month later, a lower TMA wire with minor adjustments for occlusal detailing was placed. In the 42nd month, all fixed appliances were removed. Fixed lingual retainers were delivered in both arches. The upper second molars were still erupting.

Facial Result

Lip protrusion was decreased ~2mm to the E-Line, and facial convexity was reduced to 8˚ with good facial balance. The lower face grew downward and froward ~15mm, and ANB angle decreased from 4.5 to 2.5. Maxillary and mandibular dimensions were enhanced in the anteroposterior, vertical, and transverse planes. Inclination of the upper incisors was increased from 105˚ to 121˚ (*Figs. 15-17, and Table 1*).

Dental Result

A Class I occlusion with coincident dental midlines was achieved (*Figs. 15 and 16*). Favorable expression of lower facial growth facilitated the correction of the molar relationship, and iatrogenic overjet (*Figs. 16 and 17*). Increased axial inclination of the upper incisors was noted despite the extensive use of Class II elastics (*Fig. 18*).

Fig. 15: Post-treatment facial and intraoral photographs after 42 months of active treatment

The Cast Radiograph Evaluation score was 29 points, as shown in the Supplementary Worksheet 2. Points deducted were for marginal ridge discrepancies (6), buccolingual inclination (13), overjet (2) and occlusal contacts (3). Many of the alignment problems were secondary to incomplete eruption of the 7s. No permanent teeth were extracted, all teeth were well aligned in the normal sequence, and dental esthetics were excellent, as evidenced by a Pink and White Esthetic Index of 4 (*Supplementary Worksheet 3*).

Fig. 16: Post-treatment dental models (casts)

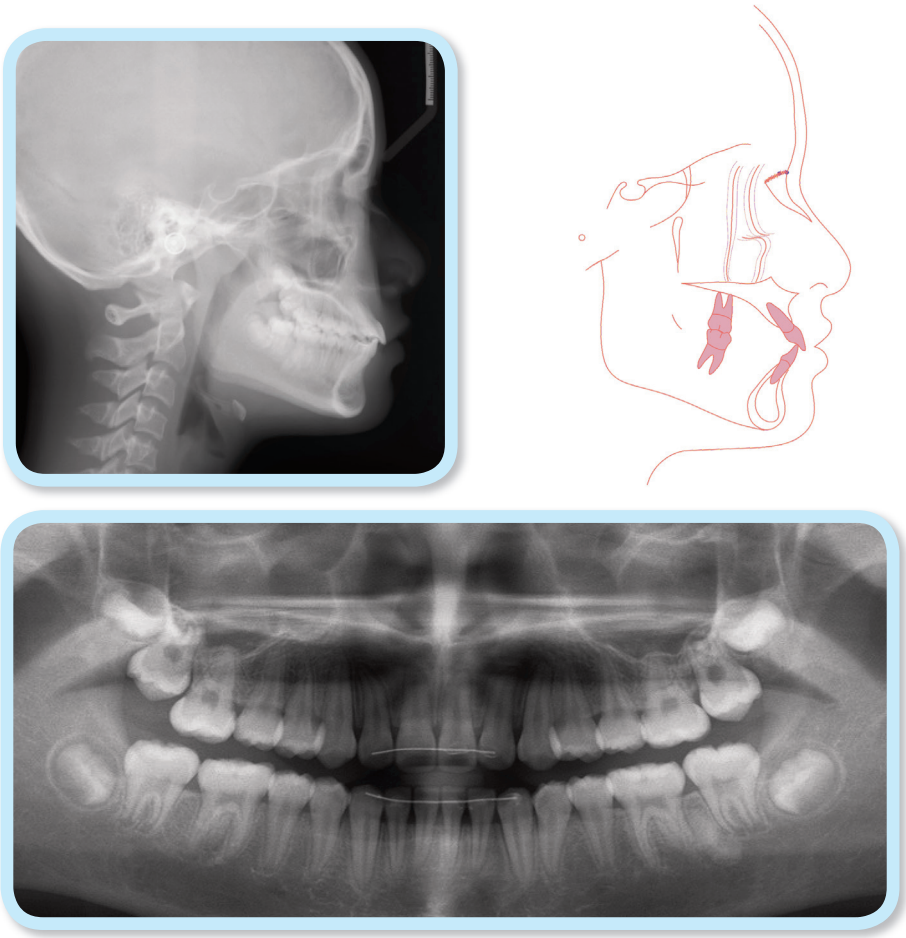


Fig. 17:
***Upper**: Post-treatment lateral cephalometric radiograph and tracing*
***Lower**: Post-treatment panoramic radiograph*

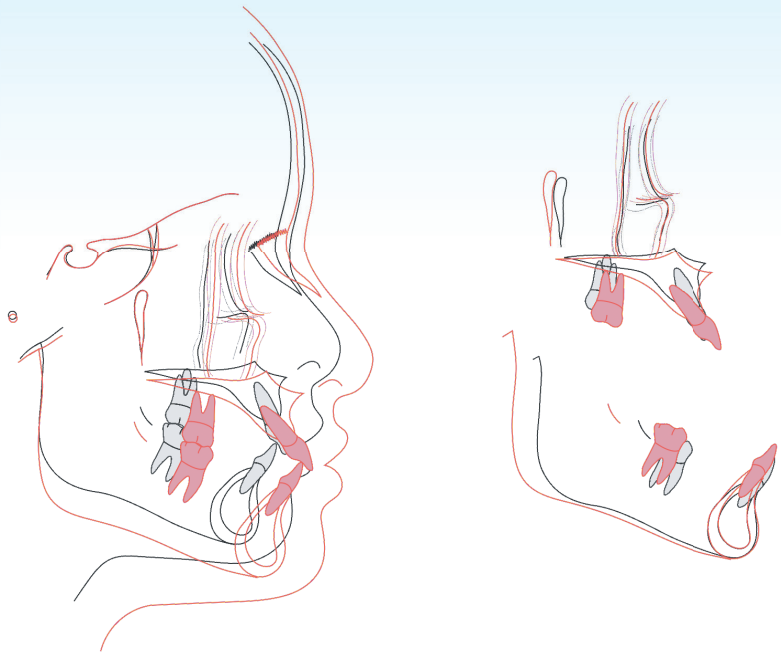


Fig. 18:
The anterior cranial base grew 4mm anteriorly during 42 months of active treatment. As usual the mandible grew further anteriorly than the maxilla, which improved the facial profile. See text and Table 1 for details.

Retention

Fixed retainers were bonded on the lingual surfaces of four upper incisors (2-2) and all lower anterior teeth (3-3). Upper and lower clear overlay retainers were provided and full time wear was prescribed for the first 6 months and nights only thereafter. The patient was instructed in home hygiene as well as care and maintenance of the retainers.

Discussion

Tooth transposition is presently defined as an interchange in the position of two adjacent teeth. Transposition of tooth crowns may be partial or complete depending on the respective positions of the roots. The problem is more common in the upper arch with the U3s as the most frequently involved teeth. Prevalence is <1% in most studies with a mean prevalence of 0.33% that was established with a meta-analysis.[12] In 1995, Peck and Peck[13] classified maxillary tooth transposition, according to the teeth involved. The 5 types described were primarily related to position of the U3s.[14] Etiology of maxillary permanent canine (*U3*) transposition is related to the complex development of the late mixed dentition period. The U3s have the longest developmental period, and path of eruption from germination, from just below the orbit in the fetal period, through calcification beginning 4-5 months after birth, to culminating with eruption into full occlusion at ~12 years age. The latter marks the beginning of the permanent dentition period.

As the tooth buds grow in the underdeveloped fetal jaw, the developing maxillary cuspid is superior and palatal to the first premolar initially, but then

migrates mesially and labially as tooth roots develop and jaw dimensions increase. Adjacent teeth develop and erupt leaving the canines to wedge between the growing roots and the U3s are usually displaced to the labial. The canine crown typically moves trough the labial plate of bone producing a canine bulge (*eminence*) on the alveolar surface that can be palpated and observed facially by the age of 8-10 years. Bony obstructions, dental crowding and resistance from adjacent structures, such as the unabsorbed root of a deciduous canine, may deflect the path of the growing canine resulting in transposition or impaction. Spontaneous eruption of an ectopic canine may jeopardize the roots of adjacent teeth particularly the lateral incisor.[15] The resorbed root of the lateral incisor is significantly correlated to encroachment of an ectopic canine. Resorbed incisor roots usually have good long-term healing potential and can be treated orthodontically.[16] The best strategy for efficiently reversing U3 transposition is early diagnosis and interceptive treatment.[17,18]

An important objective for interceptive orthodontic treatment is to correct transposition of U3(*s*) to achieve an optimal outcome with little or no root resorption (*Fig. 19*). This goal is best achieved with two phases of treatment for most patients. Mixed dentition treatment focuses on reversing the transposition and aligning the dentition prior to the late transition phase of occlusal development (*age 10-12yr*). Permanent dentition treatment is best accomplished after the second molars erupt. Avoiding incisal root resorption depends on effective management of a U3 transposition before the pubertal growth spurt.[18] Clinical palpation of the

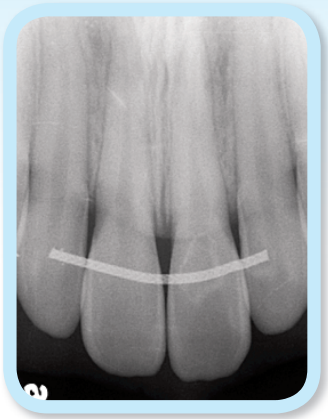


Fig. 19:
The root integrity of the maxillary incisors was preserved by interceptive orthodontic treatment.

canine eminence of the U3s high on the alveolar process and above the deciduous cuspid is an effective diagnosis tool beginning about the age of eight.[19] If the bulge (*canine eminence*) is not evident by age 10, radiographic imaging is indicated to determine if there is a developmental problem.

A NiTi open coil spring is useful for expanding the arch and creating space to accommodate the U3 which is considerably larger than the UC (*Fig. 20*).[20] If upper arch expansion is indicated in the mixed dentition, the D-gainer Damon system appliance is more gentle and effective with minimal risk of periodonal loss.[21,22] Teeth with roots near the crown of the unerupted U3 (*e.g. the U2*) should not be bonded so that they are free to move out the way of the path of eruption. For the present patient, the Damon D-gainer provided more than 5mm of space, which is comparable to traditional rapid or slow palatal expansion (*Fig. 21*). For optimal expansion, the length of the open coil spring should be 1-1.5 times the mesio-distal width of the bracket to

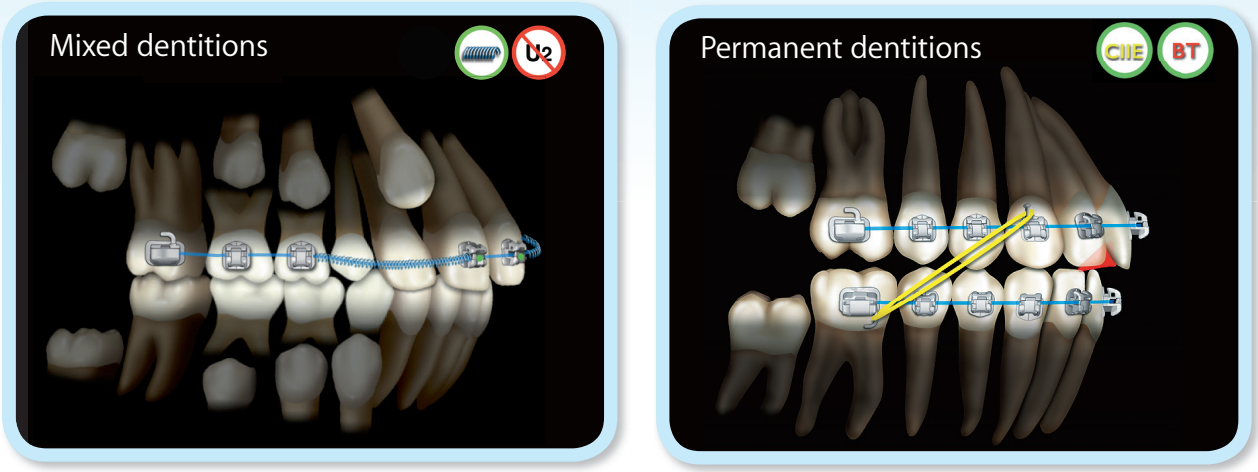


Fig. 20:

***Mixed Dentition**: Interceptive orthodontic treatment reversed the lateral incisor-canine transposition without bonding the upper lateral incisor (U2). See text for details.*

***Permanent Dentition**: A full fixed appliance (6-6), Class II elastics (CIIE) and bite turbos (BT) were used to correct the protrusive maxillary arch and overjet. See text for details.*

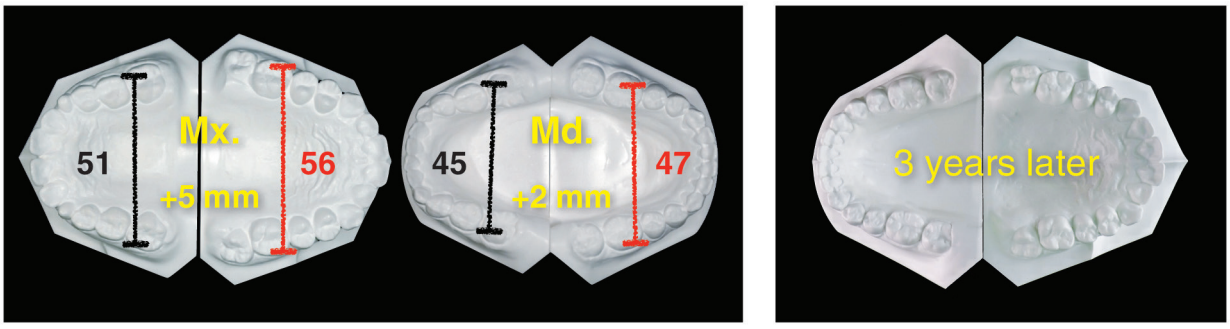


Fig. 21:

***Left**: Intermolar distance was expanded 5mm in the upper arch and 2mm in the lower arche during active treatment.*

***Right**: The post-treatment expansion was stable in both arches 3 years later.*

provide a light expanding force when threaded on a 0.014-in CuNiTi wire. In the absence of competent lips, progressive expansion of the maxillary arch to accommodate the U3 resulted in excessive maxillary incisor flaring (*Fig. 22*). Bonding low-torque brackets on the upper anteriors would have reduced this side effect.

Nine months into treatment, an iatrogenic increase in overjet was noted (*Fig. 22*), which was related to the 14 months of arch expansion and space opening that was required to achieve adequate arch length. As the space was opened, the U3s drifted distally but the overjet increased to 7mm (*Fig. 23*). It was necessary to consider upper premolar extractions because the patient was <10 years old and the second molars were

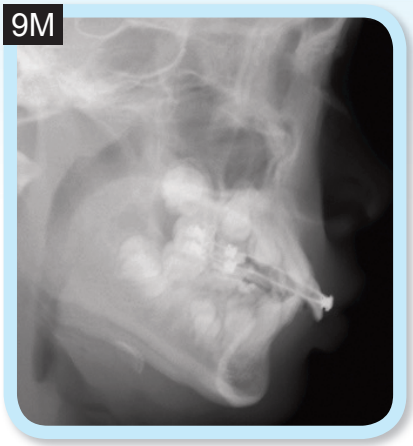


Fig. 22:
In the ninth month of treatment the overjet increased as the maxillary arch was expanded. See text for details.

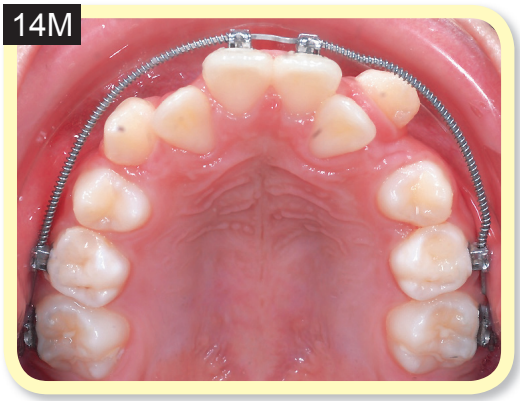


Fig. 23:
At 14 months of active treatment, the upper right canine had drifted distally to almost its normal position in the arch.

not erupted. An option to extraction is headgear or retraction of the upper arch with a temporary anchorage device (*TAD*), but either approach can block eruption of the U7s. Overjet can also be reduced with a fixed functional appliance that promotes mandible growth,[23,24] but the current prepubertal patient was growing slowly, and excessive flaring of the lower incisors was likely. All considered, the best option was deemed: 1. align the upper arch, 2. bond brackets on the remaining dentition from 6-6 in both arches when the buccal segments erupt, 3. bond bite turbos on the palatal surfaces of the central incisors, and 4. correct the overjet with Class II elastics (*Fig. 20*).

During active treatment, the first molars were expanded 5mm in the maxilla and 2mm in the mandible. Three years later, the inter-molar distance in the maxilla was stable at 56mm (*Fig. 21*), compared to the contraction (*relapse*) that is typical of patients expanded with a rapid palatal expander (*RPE*).[25] The iatrogenic increase in overjet first noted at nine months (*Fig. 22*), was corrected to an ideal Class I occlusion with no overjet that was stable (*Fig. 24*).

Fig. 24: Three years after treatment, there is an ideal Class I occlusion with second molars fully erupted into full occlusion.

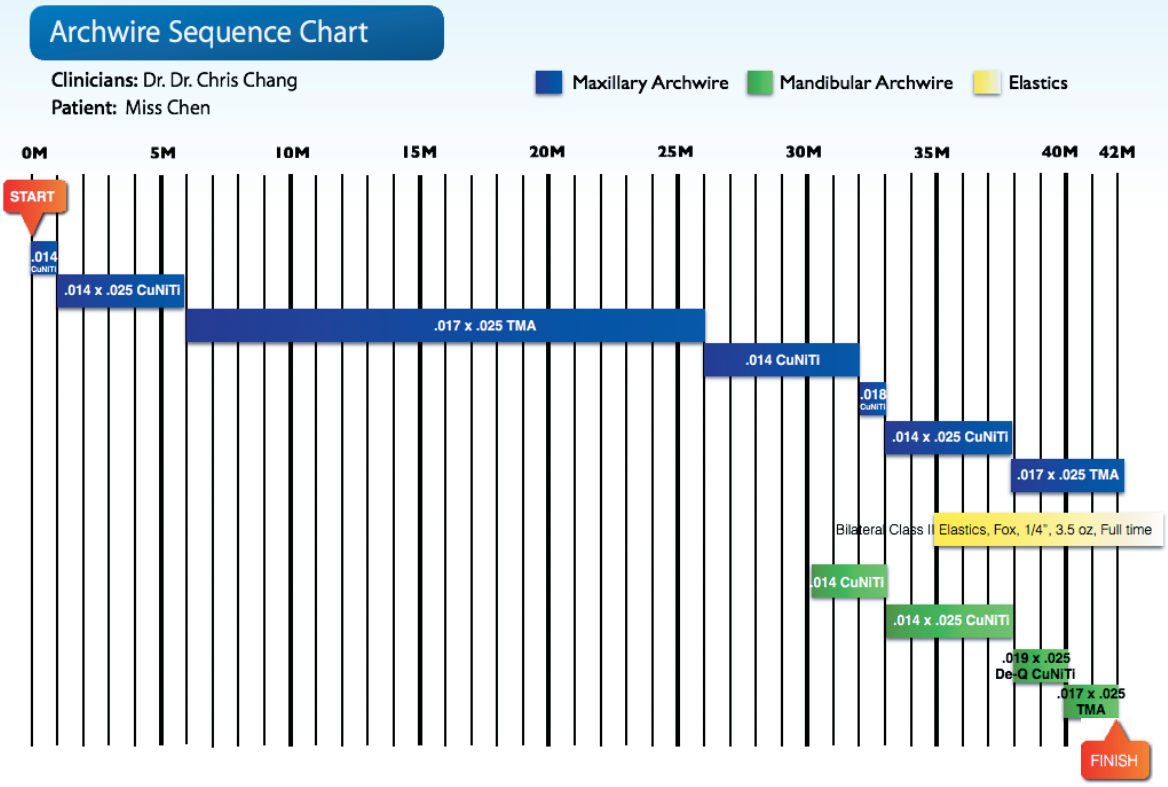


Table 2: Archwire sequence chart documents the mechanics of active treatment. See text for details.

Forty-two months of merged mixed and permanent dentition treatment resulted in a compromised outcome (*CRE 29*) with the most prominent deficiency being 13 points deducted for buccal-lingual inclinations. Because of the extended treatment time, only the permanent dentition from 6-6 was bonded and aligned with the fixed appliance. The erupting second molars were not bonded or aligned. It was hypothesized that the second molars would settle into acceptable relationships because the dentition from 6-6 was well aligned. That hypothesis was accepted because the alignment score improved 10 points to a CRE of 19 three years after treatment (*Worksheet 3 at the end of this report*). Lip protrusion and facial convexity decreased to achieve the desired facial result three years later (*Fig. 25*).

There are two keys to optimal resolution of the canine-lateral incisor transposition. One is to avoid bonding a bracket on the lateral incisor and the other is to keep the transposed canine as high as possible until it is clear of the roots of adjacent teeth.[16] In general, canine transpositions are most effectively managed in the early mixed dentition so diagnosis of the problem by about age 8 years is critical. If the transposed maxillary canine fully erupts, it is almost impossible to correct the problem without significant root resorption[26] and periodontal damage.[27] When transposed canines are fully erupted, it is often best to accept the transposition. If there is significant crowding, extraction of lateral incisors is usually preferable to removing premolars.

Fig. 25:
The facial profile continued to improve from pre-treatment (left), through post-treatment (center) to 3 years after treatment.

Conclusion

Early diagnosis and interceptive orthodontic treatment can correct an ectopically erupted tooth. This approach is designed to avoid transposition in the permanent dentition, as well as root resorption and/or periodontal defects. When the transposed canine is still high in the alveolar process, the path of tooth eruption can be redirected with a specific strategy: 3D radiographic imaging, arch expansion, removing dental or bony obstacles, and applying orthodontic traction. Careful clinical and radiographic evaluation of treatment progress is essential. Orthodontic treatment of the canine transposition often requires a long treatment time (*~4 years*) from the early mixed dentition (*~age 8*) until the initial permanent dentition (*~age 12*). However, interceptive treatment is the most effective approach for achieving harmonious esthetics and an optimal occlusion.

Acknowledgement

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 29

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 = 2

OVERBITE

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

Total = 2

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	4 pts.
Full Class II or III	=	4 pts. per side	____ pts.
Beyond Class II or III	=	1 pt. per mm. additional	____ pts.

Total = 4

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° 102° = 1 pt.

Each degree > 99° _____ x 1 pt. = 3

Total = 4

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. =	2
Tooth transposition	2	x 2 pts. =	4
Skeletal asymmetry (nonsurgical tx)		@ 3 pts. =	_____
Addl. treatment complexities	2	x 2 pts. =	4

Identify: Treatment since early mixed dentition, unacertained mandible growth

Total = 10

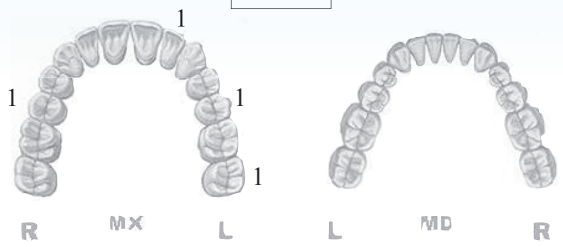
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 29

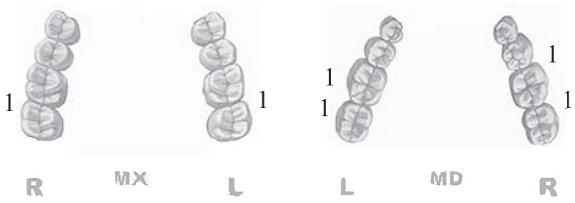
Alignment/Rotations

4



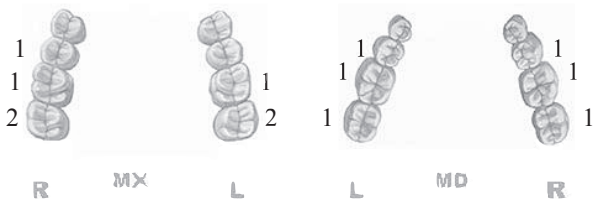
Marginal Ridges

6



Buccolingual Inclination

13

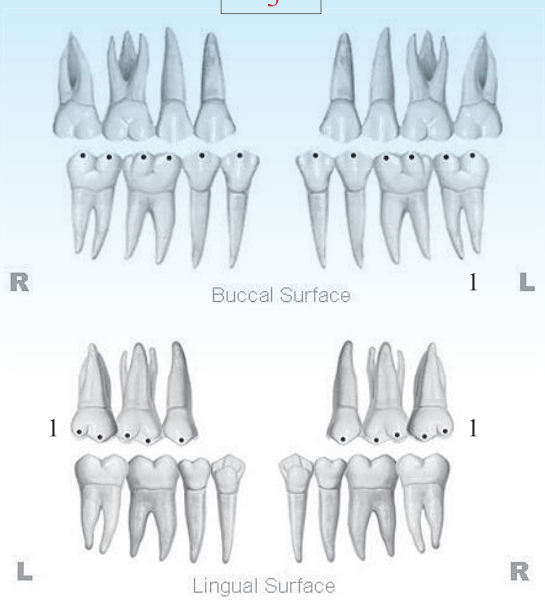


Overjet

2

Occlusal Contacts

3

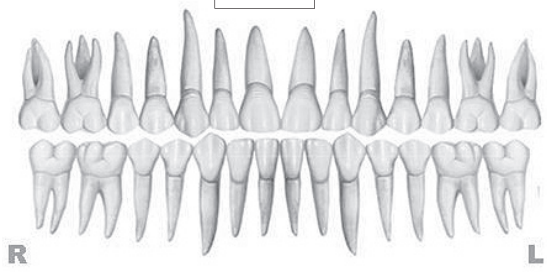


Occlusal Relationships

0

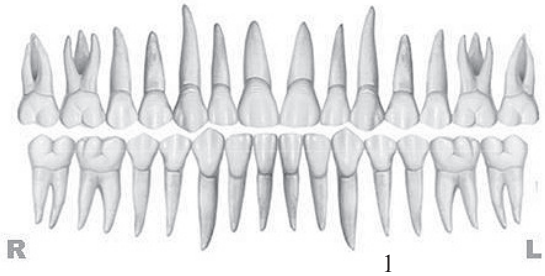
Interproximal Contacts

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.

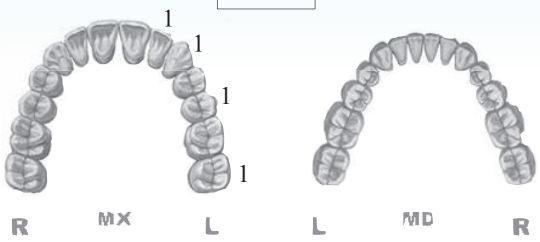
Cast-Radiograph Evaluation
3yrs F/U

Case # **Patient**

Total Score: 19

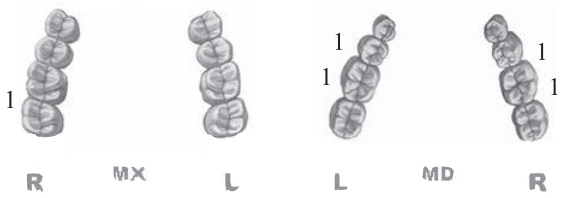
Alignment/Rotations

4



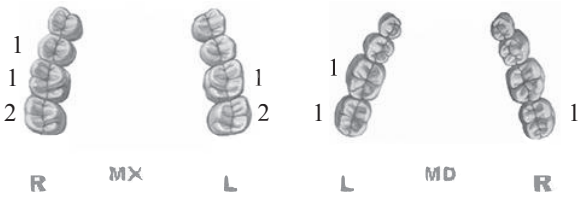
Marginal Ridges

5



Buccolingual Inclination

10

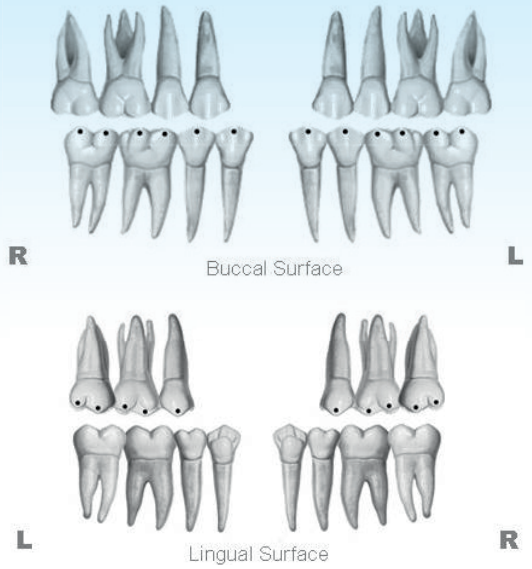


Overjet

0

Occlusal Contacts

0

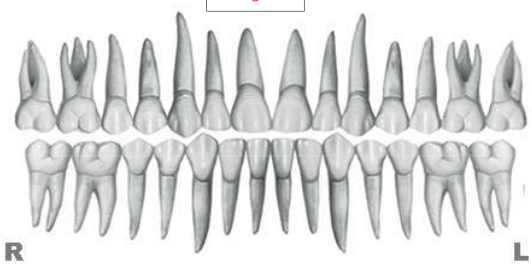


Occlusal Relationships

0

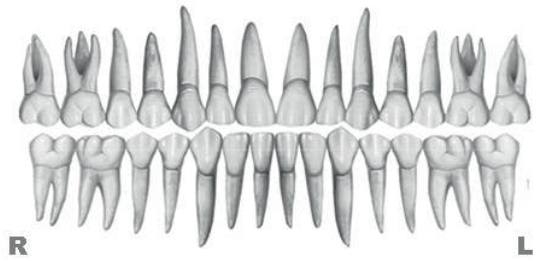
Interproximal Contacts

0



Root Angulation

0



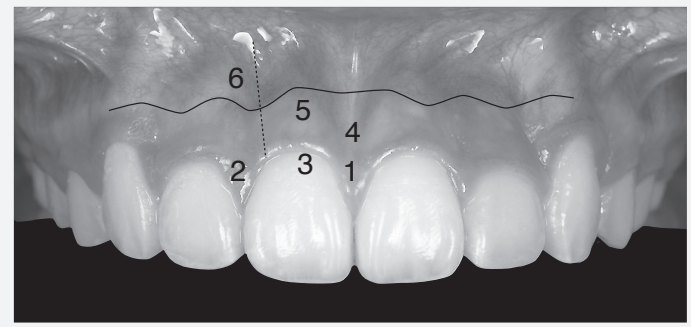
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

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

Total Score: = 4

1. Pink Esthetic Score

Total = 1

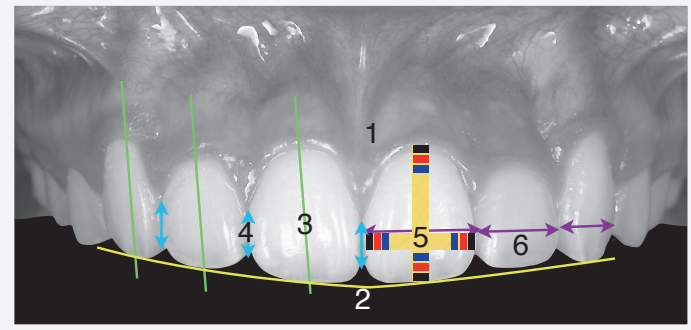


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

1. M & D 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

2. White Esthetic Score (for Micro-esthetics)

Total = 3



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