

Management of an Impacted Maxillary Canine with the Vertical Incision Subperiosteal Tunnel (VISTA) Technique

Abstract

Introduction: A 11 yr 1 mo male presented with a chief complaint (CC) of unerupted maxillary left canine (UL3).

Diagnosis: Bimaxillary protrusion (SNA 84, SNB 84) was associated with a full-cusp Class II Division 1 malocclusion with an overjet of 12mm and an overbite of 6mm (80%). This severe malocclusion was complicated by a horizontally impacted UL3 that was associated with substantial root resorption on the labial surfaces of both maxillary central incisors (UR1 and UL1). The discrepancy index (DI) was 36.

Etiology: The cause of the severe impaction was apparently a deviated path of eruption that may be related to inadequate space in the arch due to a relatively small UL primary canine.

Treatment: Phase I treatment began by placing Infrazygomatic crest (IZC) bone screws (BSs) bilaterally. The right IZC BS was used as anchorage for a VISTA submucosal procedure to retract the UL3 to its correct sagittal relationship in the arch, and then aligning it in the normal canine position. Once the UL3 was aligned, bilateral IZC anchorage was utilized to retract the entire maxillary arch to correct the full cusp Class II relationship. The occlusion terminating with the first molars was finished with vertical elastics and fixed appliances were removed. The active treatment time was 31 months. Phase II treatment for six months was indicated to improve the final alignment of the dentition after the second molars erupted. Final records were collected at the two year recall appointment.

Outcomes: The impacted UL3 was recovered and aligned in an ideal relationship. Phase I Cast-Radiograph Evaluation (CRE) was 36, due to major discrepancies in alignment and marginal ridges of the erupting 7s. After 6 months follow-up treatment, the final CRE was 26.

Conclusions: Phase I treatment with the VISTA procedure was indicated to correct the impacted UL3 before it caused further root resorption of adjacent teeth. Phase II treatment is best delayed until the second molars are erupted. The VISTA approach for submucosal retraction of maxillary canine impactions is an ideal procedure for the critical esthetic zone. (*J Digital Orthod* 2018;50:52-71)

Key words:

Impaction, impacted maxillary canine, vertical incision subperiosteal tunnel access, VISTA, infra-zygomatic crest, OBS

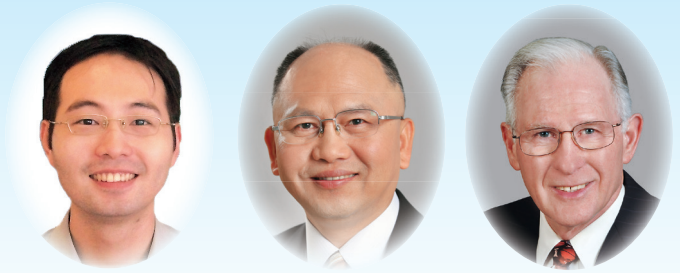
Introduction

The prevalence for impacted canines in adolescents is from 0.2-2.8%.^{1,2} Third molars are more commonly impacted than canines, but their recovery (if indicated) rarely presents significant esthetic and functional challenges.³ Recovering severely displaced, impacted canines is among the most challenging clinical problems in orthodontics. Coordination of treatment phases is very important for achieving the desirable outcomes: proper alignment, periodontal stability and longterm esthetics.⁴ Compromised surgical and biomechanics procedures may result in complications and unpredictable outcomes.

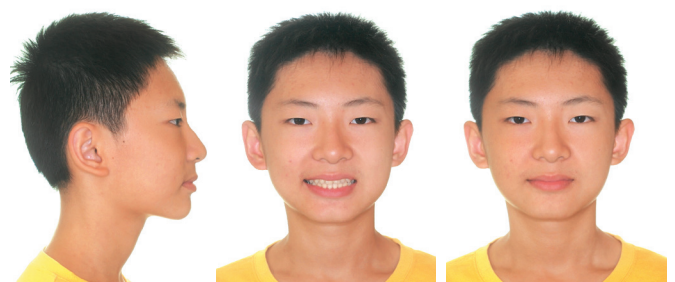
Dr. Bill Chuanwei Su,
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Dr. W. Eugene Roberts,
Editor-in-chief, Journal of Digital Orthodontics (Right)



■ Fig. 1: Pre-treatment facial photographs



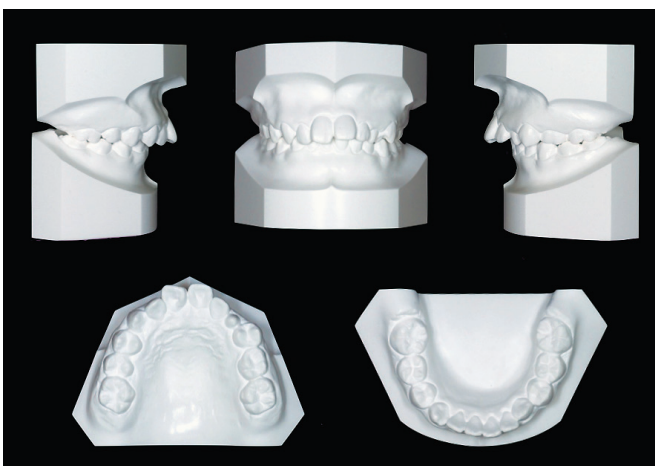
■ Fig. 4: Post-treatment facial photographs (Phase I)



■ Fig. 2: Pre-treatment intraoral photographs



■ Fig. 5: Post-treatment intraoral photographs (Phase I)



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



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

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	84°	84°	0°
SNB° (80°)	82°	83°	1°
ANB° (2°)	2°	1°	1°
SN-MP° (32°)	24°	27°	3°
FMA° (25°)	17°	20°	3°
DENTAL ANALYSIS			
U1 To NA mm (4 mm)	9 mm	6 mm	3 mm
U1 To SN° (104°)	124°	111°	13°
L1 To NB mm (4 mm)	3 mm	4 mm	1 mm
L1 To MP° (90°)	101°	103°	2°
FACIAL ANALYSIS			
E-LINE UL (2-3 mm)	1 mm	0 mm	1 mm
E-LINE LL (1-2 mm)	0 mm	0 mm	0 mm
%FH: Na-ANS-Gn (53%)	55%	58%	3%
Convexity: G-Sn-Pg' (13°)	8°	8°	0°

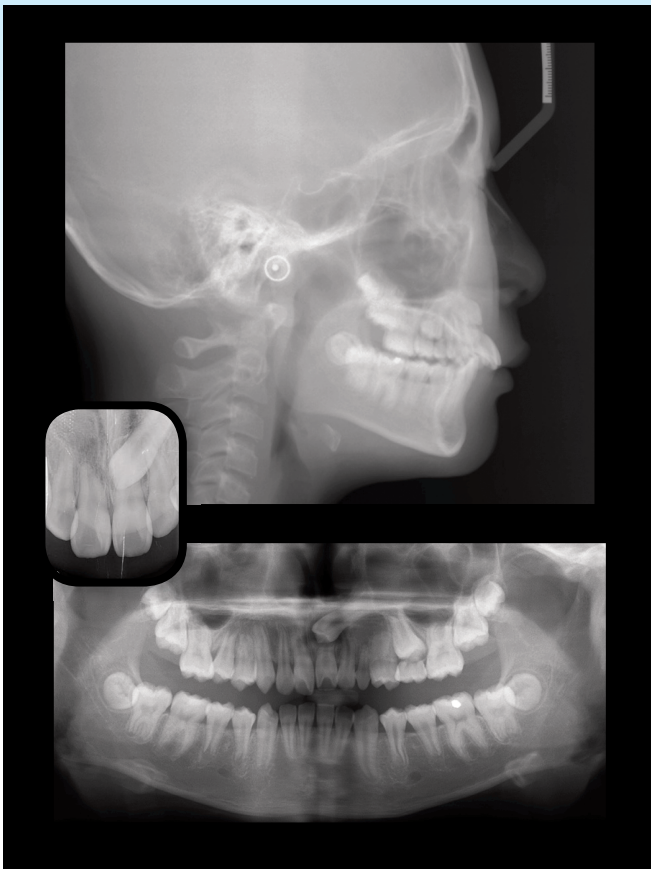
■ Table 1: Cephalometric summary for Phase I treatment

Kokich⁴ proposed three surgical methods for uncovering labially impacted maxillary canines based on the position of the cuspid crown relative to the mucogingival junction (MGJ). If the crown is occlusal to the MGJ, it is exposed by excising the overlying gingiva. For crowns penetrating the labial plate of bone, but apical to the MGJ, an apically repositioned gingival flap is recommended. Deep bony impactions require the closed eruption technique. However, the latter may be difficult to apply if the impaction is horizontal, severely displaced and/or contacting the roots of adjacent teeth. Routine traction in the occlusal direction may result in severe root resorption of adjacent teeth.

Zadeh⁵ developed a novel periodontal surgical procedure that is a minimally invasive approach for managing multiple contiguous defects in the maxillary anterior region. Vestibular incision subperiosteal tunnel access (VISTA) was originally designed to coronally reposition gingival margins to correct periodontal defects.⁵⁻⁷ Chang⁸ adapted the VISTA technique for the surgical management of labially impacted, transposed canines. The procedure minimizes invasive surgery, optimizes esthetic outcomes, and limits the threat of external root resorption. The purpose of this case report is to document the use of the VISTA method for managing a transposed, labial impaction of a maxillary canine.

Diagnosis and Etiology

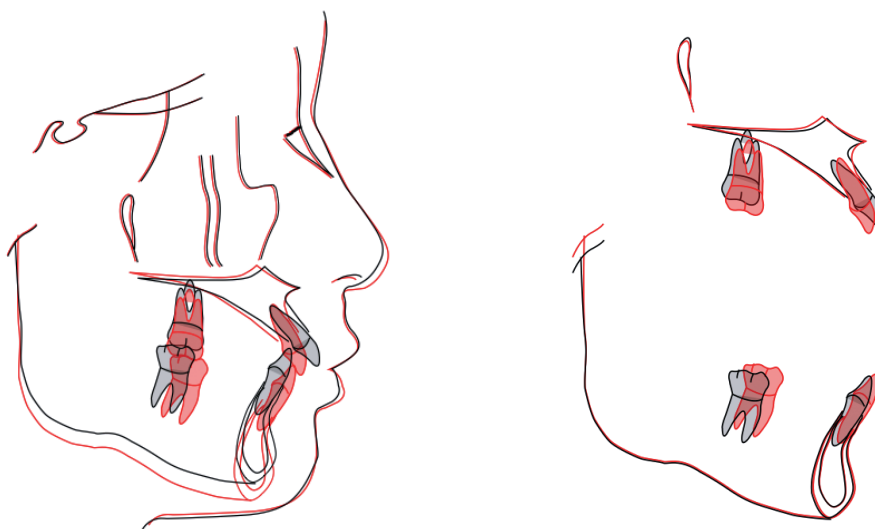
A 11 yr 1 mo male presented with his parents for orthodontic consultation to evaluate an unerupted maxillary left canine (UL3) (Figs. 1-3). There was no contributing medical or dental history other than a small unilateral UL deciduous canine that was retained. Clinical examination revealed an acceptable facial profile, with overbite and overjet of about 10 and 7mm, respectively (Figs. 2 and 3). There was a buccal posterior cross-bite of the upper left first premolar and about 7mm of crowding in the upper arch. The sagittal relationship was a full-cusp Class II malocclusion (Figs. 2 and 3). For direct comparison with the pretreatment condition, the Phase I post-treatment records are presented in Figs. 4-6 The treatment is also documented with pretreatment (Fig. 7) and post-treatment (Fig. 8) radiographs. Cephalometric measurements are



■ **Fig. 7:**
Pre-treatment panoramic and lateral cephalometric radiographs show a large overjet and a highly positioned impacted canine.



■ **Fig. 8: Phase I**
Post-treatment panoramic and lateral cephalometric radiographs show a normal overjet and overbite, and repositioned impacted canine.



■ **Fig. 9: Phase I**
Initial (black) and completed (red) cephalometric tracings are superimposed on the anterior cranial base (left), as well as on the stable skeletal structures of the maxilla (upper right), and mandible (lower right). The superimposed mandibular image shows the growth in condylar length that contributes to the increased facial height.

presented in Table I, and superimposed tracings are shown in Fig. 9.

Pre-treatment CBCT images (Figs. 10 and 11) show the position of the impacted and transposed UL3. The high position of the horizontal impaction requires some form of closed eruption.⁴ Severe transposed labial impactions are best managed with Zadeh's⁵ VISTA procedure (Fig. 12) as modified by Chang et al.⁶⁻⁸ (Fig. 13) for submucosal retraction of the transposed impaction (Fig. 14).

Specific Objectives of Treatment

Maxilla (all three planes):

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

Mandible (all three planes):

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

Maxillary Dentition

- A - P: *Retract incisors*
- Vertical: *Allow extrusion consistent with normal growth*
- Inter-molar Width: *Maintain*

Mandibular Dentition

- A - P: *Slight protraction consistent with normal growth*
- Vertical: *Allow extrusion consistent with normal growth*
- Inter-molar / Inter-canine width: *Maintain*

Facial Esthetics

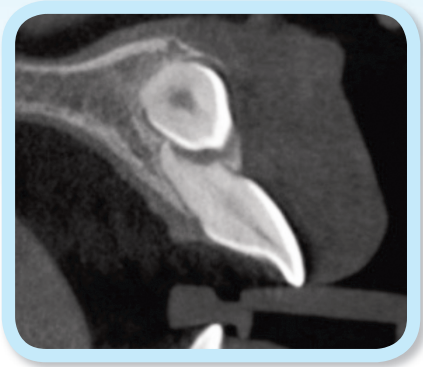
- Increase lower facial height and lower lip protrusion

Treatment Alternatives

The ideal objective(s) for full fixed appliance treatment was to resolve the malocclusion and align the impacted cuspid. Two treatment plans were proposed: Option 1 was a non-extraction treatment to align the entire permanent dentition, and Option 2 was a surgical removal of the impacted canine, substitution of the missing canine with the adjacent first premolar, and extraction of the other three first premolars. After discussing the pros and cons of each option with the patient and her parents, they selected Option 1: Non-extraction treatment divided into two phases to initially correct the impaction and then complete the final alignment after the second molars erupted.



■ **Fig. 10:**
CBCT image shows a labially-positioned and impacted UL3 impinging on the root of the UL1.



■ Fig. 11:

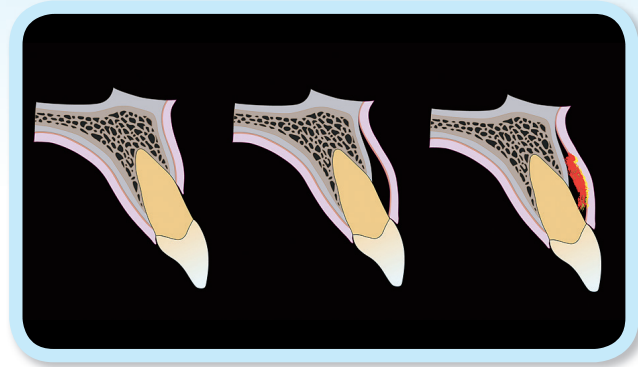
The image shows that half of the root of the central incisor is resorbed as result of the impaction.

1. Phase I:

- Use of the vertical incision subperiosteal tunnel access (VISTA) technique to uncover the impacted canine, and then reposition it (Fig. 14) with a power chain anchored with an IZC OBS.
- Damon Q® brackets (Ormco, Glendora, CA) a passive self-ligating (PSL) fixed appliance utilizing low torque brackets in the maxillary segment.
- Class II elastics as needed to correct the sagittal molar discrepancy.
- Frenectomy of the maxillary labial frenum.

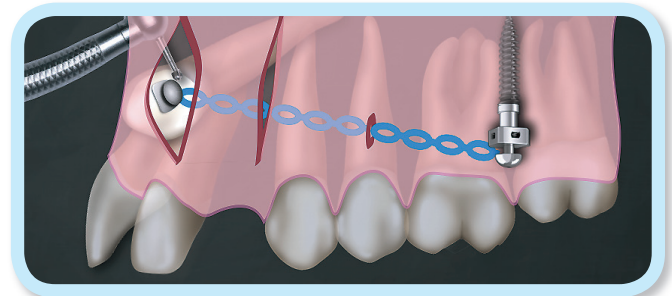
2. Phase II: after the second molars are in full occlusion, align the entire dentition with a full fixed appliance.

3. Final Records: at two year follow-up after completion of Phase I treatment



■ Fig. 12:

As shown from left to right, the VISTA procedure is a novel, minimally invasive approach for undermining the labial mucosa to correct soft tissue defects in the maxillary anterior region. See text for details.



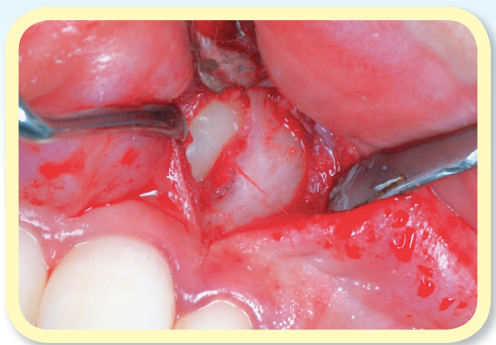
■ Fig. 13:

The VISTA technique is modified for submucosal retraction and uprighting of a labially positioned and transposed canine impaction. See text for details. The illustration was provided by Rungsi Thavarungkul.



■ Fig. 14:

VISTA retraction of the impaction is superimposed on an intraoral labial photograph to show the interior and exterior aspects of the mechanism. See text for details.



■ **Fig. 15:**
The first incision is made to expose the bone covering the crown of the impaction prior to removing it.



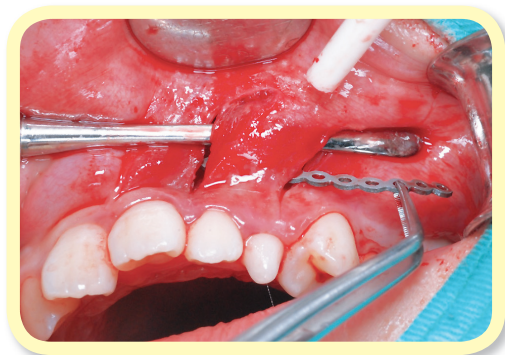
■ **Fig. 16:**
The second incision exposes the bone along the traction route in preparation for removing all obstacles.



■ **Fig. 17:**
A button with a power chain attached is bonded on the crown of the impaction.

Appliances and Treatment Progress

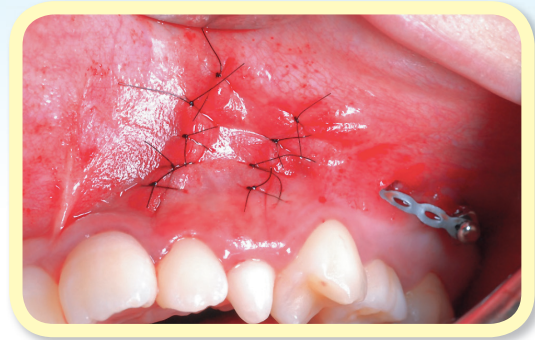
If the impacted UL3 was moved inferiorly, with a routine closed eruption method,⁴ additional root resorption is likely. It was necessary to design a sequence of treatment that retracted the impacted canine and moved it distally into its correct position in the arch. The method selected was the VISTA periodontal surgery procedure, devised by Zadeh⁵ in 2011 (Fig. 12), and modified by Chang et al.⁶⁻⁸ for the management of labiobuccal impactions in the maxillary arch (Fig. 13). The method is well suited for retracting maxillary canines that impinge on the labial surface of the adjacent incisors (Fig. 14). The original design⁵ of the VISTA procedure utilized vertical, parallel incisions in the alveolar mucosa to produce tunnels for soft tissue grafts. However, a variation of the procedure (Figs. 15-20) utilizes the same subperiosteal tunneling procedure to produce a path for submucosal retraction of the impacted canine.



■ **Fig. 18:**
The power chain is pulled through the undermined tunnel between the first two incisions.

The initial surgery to expose the impaction involved a variation of the VISTA procedure designed to coordinate with an orthodontic retraction mechanism anchored by an OBS® (Newton's A, Hsinchu City, Taiwan) placed in the left infra-zygomatic crest (IZC). A button was bonded to the crown of the impaction and an elastic chain was attached to provide anchorage for the traction and uprighting. Bone in the planned path of retraction was removed with a #4 carbide round bur to facilitate tooth movement.

A 3-D image (CBCT) provided accurate and detailed information on the location of the impaction relative to the maxillary incisors. With that knowledge a vertical incision (*1st incision*) was performed between the central and lateral incisors (Fig. 13). VISTA technique uses only vertical incisions (Fig. 14) because horizontal incisions may disrupt the blood supply of the gingiva.^{5,6} Following the initial incision, a periosteal elevator was used to detach the periosteum and expose the impaction (Fig. 15), after which the bone covering the crown was removed down to the cemento-enamel junction (CEJ). Then a second incision was performed above the primary canine to expose and remove the bone in the proposed path of tooth movement (*traction route*) (Fig. 16). When the crown had been fully exposed, a button was bonded on the labial surface, and a power chain was attached (Figs. 17 and 18). A third incision was performed to allow the power chain to exit the soft tissue and extend to the IZC OBS (Figs. 18 and 19). This independent force system provided the necessary retraction force, without producing undesired side effects on other teeth. After engaging



■ Fig. 19:

The first two incisions are closed and the power chain exits a third small incision en route to the IZC bone screw. See text for details.



■ Fig. 20:

This buccal view shows the wound one month after VISTA surgery.



■ Fig. 21:

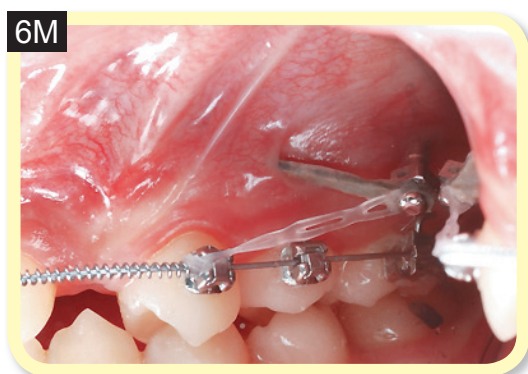
Five months after VISTA surgery, a 0.014-in CuNiTi maxillary arch wire is placed with a plastic sleeve to prevent soft tissue irritation.

the force, the two vertical incisions were sutured using 6-0 Nylon to ensure minimal damage to the mucosa (Fig. 19). Fig. 20 shows good wound healing of the incision around the exit tunnel for the power chain.



■ Fig. 22:

The occlusal view in the 5th month of treatment shows that the UL1 and UL2 were not bonded. An open coil spring was inserted to open space between the UR1 and UL4.



■ Fig. 23:

At the 6th month of treatment, the soft tissue is well healed and healthy. An IZC miniscrew anchors the power chains that retract the impaction and the UL4. See text for details.

Five months after the VISTA surgery, a self-ligating fixed appliance (*Damon Q*®, *Ormco Corporation, Glendora, CA*) were bonded on all permanent teeth, except for the left central and lateral incisors, and an 0.014-in CuNiTi arch wire was engaged (Fig. 21). One month later, a closed coil spring was inserted between the brackets on the right central incisor and the left first premolar to create space for the impacted cuspid (Fig. 22). Note that the unbonded left central and lateral incisors act as free bodies to avoid interference with the path of retraction which might result in more root resorption.¹¹ A light power chain from the OBS was attached to the archwire mesial to the upper first premolar bracket (Fig. 23) to retract the Class II left buccal segment (Fig. 3). After 6 months of VISTA retraction, the impaction was aligned to extrude into the desired position. A series of panoramic x-rays demonstrate this sequence of pre-eruptive tooth movement (Figs. 24-26).

In the 7th month of active treatment, a follow up surgery was performed to attach a new power chain from the impacted cuspid to the main wire (Fig. 27). Six months of traction extruded the impacted canine so that it could be bonded with a bracket and engaged on the 0.016-in CuNiTi archwire.

Once the canine recovery was completed, at 17 months of active treatment, *Damon Q*® low torque brackets were bonded on the lower arch (Fig. 28). The initial lower archwire was 0.014-in CuNiTi and Class II elastics (*Parrot 5/16-in 2-oz, Ormco, Glendora, CA*) were worn from the upper canines to the lower first

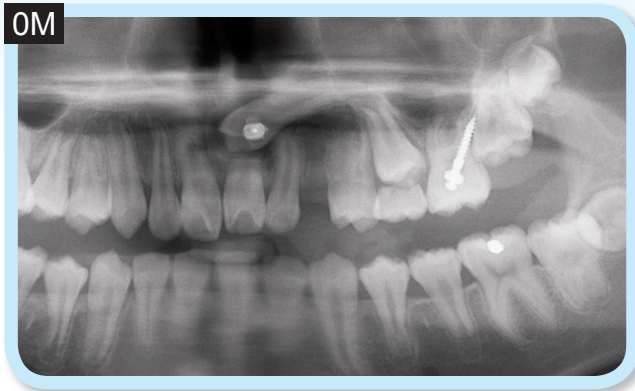


Fig. 24:
A panoramic radiograph was exposed on the day of surgery. The original position of the impaction is labial to the apex of the central incisor (UL1).



Fig. 26:
After 6 months of distal traction, the crown of the impacted UL3 is well positioned for efficient extrusion into the maxillary arch.

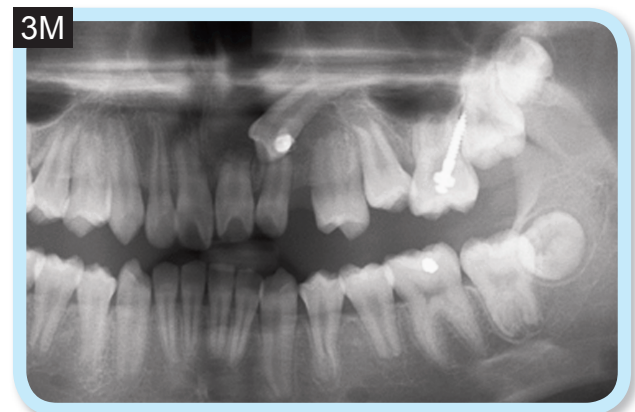


Fig. 25:
After 3 months of distal traction, the impaction is passing labial to the root of the lateral incisor (UL2).

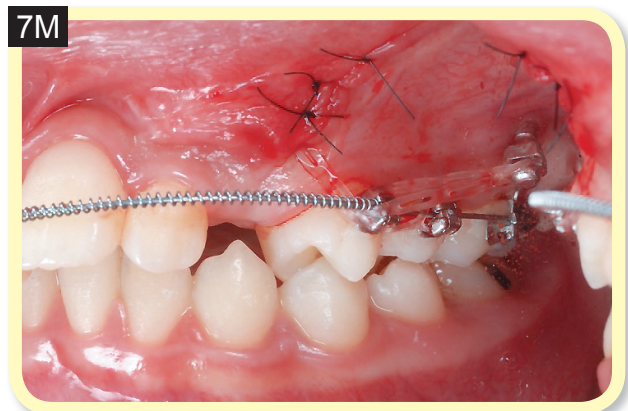


Fig. 27:
At 7 months of active treatment a power chain is surgically connected between the impaction and the UL4. See text for details.

molars bilaterally. Bite turbos were bonded on the occlusal surfaces of both lower first molars (Fig. 29) to enhance patient comfort as the bite was opened. The patient was instructed to wear the 2-oz elastics full time, and to replace them with new ones at least four times per day, preferably after meals or snacks. Following four months of intermaxillary elastics, the

Class II molar relationships were improved. Torque springs were used on the maxillary canines to increase their axial inclination (Fig. 30).

In the 26th month of active treatment, a second OBS was inserted in the right IZC, and an elastomeric chain was attached to the upper right canine to

correct the buccal interdigitation and midline discrepancy (Fig. 31). Four months later (30th month of treatment), adjustments in a 0.017x0.025-in TMA archwire were used to finish the maxillary anterior segment (Fig. 32).¹⁰ During the last two weeks of treatment, occlusal contacts were improved with bilateral intermaxillary elastics (Fox 1/4-in 3.5-oz) (Fig. 33). After 31 months of active treatment, all appliances were removed and two retainers were delivered: an upper clear overlay and a maxillary



■ Fig. 30:

In the 4th month of lower arch treatment, torque springs were used for palatal torque on the maxillary canines bilaterally.



■ Fig. 28:

At 17 months of active treatment the impacted canine is fully erupted and aligned. See text for details.



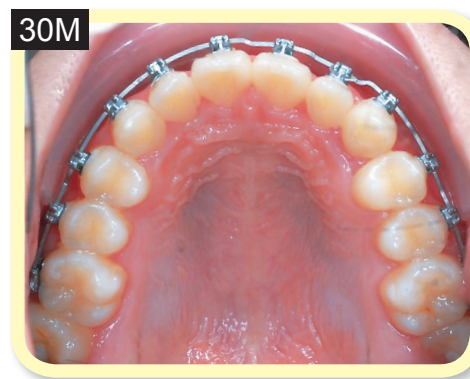
■ Fig. 31:

At 26 months into treatment, the Class II molar relationships were improved, and torque springs were continued on the maxillary canines to deliver palatal root torque.



■ Fig. 29:

Bite turbos were bonded to the occlusal surface of the lower first molars.

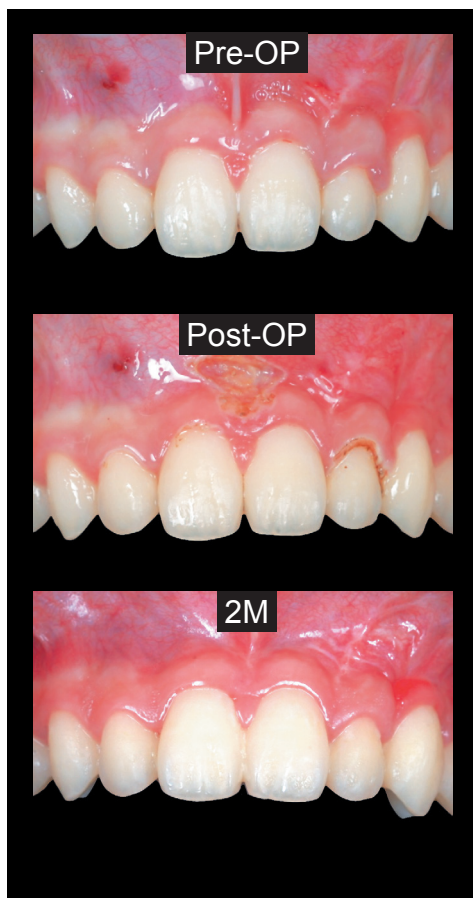


■ Fig. 32:

At the 30th month of treatment, finishing bends were made in the 0.017x0.025-in TMA archwire.



■ **Fig. 33:**
During the last two weeks of active treatment, vertical elastics (Fox 1/4-in 3.5-oz) were used to improve occlusal contacts.



■ **Fig. 34:**
Following the termination of active treatment, the maxillary labial frenum was removed with a diode laser and post-op healing is shown two months later.

anterior 2-2 fixed. The maxillary labial frenum was reduced with a diode laser (Fig. 34). Fig. 35 is panel of intraoral photographs and radiographs showing the alignment of the impacted canine pre-treatment, post-treatment, and at two year follow-up. One year post-treatment, all four second molar were erupted and a similar fixed appliance was installed to correct posterior tooth alignment (Fig. 36). Six months later, fixed appliances were removed and post-treatment intraoral photos were obtained (Fig. 37).

Results Achieved

Maxilla (all three planes):

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

Mandible (all three planes):

- A - P: *Maintained*
- Vertical: *Growth and clockwise rotation to improve the mandibular plane angle*
- Transverse: *Maintained*

Maxillary Dentition

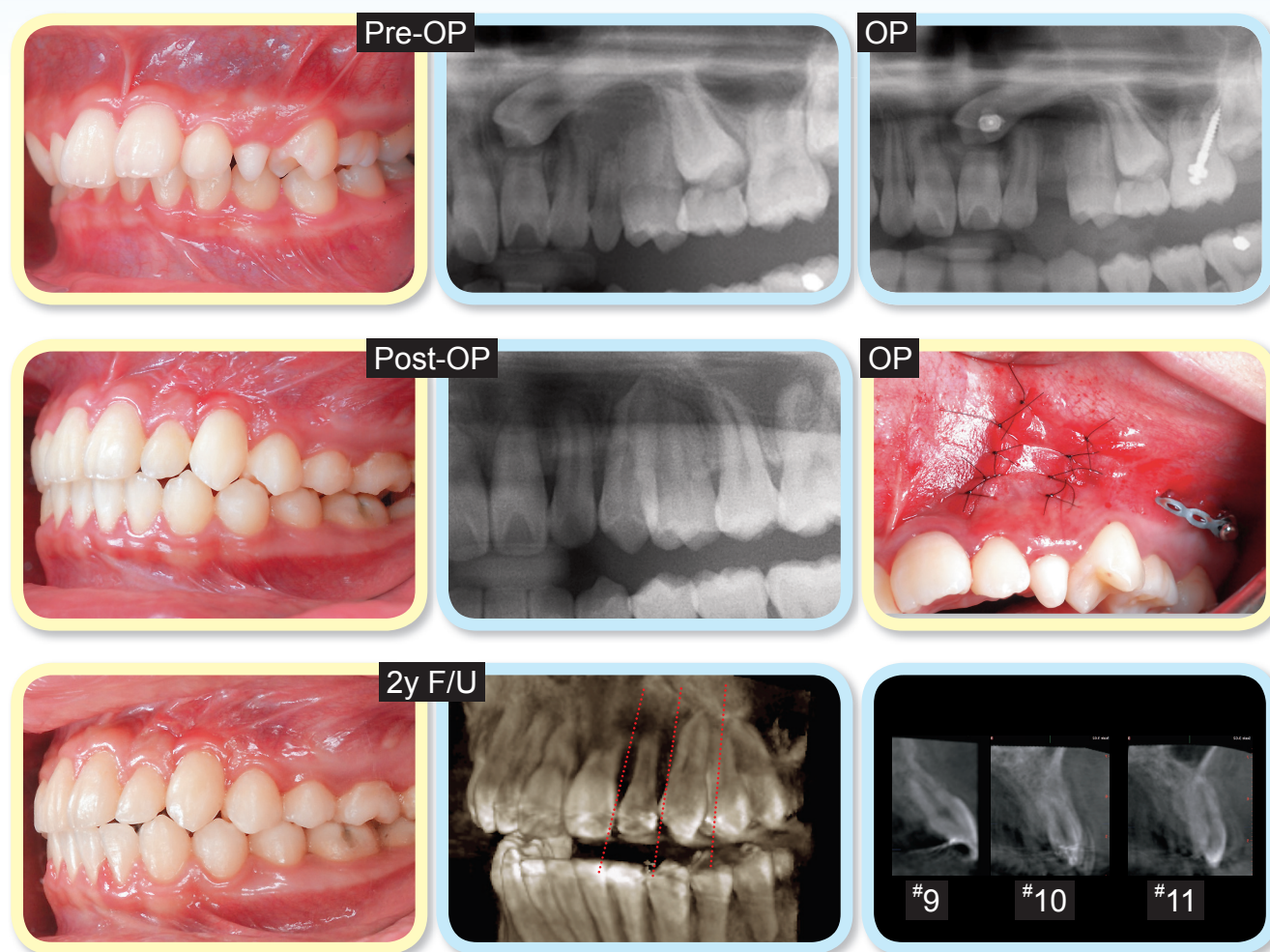
- A - P: *Incisors retracted to improve axial inclination (124 to 111°)*
- Vertical: *Molars extruded*
- Inter-molar / Inter-canine Width: *Increased*

Mandibular Dentition

- A - P: *Incisors slightly protracted from 101 to 103°*
- Vertical: *Molars extruded*
- Inter-molar / Inter-canine Width: *Maintained*

Facial Esthetics

- Upper and lower lip: *Position maintained*



■ Fig. 35:

A panel of six intraoral photographs and radiographs on the left shows the pre-treatment condition, post-treatment outcome, and two year stability of an impacted UL3. The vertical panel of three shows the VISTA post-op radiograph (upper) and intraoral view (middle). The bottom right shows CBCT cuts from the post-treatment scan revealing the optimal healing and post-treatment recovery of the UL1 (#9), UL2 (#10), and UL3 (#11). See text for details.

Retention

A fixed retainer was bonded on the palatal surface of all maxillary incisors. A clear overlay retainer was delivered for the upper arch and the patient was instructed to wear it full time for the first 6 months and nights only thereafter. Instructions were provided for oral hygiene and maintenance of the retainers.



■ **Fig. 36:**
Phase II Treatment: After the second molars erupted, a full fixed appliance was installed for final alignment.



■ **Fig. 37:**
Phase II Treatment Finish: The final facial and intraoral photographs were obtained at the two year follow-up which, which is six months after completion of Phase II treatment to improve the final alignment. See text for details.

Final Evaluation of Treatment

The facial profile was maintained and the lower dental midline was shifted slightly to the right. The pre-treatment and post-treatment cephalometric tracings reveal that the SN to mandibular plane angle were increased 3° due to condylar growth and the clockwise rotation of the mandible. The axial inclination of the upper incisors to SN was decreased from 124° to 111° . The lower incisors were flared about 2° . All of the molars were extruded as the vertical dimension of occlusion was increased. The CRE score was 26 points as shown in the subsequent work sheet as described by Huang.¹² Most of the points deducted were for alignment and marginal ridges. A post treatment panoramic radiograph was exposed to check the root angulation (Fig. 8). Seven points were deducted from the P&W esthetic score, as documented in the form at the end of this report.⁹

Although the conservative treatment plan required 31 months of active treatment, the patient and parents were very pleased with the outcome. However, the second molars were erupting in undesirable positions so at one year recall the dentition was realigned as previously described. At the two year follow-up, intraoral photographs and a CBCT were obtained and compared to the pre-treatment and post-treatment records (Fig. 35). Despite the initial root resorption of the incisors, teeth #9-11 (UL6-8) achieved good bone support and all of the teeth were vital.

Discussion

This patient had a high labial impaction of the UL3 that was transposed to the midline and infringing on the labial root surface of the UL1 and UL2. When determining the optimal treatment plan, it is helpful to tabulate the advantages and disadvantages of each plan to determine if extraction of the impaction or first premolars is indicated. No treatment plan is perfect so a decision must be made on the pros and cons of each approach. If the impacted canine was extracted and substituted with the adjacent first premolar, the main problems would be asymmetric smile esthetics and a Class II molar relationship on the left side. Surgical uncovering and orthodontic traction were started immediately because there was a concern that the impacted canine could cause further damage to the roots of the central and lateral incisors (*Fig. 11*). A disadvantage of commencing comprehensive fixed appliance treatment prior to eruption of the second molars is the final alignment is compromised if the 7s do not erupt in an ideal position. To achieve an ideal result, two phases of active treatment were needed. Phase I corrected the impaction and aligned the teeth from first molar to first molar, but a second phase of treatment was required to align the second molars and finish the occlusion.

Three surgical approaches were proposed based on the position of the impaction.⁴ The open window method is recommended for palatal impactions

because they usually erupt spontaneously into the oral cavity. The closed eruption technique and an apically positioned flap (APF) are the most common procedures for impactions on the facial surface of the arch. The optimal approach depends on the position of the impaction to adjacent tooth roots and the condition of the supporting soft tissue. One of the main problems with the closed eruption technique is the difficulty in obtaining tension release of the flap during the uncovering procedure. Conversely APF presents a similar challenge during wound closure. The apical repositioning of the soft tissue makes it difficult to precisely control the flap margin. The closed eruption and APF techniques are suitable for vertical but not horizontal traction to recover impactions.⁸ For the present patient, the labially impacted canine is considered to be “high” because it is positioned against the roots of the UL1 and UL2. Neither vertical or distal traction is possible without further compromising the incisor roots. The VISTA approach is an excellent alternative because the impaction can be tipped to the labial and away from the incisor roots, and then uprighted and retracted to its correct position in the arch.

Zadeh⁵ developed a novel, minimally invasive approach for isolated recession defects and multiple contiguous periodontal defects in the maxillary anterior region (*Fig. 12*). The VISTA approach avoids several of the shortcomings of the intrasulcular tunneling techniques used for periodontal root

coverage. It provides broader access to the vestibule and a single vestibular incision can provide access to the entire region. VISTA allows visualization of the underlying alveolar bone and root dehiscences. In addition it is compatible with connective tissue and particle bone grafts for managing gingival recession with a bony defect (*Fig. 12*). This article describes a minimally invasive modification of the VISTA technique for managing canine impactions that are positioned labially to the adjacent incisors. This approach has the esthetic advantage of positioning the IZC screw head near MGJ so that the mechanics are less noticable. An IZC anchored power chain to the transposed canine provides a more superior line of force to retract and upright it, while avoiding further root resorption of the adjacent incisors (*Fig. 13*). The IZC is on the inferior aspect of the zygomatic process. The osseous process terminates on the buccal aspect of the alveolar process between the first and second molars.¹³⁻¹⁵ This position allows the bone screw to pass buccal to the molar roots and then penetrate the thick bone superior to the molars. A properly positioned head of an IZC screw provides the correct line of force to retract labially impacted canines.

Conclusions

The VISTA method was designed as a flapless surgical technique to minimize trauma to soft tissue associated with gingival revisions. It facilitated

wound care and the healing process was more comfortable for the patient. An additional advantage is decreased tension of the wound edges to facilitate closure with direct loop interrupted sutures. The VISTA approach, as modified for recovery of labial impactions, is more comfortable for the patient, enhances the wound healing process, and provides for submucosal retraction of a transposed tooth. This approach is well suited for surgical management of labial impactions in the esthetic zone (*Fig. 13*).

Acknowledgement

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Discrepancy Index Worksheet

TOTAL D.I. SCORE **36**

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 = **5**

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 = **4**

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. ____ pts.
 additional

Total = **8**

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = **0**

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = **2**

CEPHALOMETRICS (See Instructions)

ANB $\geq 6^\circ$ or $\leq -2^\circ$ = 4 pts.

Each degree $< -2^\circ$ ____ x 1 pt. = ____

Each degree $> 6^\circ$ ____ x 1 pt. = ____

SN-MP

$\geq 38^\circ$ = 2 pts.

Each degree $> 38^\circ$ ____ x 2 pts. = ____

$\leq 26^\circ$ = 1 pt.

Each degree $< 26^\circ$ ____ x 1 pt. = **3**

1 to MP $\geq 99^\circ$ = 1 pt.

Each degree $> 99^\circ$ ____ x 1 pt. = **3**

Total = **6**

OTHER (See Instructions)

Supernumerary teeth ____ x 1 pt. = ____
 Ankylosis of perm. teeth ____ x 2 pts. = ____
 Anomalous morphology ____ x 2 pts. = ____
 Impaction (except 3rd molars) **1** x 2 pts. = **2**
 Midline discrepancy (≥ 3 mm) ____ @ 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 ≥ 2 mm) ____ @ 2 pts. = ____
 Tooth transposition ____ x 2 pts. = ____
 Skeletal asymmetry (nonsurgical tx) ____ @ 3 pts. = ____
 Addl. treatment complexities **2** x 2 pts. = **4**

Identify:

Highly positioned impacted canine
 Severe root resorption

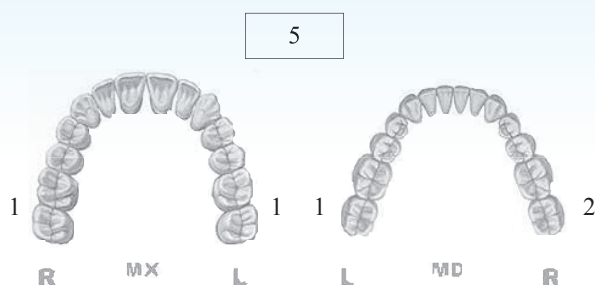
Total = **6**

Cast-Radiograph Evaluation

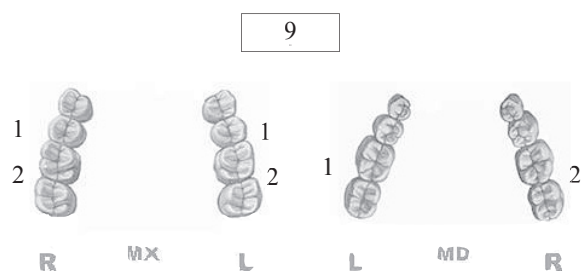
Case # 1 Patient

Total Score: **26**

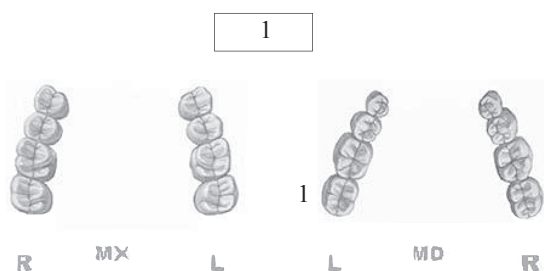
Alignment/Rotations



Marginal Ridges



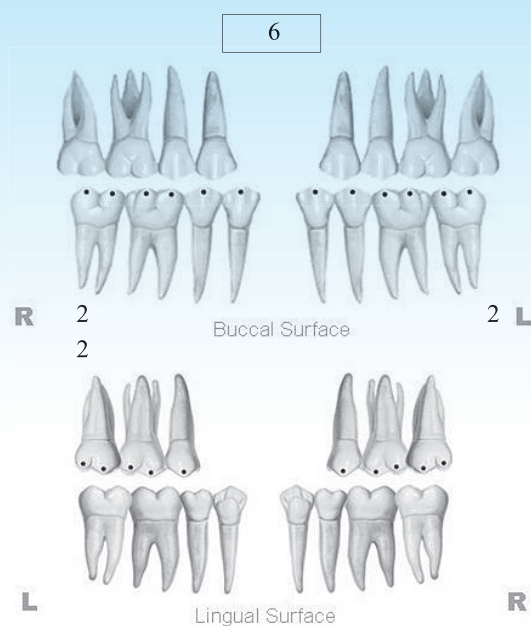
Buccolingual Inclination



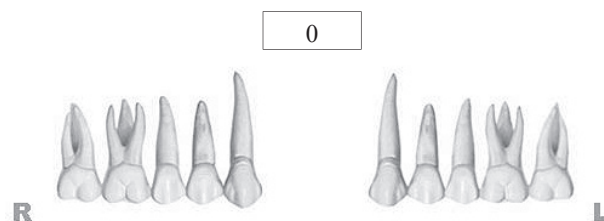
Overjet



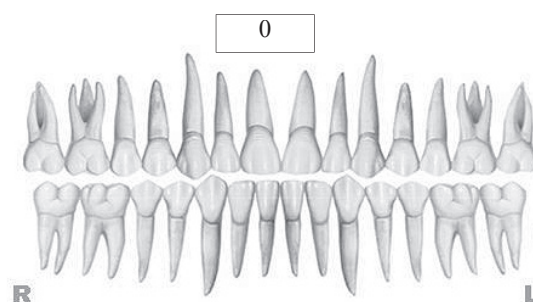
Occlusal Contact



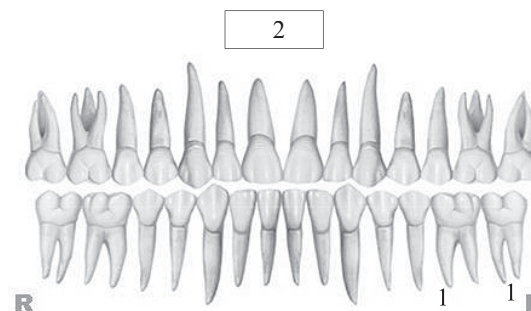
Occlusal Relationships



Interproximal Contacts



Root Angulation

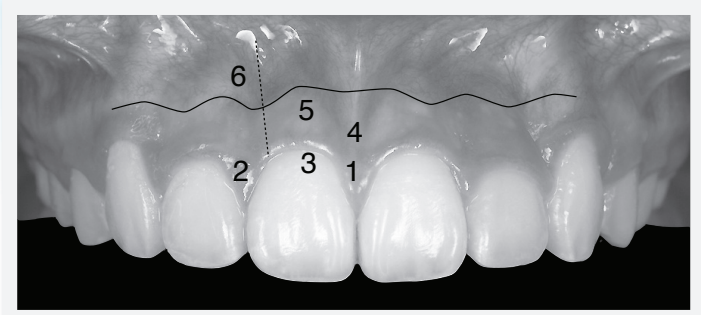


INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = **7**

1. Pink Esthetic Score



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

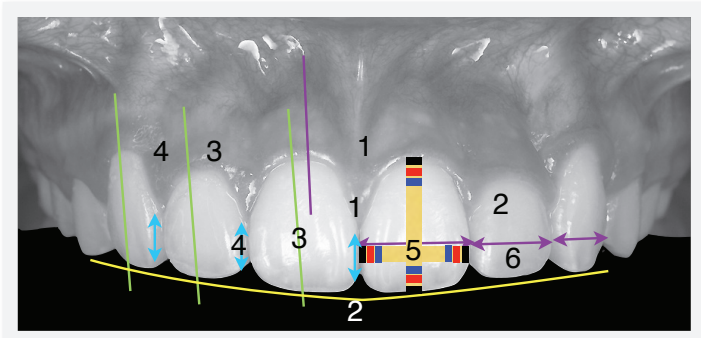
Total = **3**



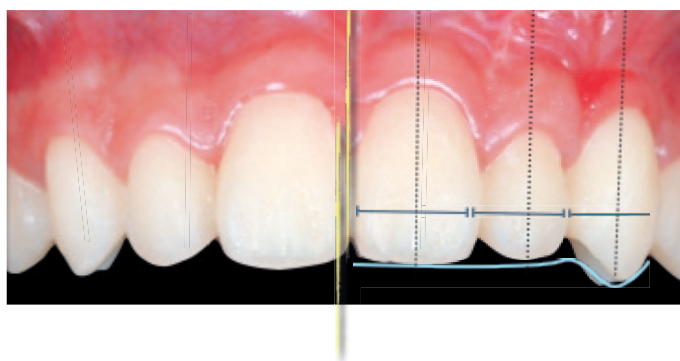
1. M & D Papilla	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

2. White Esthetic Score (for Micro-esthetics)

Total = **4**



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