Mutilated Class III Malocclusion with Anterior Crossbite and Autotransplantation of Two Molars

Abstract

***Introduction**: A 20-year-old female presented for orthodontic consultation to evaluate chief complaints of multiple caries, lower arch spacing and a protrusive lower lip.*

***Diagnosis**: Clinical and radiographic examination revealed a straight facial profile (G-Sn-Pg' 3˚), protrusive lower lip, hypermentalis activity, lower dental midline deviated to the left, asymmetric Class III/I subdivision-right malocclusion, wide arches, 6mm of space in the lower arch, and a relatively high mandibular plane angle (SN-MP 45˚). Panoramic radiography revealed a hopeless UR6, missing LL7 and an endodontically-treated LL6 with periapical sclerosis. The Discrepancy Index was 54 points.*

***Treatment**: A passive self-ligating appliance was installed to align the dentition and prepare implant sites. Two teeth (UR6, LL6) were subsequently extracted and the sites were immediately transplanted with the LR7 and UL8, respectively. A mandibular buccal shelf (MBS) bone screw (BS) was placed mesial to the LR8 for anchorage to retract the lower right segment to close space and correct the dental midline. Lower buccal segments were differentially retracted with BS anchorage and Class III elastics to correct the asymmetric Class III interdigitation. Third order correction and finishing were accomplished with rectangular archwires and a root torquing auxiliary. The active treatment time was 38 months.*

***Outcomes**: Excellent dental and periodontal results were achieved. Cast-Radiograph Evaluation was 27 and the Pink & White Esthetic Score was 2. Lip protrusion and incompetence were corrected to the patient's satisfaction. The lower lip was retracted and lower facial height increased. The facial changes reflected an undiagnosed functional shift in occlusion, extruded lower molars, a 2˚ clockwise rotation of the mandibular plane, as well as retraction and extrusion of the lower incisors.*

***Conclusions**: Autogenous molar transplantation is a cost-effective option for correction of a complex, mutilated malocclusion. It is important to carefully assess functional shifts in occlusion particularly if there are wear facets on the teeth. (J Digital Orthod 2019;54:4-23)*

Key words:
Class III, mutilated malocclusion, passive self-ligating appliance, buccal shelf miniscrew, dental transplantation, anterior crossbite, interdisciplinary treatment, midline deviation

History and Etiology

A 20-year-old female presented for orthodontic evaluation with chief complaints: multiple caries, lower arch spacing and a protrusive lower lip. Clinical and cephalometric evaluations showed an intermaxillary discrepancy (*ANB 1˚*) that was due to a slightly protrusive mandible (*SNB 84˚*). The straight facial profile (*G-Sn-Pg' 3˚*) was associated with increased lower facial height (*58.5%*), lower lip protrusion (*0.5mm to the E-Line*), and hypermentalis strain when the lips were closed (*Fig. 1*). This morphologic pattern is commonly referred to as an increase in lower facial height (*LFH*) and/or an excessive vertical dimension of occlusion (*VDO*). An

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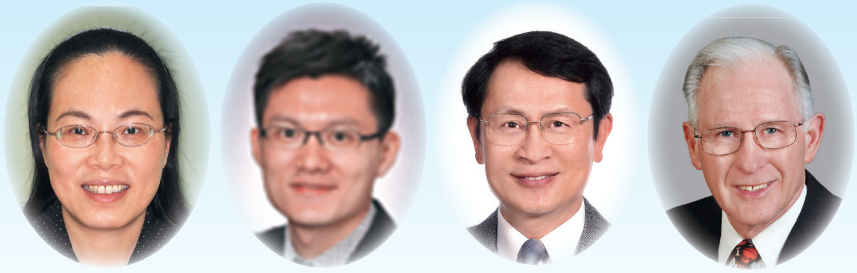

intraoral examination and study casts revealed canine and molar relationships that were Class III on the right side and Class I on the left (*Class III/I subdivision-right malocclusion*). A -1.5mm negative overjet was associated with an anterior openbite (*1-2mm*), and there was 6mm of spacing in the lower arch (*Fig. 2*). The lower dental midline and chin were both shifted to the left (*Fig. 1*).

Fig. 1: Pre-treatment facial and intraoral photographs

Cephalometric analysis revealed a straight facial pattern (*G-Sn-Pg' 3˚, SNA 85˚, SNB 84˚, ANB 1˚*), with a high mandibular plane angle (*SN-MP 45˚*) (*Fig. 3 & Table 1*). The panoramic radiograph (*Fig. 4*) showed two teeth are missing: UR8 and LL7. The UR6 was severely decayed and the endodontically treated LL6 had a large periapical lesion on the distal root.

Interdisciplinary treatment with bone screw (*BS*) anchorage[1-3] is indicated to correct the deviated midline. Instead of extractions and implant-supported protheses, the patient preferred orthodontic preparation for autotransplantation (*LR7 to replace UR6, and UL8 to replace LL6*), followed by comprehensive orthodontics to align both arches and close space.

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA˚ (82°)	85˚	85˚	0˚
SNB˚ (80°)	84˚	83˚	1˚
ANB˚ (2°)	1˚	2˚	1˚
SN-MP˚ (32°)	45˚	47˚	2˚
FMA˚ (25°)	38˚	40˚	2˚
DENTAL ANALYSIS			
U1 To NA mm (4 mm)	6 mm	4.5 mm	1.5 mm
U1 To SN˚ (104°)	107˚	103˚	4˚
L1 To NB mm (4 mm)	8 mm	6 mm	2 mm
L1 To MP˚ (90°)	80˚	68˚	12˚
FACIAL ANALYSIS			
E-LINE UL (-1 mm)	-4.5 mm	-3 mm	1.5 mm
E-LINE LL (0 mm)	0.5 mm	-0.5 mm	1 mm
Convexity: G-Sn-Pg' (13°)	3˚	4.5˚	1.5˚
%FH: Na-ANS-Gn (53%)	58.5%	59.5%	1%

Table 1: Cephalometric summary

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

Fig. 3: Pre-treatment lateral cephalometric radiograph

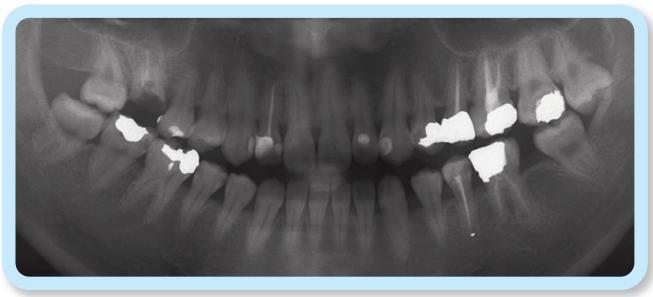

Fig. 4: Pre-treatment panoramic radiograph

Diagnosis

Skeletal:

- Lower face protrusion: *SNA 85˚, SNB 84˚, ANB 1˚*
- Mandibular plane angle was increased: *SN-MP 45˚, FMA 38˚*
- Facial asymmetry: *The chin point is deviated to the left.*

Dental:

- Buccal (*canine and molar*) relationships: *Class III on the right and Class I on the left.*
- Overjet: *-1.5mm, negtive overjet*
- Anteior openbite: *1-2mm*
- Spacing: *6mm in the lower arch*
- Missing teeth: *UR8 and LL7*
- Midlines: *Lower dental midline was shifted to the left.*
- Arch-forms: *Wide arches*

Facial:

- Profile: *Decreased convexity (G-Sn-Pg' 3˚)*
- Nasolabial Angle: *Increased due to retrusive upper lip (-4.5mm to the E-Line).*
- Anterior-Posterior: *Prognathic mandible, maxilla was within normal limits (WNL)*
- Protrusive lower Lip: *0.5mm to the E-Line*
- Hypermentalis Strain: *On lip closure*

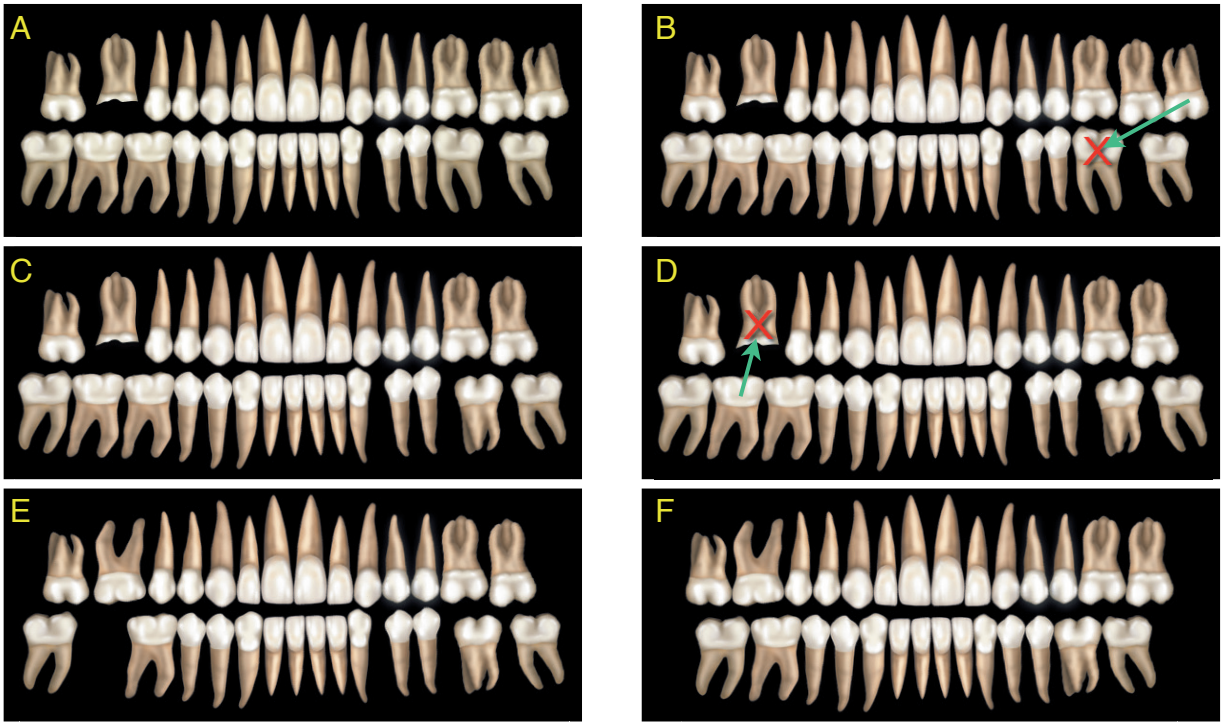

Fig. 5:
A. Pre-treatment mutilated malocclusion. B. Plan for extracting the LL6 and replacing it with an autotransplantation of the UL8. C. After the initial autogenous tooth transplant. D. Plan for replacing the UR6 with autotransplantation of the LR7. E. After the second autogenous tooth transplant. F. Final result after orthodontic alignment.

The American Board of Orthodontics (*ABO*) Discrepancy Index (*DI*) was 54 points as shown in the subsequent Worksheet 1.[4]

Treatment Objectives

1. Level and align both arches.
2. Correct overjet and overbite.
3. Retract the lower lip and control the VDO to relieve mentalis strain.
4. Maintain the maxilla and mandible in all three planes.
5. Maxillary and mandibular dentition:
   a. Orthodontic alignment for autotransplantation: LR7 → UR6, UL8 → LL6
   b. Optimal intermaxillary alignment
   c. Close interproximal spaces
   d. Ideal overjet and overbite
   e. Class I canine and molar relationships
6. Facial esthetics: Retract the protrusive lower lip and establish lip competence

Treatment Alternatives

Interdisciplinary options were orthodontics, implants, prostheses and autotransplants. After a thorough discussion, the patient preferred a camouflage treatment plan: periodontal treatment, restorative replacement of amalgam restorations, presurgical orthodontic preparation, autotransplantation, and comprehensive orthodontics for optimal alignment and space closure.

Treatment Progress

Since the patient had multiple carious lesions and poorly restored teeth, it was important to stabilize dental health. A periodontist was consulted for a complete evaluation of periodontal health and to plan the autogenous transplants. Oral hygiene, scaling and root planning were performed. Then the patient was referred for restorative dentistry to restore caries and reconstruct poorly restored teeth (*Fig. 6*). After 11 months of general dental care, a

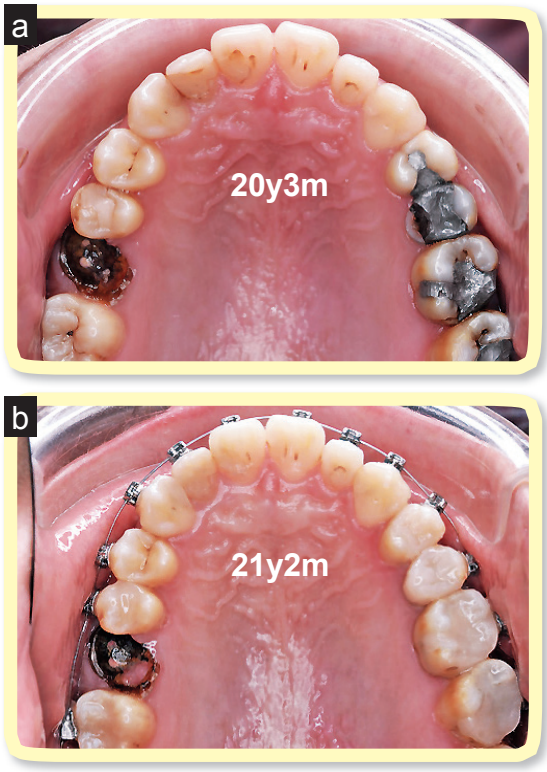

Fig. 6:
a. Pre-treatment view (20y3m) of the maxillary arch showing multiple teeth on the left restored with amalgam. b. Post-treatment view (21y2m) after the amalgam restorations were replaced with composite resin.

full fixed 0.022-in slot Damon Q® bracket system (*Ormco, Brea, CA*) was installed. Archwires, elastics and auxiliaries were provided by the same supplier. All brackets were standard torque (*Fig. 7*), and the initial archwires were 0.014-in CuNiTi for both arches. The entire dentition was bonded including UL8, LL6 and LR7. Orthodontic alignment was used to mobilize teeth in order to reduce extraction trauma and maintain intact PDL tissue on teeth to be transplanted (*Fig. 8*).[5] Orthodontic stimulation widens the PDL by stimulating alveolar bone resorption and increasing periodontal vascularity. This approach helps preserve PDL vitality during and after the surgical procedure.[6]

Fig. 7: All brackets were standard torque.

In preparation for the autogenous tooth transplantation from the UL8 to the LL6 site, an analog of the donor tooth (*UL8*) was produced from a 3D print of the CBCT image.[7] Analysis of the 3D image of the UL8 revealed a rotation of 90 degrees was required to achieve the best fit in the LL6 extraction socket. The sterilized UL8 analog was used to prepare the recipient site to achieve a socket slightly larger than the donor tooth (*Fig. 9*). Occlusal reduction and fixation grooves were prepared before extracting UL8. Following the prescribed two months of tooth movement, the donor tooth was easily removed with intact PDL tissue on the root. The transplant with an extraoral time <60 secs was fixed into place with a non-rigid fixation method for 2 weeks (*Fig. 10*).[8,9] One month after surgery, the LL6 recipient tooth was well healed, and after 3mo there were no symptoms nor evidence of root resorption (*Fig. 11*). At the same appointment, the archwires were changed to 0.018-in CuNiTi in both arches. Orthodontic preparation of the UR6 site was required because severe caries had reduced the arch-length at the crest to 8mm which was too small to receive the 10mm wide LR7 donor tooth. A compressed coil spring between the UR7 and UR5 was used to open

Fig. 8:
UL8 , LL6 and LR7 were bonded with brackets and aligned with the archwire for mobilization of the teeth in preparation for an extraction designed to maintain PDL cells on the root surfaces.

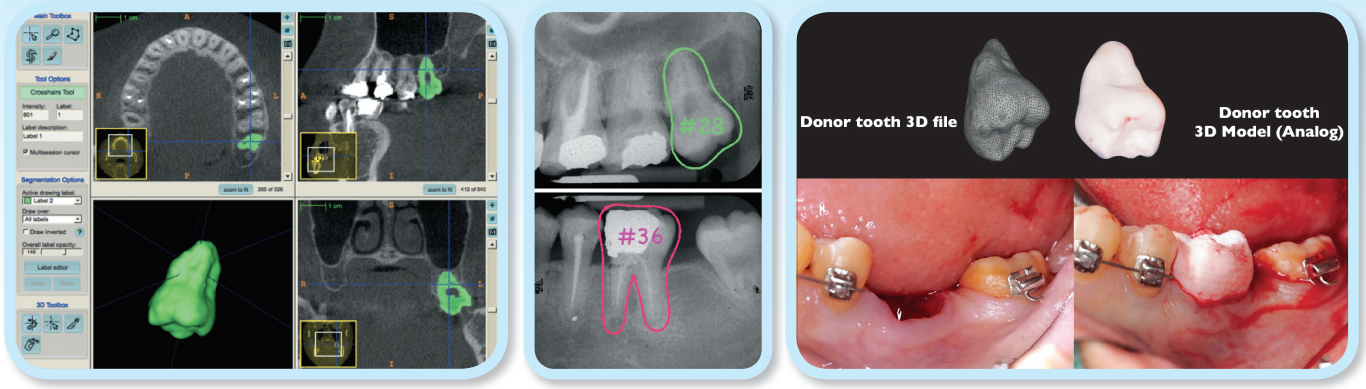

Fig. 9:
3D printing from a CBCT image (left) was used to make an analog for the donor tooth UL8 (upper right). The UL8 analog was used to prepare the recipient site to make the socket slightly larger to accommodate the donor tooth (lower right).

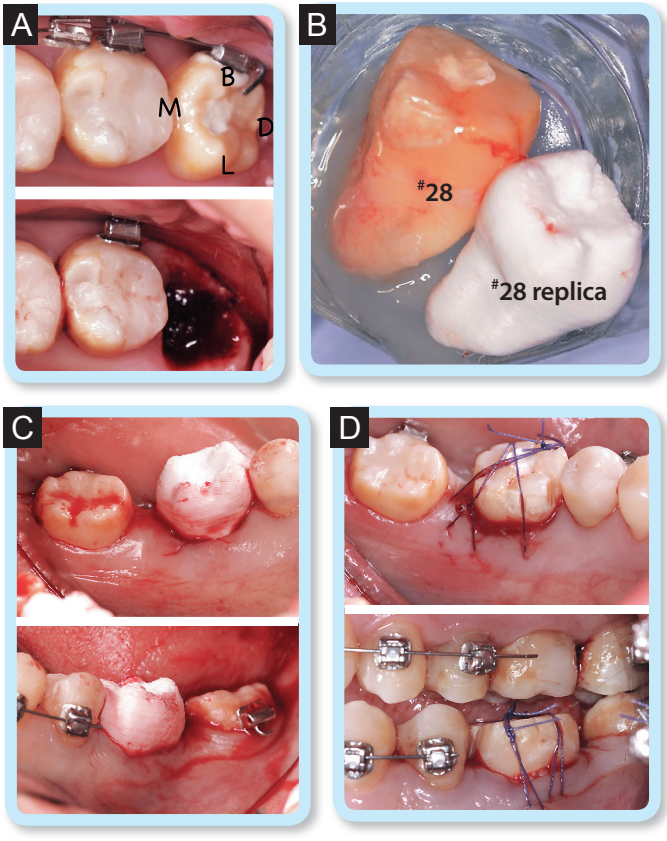

Fig. 10:
***A.** Upper view shows the mesial (M), buccal (B), distal (D) and lingual (L) surfaces of the UL8 (#28), and the lower view is post-extraction. **B.** The extracted UR8 with PDL tissue on the surface (#28) is shown next to the 3D replica (#28 replica). **C.** Occlusal and buccal views show the replica seated in the desired position. **D.** Occlusal and buccal views show the transplanted UR8 is stabilized in the site with nonrigid sutural fixation that traverses the prepared occlusal surface with fixation grooves.*

Fig. 11:
One month after surgery, the soft tissue for the LL6 transplant was well healed.

Fig. 12:
Upper: The panoramic radiograph (3M) shows the postoperative view following the initial transplantation procedure. Lower: An open coil spring between UR7 and UR5 opens space for the UR6 transplant.

the space (*Fig. 12*). In the 7th month of treatment, the UR6 space was sufficient to transplant LR7 (*Fig. 13*). The archwires were extended from UR5 to UL5 and LR6 to LL5 (*Fig. 14*).

Eleven months into the treatment, the lower arch wire was changed to 0.018x0.025-in CuNiTi with a tie back ligature was placed between the LR6 and LR8 to prevent dislodging of the wire (*Fig. 15*). One month later, LR8 protraction was activated by applying power chains from LR6 to LR8 on both the buccal and lingual surfaces. Class II elastics (*Fox 1/4-in 3.5-oz*) were applied on the left side to help correct the midline deviation (*Fig. 16*).

In the 16th month, the negative overjet was improved, and a 2x8mm stainless steel (*SS*) bone screw (*BS*) was installed mesial to the lower right third molar. A chain of elastics was applied from the lower right canine to the BS to help correct the lower midline deviation (*Fig. 17*). Three months later, space closure was inadequate so the BS was removed because it appeared to interfere with space closure (*Fig. 18*). Buttons were bonded on the lingual surface

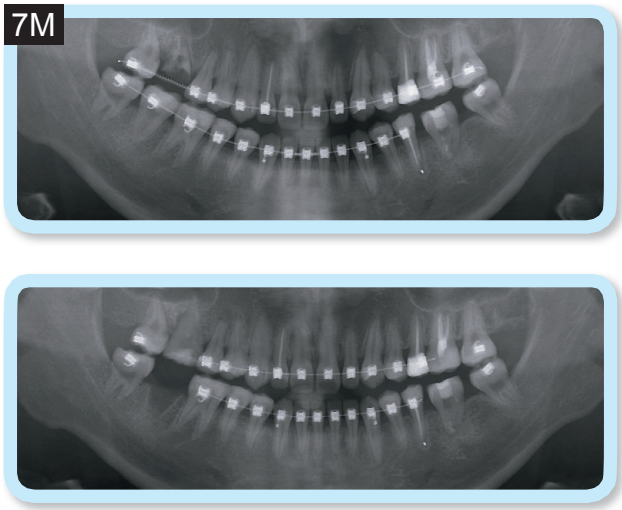

Fig. 13:
In the 7th month of treatment (7M) panoramic radiographs show the preoperative (upper) and postoperative (lower) views of the LR7 to UR6 autotransplantation procedure.

Fig. 15:
At eleven months (11M) a twisted ligature tie was placed to connect the LR6 and LR8. See text for details.

Fig. 14:
At seven months (7M) buccal intraoral photographs show the restored dentition following both transplantation procedures. See text for details.

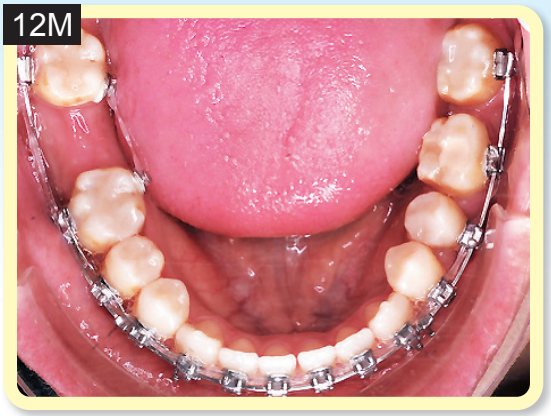

Fig. 16:
In the 12th month (12M), the LR8 protraction was initiated by applying power chains of elastics from LR6 to LR8 both buccally and lingually.

Fig. 17:
In the 16th month (16M), a 2x8mm SS BS was installed mesial to the lower right third molar to correct the lower midline deviation. See text for details.

of the LR6 and LR8 to attach a chain of elastics. Another chain of elastics was applied from LL3 to LR8. Class II elastics Fox (*1/4-in 3.5-oz*) were applied from UR4 to the LR6 and from UR4 to the LL8. Eight months later, the Class II elastics were increased to

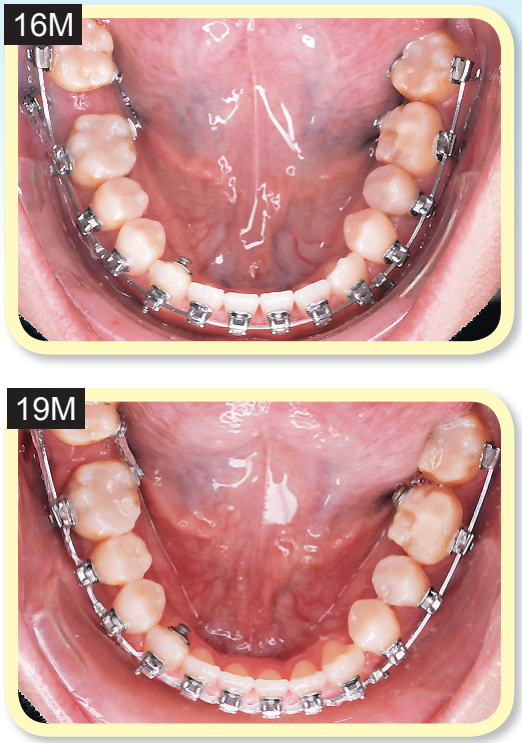

Fig. 18:
Compared to the start at sixteen months (16M), the lack of progress in the mesial movement of the LR8 at nineteen months (19M) was due to interference of the BS. See text for details.

Kangaroo (*3/16-in, 4.5-oz*) bilaterally.

In the 22nd month of the treatment, the upper archwire was changed to a 0.018x0.025-in CuNiTi and the lower archwire was changed to a 0.014x0.025-in CuNiTi. The dental midlines were almost coincident but a space between the LL3 and LL4 required a chain of elastics (*Fig. 19*).

In the 29th month, there was a gumboil on the mucosa apical to the UL3. Pulp necrosis was diagnosed that was probably related to a previous composite restoration (*Fig. 4*). The patient was referred for endodontics (*Fig. 20*). Precise bracket repositioning was performed repeatedly throughout the treatment to correct axial inclinations in the

Fig. 19:
At twenty-two months (22M) the midline was nearly aligned, but a space had opened distal to the LL3.

Fig. 20:
In the 29th month (29M), a gumboil was noted on the mucosa adjacent to the UL3. Pulp necrosis was diagnosed and the patient was referred for endodontics.

buccal segments. Archwires were adjusted to detail the occlusion.

In the 35th month of treatment both archwires were replaced with 0.014x0.025-in NiTi. Another 2x8mm BS miniscrew was installed on the mesial side of the

Fig. 21:
In the 35th month of treatment, both archwires were replaced with 0.014x0.025-in NiTi. A new 2x8mm SS BS miniscrew was installed to the buccal of the lower right first and third molars, and a chain of elastics was applied from lower right canine to help correct the lower midline deviation. See text for details.

LR8 area and a chain of elastics was applied from the LR3 to the BS to correct the dental midlines and close space between LR6 and LR8 (*Fig. 21*).

After 38 months of active treatment, all fixed appliances were removed.

Results achieved

Maxilla (all three planes)**:**

- A - P: *Maintained*
- Vertical: *Maintained*
- Transverse: *Constricted with correction of asymmetry*

Mandible (all three planes)**:**

- A - P: *Retracted (posterior rotation)*
- Vertical: *Increased (posterior rotation)*
- Transverse: *Constricted with correction of asymmetry*

Maxillary Dentition

- A - P: *Retracted*
- Vertical: *Incisors Extruded*
- Inter-molar / Inter-canine Width: *Decreased with correction of asymmetry*

Mandibular Dentition

- A - P: *Retracted the entire arch*
- Vertical: *Increased (molar and incisor extrusion)*
- Inter-molar / Inter-canine Width: *Decreased with correction of asymmetry*

Facial Esthetics:

- Lips: *Retracted lower lip to improve facial balance*
- Mentalis Strain: *Relieved by retracting incisors*
- Lip protrusion: *Improved balance*
- Facial Profile: *Relatively straight with acceptable lip protrusion*

Retention

Removable retainers were delivered for both arches to be worn full time for the first 6 months and nights only thereafter. Plaque control and the retainer maintenance instructions were provided.

Final evaluation of treatment

The final records are presented in Figs. 22-26. A 1% increase in both LFH and facial convexity was associated with the extrusion of the lower molars (*Fig. 26*). The relatively long, more retrusive facial pattern appears related to lower molar extrusion. The latter was deemed a sequelae of Class II elastics and the elastic chains used to close the LR extraction space. Despite the increase in facial convexity, acceptable lip protrusion and competence were achieved (*Figs. 25 and 26*). Dental alignment (*Figs. 22-24*) and functional occlusion (*Figs. 22, 25 and 26*) were near ideal. The final alignment was assessed at 27 points with ABO Cast-Radiograph Evaluation (*CRE*), as documented in the supplementary Worksheet 2 at the end of this report.[10] Major residual discrepancies were buccolingual Inclination (*13 points*) and occlusal contacts (*5 points*). The negative overjet was corrected to an ideal relationship. The Pink and White dental esthetic score was 2 points, as subsequently documented in Worksheet 3, which is consistent with the outcomes recommended by Sarver and Yanosky.[11]

Discussion

Surgical and technical factors that influence outcomes are the focus of the current case report. Clinical studies of dental autotransplantation and replantation report a short extraoral time for the donor tooth considerably improves success and survival rates to 80.0-91.1% and 95.5-100%, respectively.[12-17] A significant decrease in extraoral time and high success rates are associated with the use of donor tooth replicas.[12] Success depends on preserving vital PDL tissue on the root surface of a tooth that is extracted and autotransplanted. A 20-

Fig. 22: Post-treatment facial and intraoral photographs

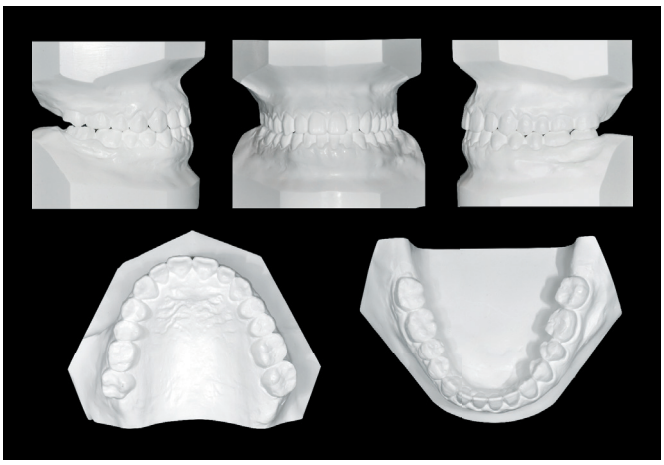

Fig. 23: Post-treatment dental models (casts)

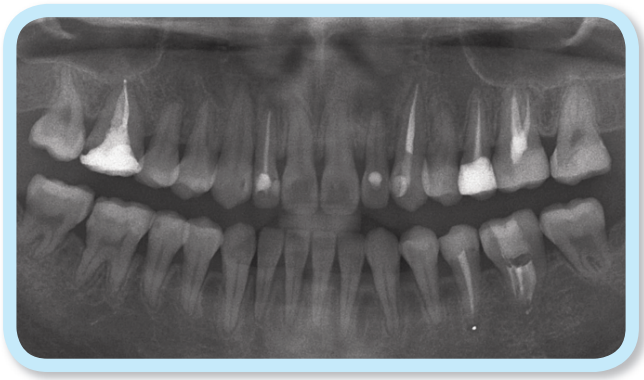

Fig. 24: Post-treatment panoramic radiograph

Fig. 25: Post-treatment lateral cephalometric radiograph

30 minutes interval between the time of extraction and subsequent re-implantation may be compatible with the preservation of PDL cells attached to the root surface,[13] but a much shorter transplant time is preferred for improved vitality. A pre-operatively designed surgical guide for autotransplantation enables accurate positioning which facilitates the surgery to substantially decrease the extraoral time for a transplanted tooth.[14-17]

Donor tooth morphology has been reported as a critical factor for success. Multi-rooted teeth complicate the extraction resulting in more PDL damage. When atraumatically extracted teeth with healthy PDL cells is transplanted within three minutes into a well-fitting prepared socket, the

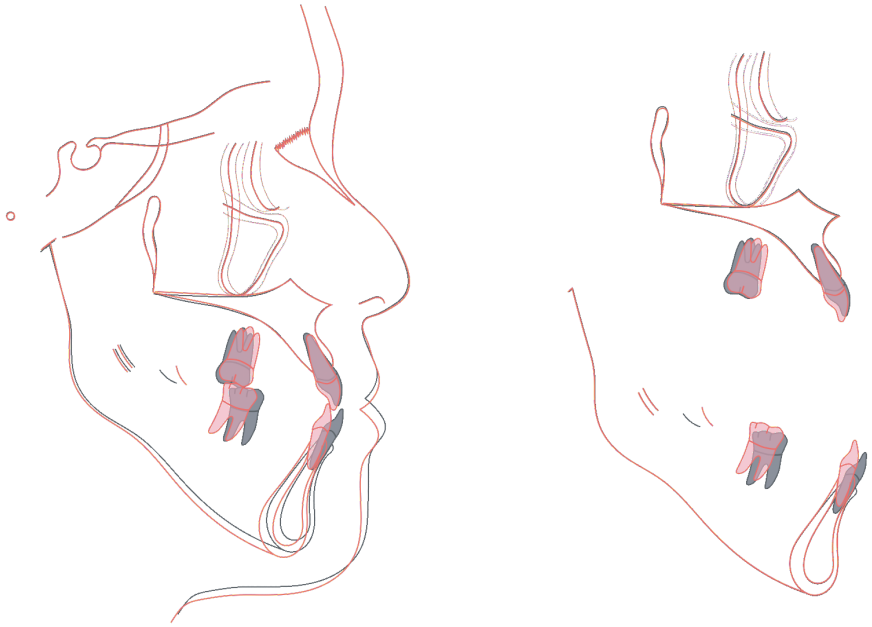

Fig. 26:
Superimposed cephalometric tracings show dentofacial changes over 38 months of treatment (red) compared to the pre-treatment position (black). The anterior cranial base superimposition (left) documents the retraction of the protrusive lower lip and opening of the VDO as the mandible rotated clockwise. The LFH increased and the mandible assumed a more posterior posture. The upper right superimposition on the maxilla shows the corrected dentition relative to the apical base of bone. The lower right superimposition on the mandible reveals the extrusion of the mandibular molars. See text for details.

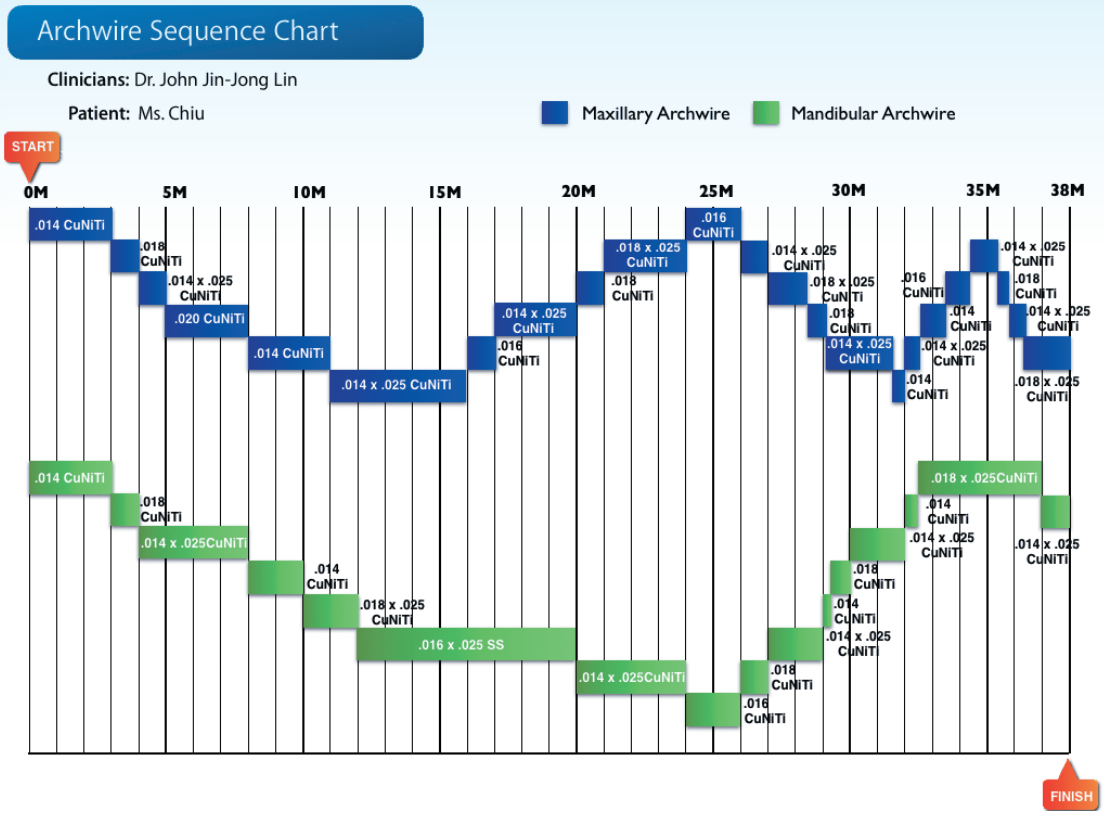

Table 2: Archwire sequence chart

success rate is almost 94%. The placement, location, and angulation of the transplant in the site can be accomplished with the replica without damaging the transplant. Therefore, the use of a replica increases the ease and control of the autotransplantation procedure (*Fig. 10*).[8,9]

The initial reaction to the trauma is acute inflammation. If there is no additional stimulus to maintain the inflammatory response, healing will occur naturally. The healing of a damaged root surface is dependent on the surface area of the damaged root that requires repopulation with PDL cells. The smaller the area of damaged root the more likely there will be a successful cellular repopulation to form new cementum and periodontal ligament. Large areas of traumatized root often result in ankylosis, which is an osseous connection of the tooth to alveolar bone. If the pulp of the transplant becomes infected, the periodontal reaction to bacterial toxins emitted at the apex prevents the healing reaction from progressing. This form of inflammatory root resorption is arrested in its early stage with successful endodontic treatment. Rapid bone regeneration and the emergence of lamina dura around the transplant are encouraging signs. Bone graft materials are unnecessary even if the space between the bone and the transplant is wide. Positioning of donor teeth is critical. Compromises such as inadequate bucco-lingual space results in root protrusion and dehiscence. Graft materials should be placed over the exposed root in order to

create space for bone regeneration. Bone induction around a transplanted tooth is a significant advantage compared to healing of implants.[9,18,19]

In recent decades, TADs have become increasingly popular for managing difficult adult malocclusions.[20,21] However, the interradicular position of miniscrews, a high failure rate, and their tendency to move when loaded has limited their application for managing crowding and skeletal malocclusions. Extra-alveolar or radicular TADs provide adequate anchorage for management of severe malocclusions without extensive patient compliance.[1-3]

The present patient with Class III malocclusion had an excellent prognosis for a relatively simple dento-alveolar correction according to the 3-ring diagnosis scheme (*Fig. 27*).[22,23] For this patient, a conservative camouflage treatment was also a viable alternative.[24] However, an orthodontic treatment plan and autotransplantation of the molars was the most conservative solution for this mutilated Class III patient (*Figs. 1-4*).

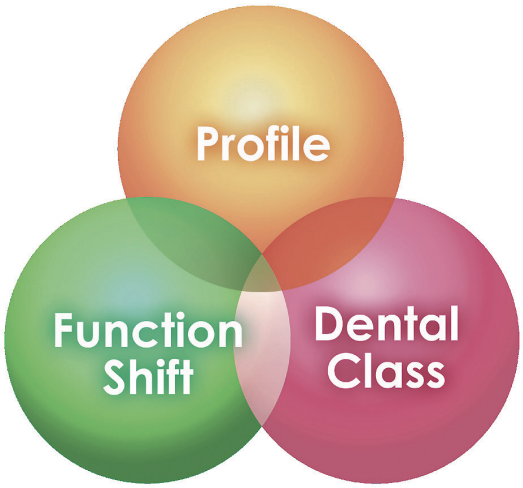

Fig. 27:
The 3-ring diagnosis scheme introduced by Dr. John Lin.[1]

Cephalometric superimposition on the mandible (*Fig. 26*) shows extrusion and distal movement of the lower molars, but no net retraction relative to the apical base of bone. This is an illusion in a 2D cephalometric view (*Fig. 25*). The lower arch was constricted, and the molars have been moved distally as shown in the post-treatment panoramic radiograph (*Fig. 24*).

Overall, the orthodontic treatment and molar autotransplantation has produced good dental alignment and reduced lip protrusion, but there was an increase in the VDO as reflected by ~2˚ increase in facial convexity and the mandibular plane angle (*FMA*). These undesirable sequelae are consistent with two changes noted in the cephalometric tracings:

1. Lower molars are extruded ~2mm in the mandibular superimposition (*Fig. 26 lower right*).

2. The mandible moved distally ~2mm as it rotated posteriorly ~2˚ in the anterior cranial base superimposition. The molar extrusion problem can be explained by the mandibular molars having moved distally (*Fig. 26 left*).

This problem can be avoided by using both maxillary and mandibular extra-alveolar (*extra-radicular*) bone screws for intra-alveolar force in each arch rather than relying on intermaxillary anchorage.[1,3,24-26] Intermaxillary elastics commonly extrude molars and

increase the VDO because of the vertical component of force and the rotation of the arches around their respective centers of resistance.[27]

This challenging malocclusion (*DI=54*), was treated conservatively in 38 months to an excellent dental alignment (*CRE=27*) with a third molar autotransplantation treatment plan to replace the hopeless teeth in both arches and to correct the asymmetrical Class III molar relationship. However, mandibular molar extrusion and an apparent $C_O \rightarrow C_R$ discrepancy contributed to increased facial convexity, which is associated with a more posterior position and clockwise rotation of the mandible.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 54

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 – 7 pt

Total = 7

OVERBITE

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

Total = 0

ANTERIOR OPEN BITE

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

Total = 10

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 4

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 = 0

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	4 pts.
Beyond Class II or III	=	1 pt. per mm. additional	3 pts.

Total = 7

Beyond Class III (right)

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 5

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° 7 x 2 pts. = 14

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

Each degree > 99° _____ x 1 pt. = _____

Total = 16

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. =	2
Missing teeth (except 3rd molars)	_____ x 1 pts. =	1
Missing teeth, congenital	_____ x 2 pts. =	_____
Spacing (4 or more, per arch)	_____ x 2 pts. =	2
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 = 5

Cast-Radiograph Evaluation

Case # **Patient**

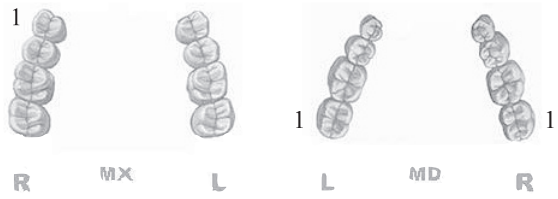
Total Score: 27

Alignment/Rotations

3

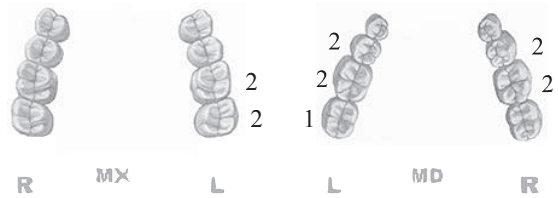
Marginal Ridges

3



Buccolingual Inclination

13

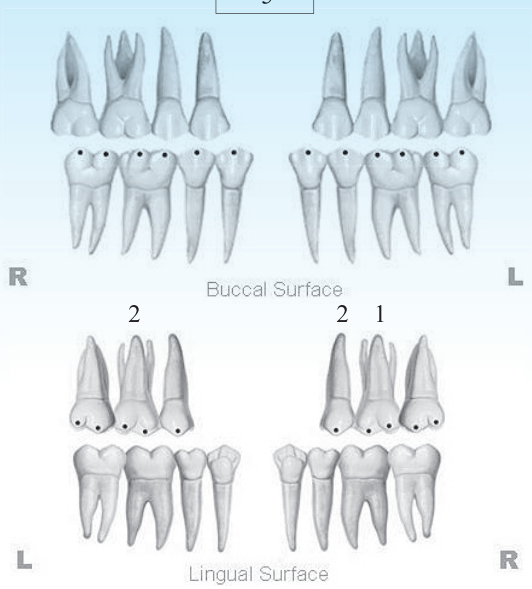


Overjet

1

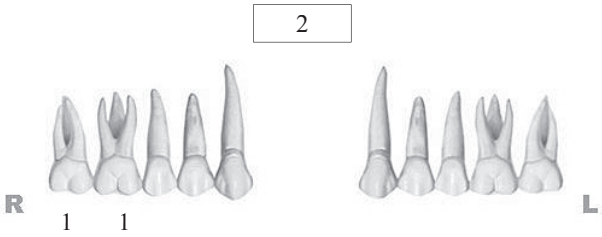
Occlusal Contacts

5



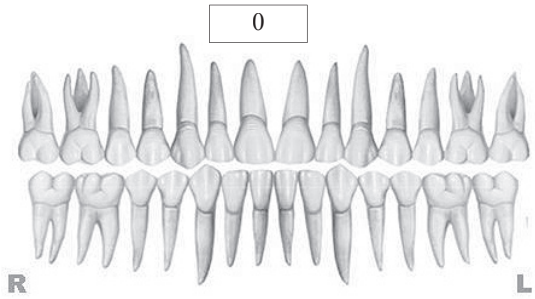
Occlusal Relationships

2



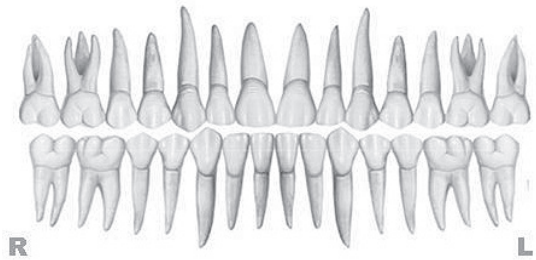
Interproximal Contacts

0



Root Angulation

0



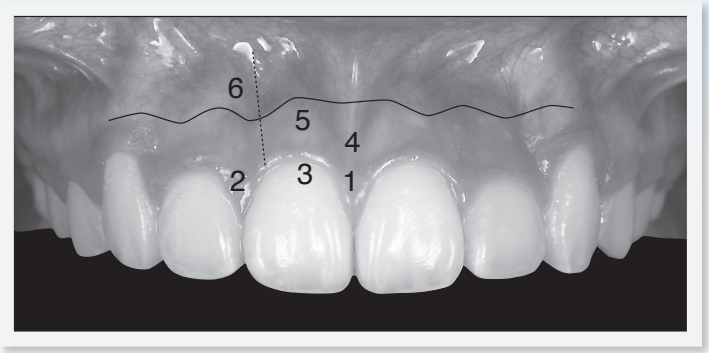
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 2

1. Pink Esthetic Score

Total = 0

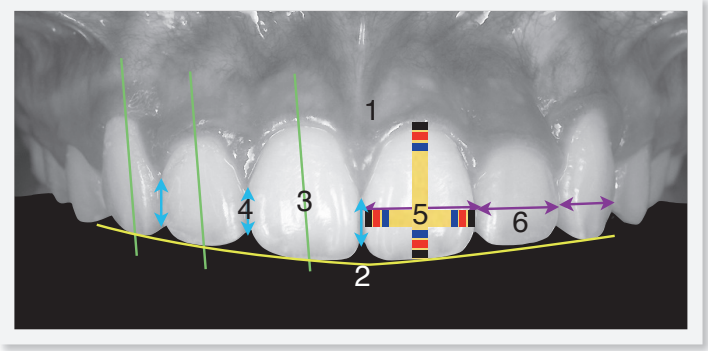


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

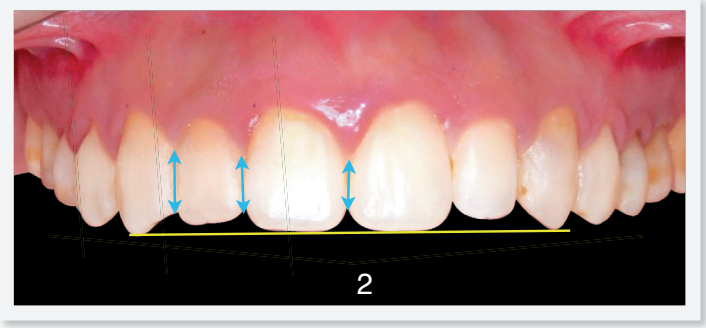
1. M & D Papilla	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	(0)	1	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	(0)	1	2

2. White Esthetic Score (for Micro-esthetics)

Total = 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