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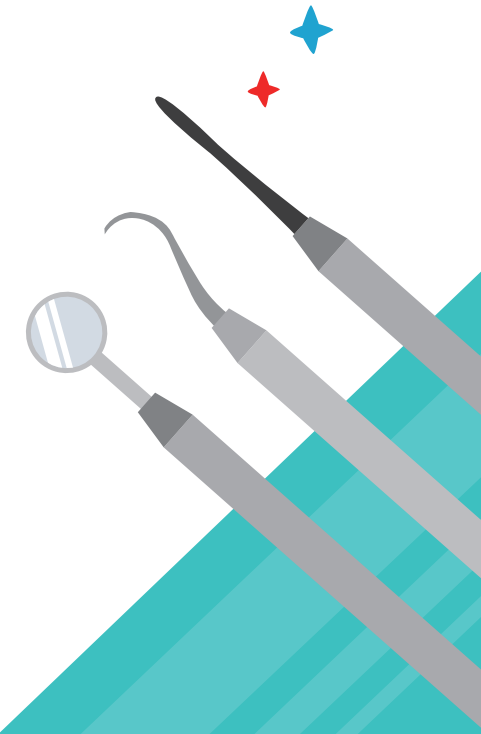

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Managing a Labially-Impacted Canine with VISTA, Connective Tissue Graft, IZC Screws, and a 3D Lever Arm

Abstract

History: *A 13year-2month-old male presented with chief complaints (CC) of an unesthetic smile and diastema.*

Diagnosis: *The upper right deciduous canine (URc) was retained, and the UR3 was labially impacted. An oblique direction of canine eruption wedged the impaction between the keratinized mucosa and the adjacent incisor. His lower facial height was within normal limits (WNL) (%FH: Na-ANS-Gn 53%), but the profile was more convex than normal (Convexity: G-Sn-Pg' 20˚). Bilateral molars were in full-cusp Class II malocclusion. Mandibular retrusion (SNB 76˚) and a normal mandibular angle (SN-MP 33˚) were noted. Bilateral incisors were prominent (U1 to NA 9mm, U1 to SN 118˚, L1 to NB 6.5mm, L1 to MP 99˚). The Discrepancy Index (DI) was 37.*

Etiology: *The severely impacted UR3 was apparently due to a deviated path of eruption, which may be related to improper development of the tooth, and/or limited space in the arch.*

Treatment: *Following extraction of the URc, all teeth except the UR2 were bonded with a Damon Q® passive self-ligating (PSL) bracket system. Vertical incision subperiosteal tunnel access (VISTA) technique was performed to produce a submucosal space for retracting and extruding the impacted UR3. A button was bonded on the UR3, and a power chain was attached. The elastomer chain exited the mucosa through a more distal incision, and traction was applied with a custom lever arm, anchored by an OrthoBoneScrew® (OBS) inserted into the right infrazygomatic crest (IZC). The impaction was retracted into a normal position between the UR2 and UR4. Once the UR3 was extruded and approached the occlusal plane, the UR2 was bonded. The VISTA technique can be used in combination with a connective tissue graft (CTG) to treat UR3 gingival recession defects. A slow traction procedure, with regular periodontal maintenance, was performed to avoid a premature perforation of the labial alveolar plate. Both arches were detailed and finished.*

Outcomes: *Facial esthetics was improved. After 33 months of active treatment, the UR3 was well aligned. The supporting labial gingiva matured and keratinized without any additional root resorption. Final alignment and dental esthetics were excellent, as evidenced by an ABO Cast-Radiograph Evaluation (CRE) score of 24, and an IBOI Pink and White esthetic score of 8.*

Conclusions: *The VISTA approach with an OBS-anchored 3D lever arm for submucosal retraction of maxillary canine impactions is an ideal procedure for the critical esthetic zone. Differential soft and hard tissue biomechanics protect an unrestrained lateral incisor while the impacted canine is being recovered. (J Digital Orthod 2022;65:30-47)*

Key words:
Tooth movement, eruptive force, differential biomechanics, impacted maxillary canine, vertical incision subperiosteal tunnel access (VISTA)

Introduction

The dental nomenclature for this report is a modified Palmer notation. Upper (*U*) and lower (*L*) arches, as well as the right (*R*) and left (*L*) sides, define the four oral quadrants: UR, UL, LR and LL. The teeth are numbered 1-8, and deciduous teeth are a-e from the midline in each quadrant, e.g., a lower right first molar is LR6 and a upper right deciduous canine is URc.

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Periodontists are often called on by orthodontists to expose an impacted tooth,[1] which is essential for orthodontic treatment to be successful. The cuspids are generally one of the last teeth to erupt into the arch and are adversely affected by: 1. loss of space, 2. over-retained deciduous teeth, and 3. facial or palatal deflection of the lateral incisor. The prevalence of impacted canines in adolescents ranges from 0.2-2.8%.[2] Third molars are more commonly impacted than canines, but their recovery (*if indicated*) rarely presents significant esthetic and functional challenges. Recovering severely displaced, impacted canines is among the most challenging clinical problems in orthodontics.

***Fig. 1**: Pre-treatment facial and intraoral photographs*

Coordinating treatment phases is very important for achieving the desired outcome: proper alignment, periodontal stability, and long-term esthetics. Compromised surgical and biomechanical procedures may result in complications and unpredictable outcomes.[3] Studies have shown an impacted canine prevalence of 0.27-2.4% is second only to third molars.[2] For North American patients, about two thirds of the impacted canines are located palatally, while the rest are positioned labially or within the alveolus. In contrast, for Chinese adolescents, about 50-68% of impacted canines are on the labial side.[2] Labial impactions are clinically more difficult to manage since root resorption and gingival recession are prone to occur during the recovery process.

History, diagnosis, and Etiology

A 13year-2month-old male presented with an acceptable facial profile and an impacted UR3. The maxillary midline was shifted 3mm to the right (*Figs. 1 and 2*), and there was bilateral irregularities in the maxillary lateral incisor and canine regions (*Figs. 2 and 3*). A clinical examination revealed an impinging overbite and a 9mm overjet (*Figs. 2 and 3*). No contributing medical and dental histories were reported, but some late facial growth was expected. The deciduous upper right canine (*URc*) was retained with no mobility. Crowding of 9mm was noted in the lower arches. The cephalometric and panoramic radiographs, as well as the cone-beam computerized tomography (*CBCT*) of the head revealed that the UR3 was a complex impaction (*Figs. 2-5*). There was no history of significant trauma, dental problems, or medical disorders. The etiology appeared to be a deviated UR3 eruption path.[4] Severe transposed labial impactions are best managed with Zadeh's VISTA procedure,[5] modified by Chang et al.[6] for submucosal retraction of the transposed impaction.

Treatment Alternatives

The ideal objectives for full fixed appliance treatment is to resolve the malocclusion and align the impacted cuspid. Three options were considered (*Fig. 6*):[7]

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

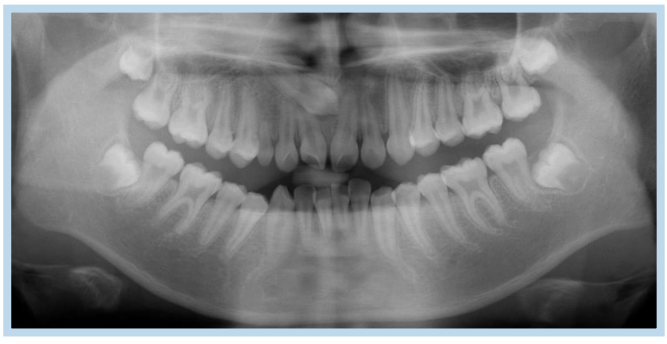

Fig. 3: *Pre-treatment panoramic radiograph*

Fig. 4: *Pre-treatment lateral cephalometric radiograph*

Fig. 5:
CBCT cut through the long axis of the UR2 showing labial impingement of the impacted UR3 (white arrow). See text for details.

1. Extract all four 1st premolars and the URc, then, use the modified VISTA and OBS 3D lever arm technique to align the impacted UR3.

Option 1: Extraction of premolars allows the lips to be retracted, but his profile was already good and extraction may cause the profile to become too concave. Specialized surgery and mechanics are required to recover the impacted canine.

2. Extract UL4, LR4, LL4, URc, and the impacted UR3. Substitute UR3 with UR4.

Option 2: As mentioned above, extraction of the premolars and the deciduous canine may cause the profile to be too concave. Extracting the impaction rather than recovering it would decrease treatment time, but substituting the UR4 for the missing UR3 would result in an unesthetic outcome and functional compromise.

3. Extract only the deciduous canine. Use the modified VISTA and OBS 3D lever arm techniques to align the impacted UR3.[8]

Option 3: Extracting only the URc and recovering the impacted UR3 could achieve a minimally invasive treatment. Good dental esthetics and function are expected.

Rationale: After discussing the pros and cons of each option with the patient and his parents, Option 3 was selected. This treatment was divided into two phases to firstly correct the impaction and then complete the final alignment.

Treatment Progress

A passive self-ligating (*PSL*) fixed appliance (*Damon Q®, Ormco Corporation, Glendora, CA*) was bonded

on all upper teeth except for the UR2, URc and a 0.014-in CuNiTi achwire was engaged. Low-torque brackets were chosen for the upper anterior segments to control the flaring incisors (*decreased axial inclination*) during alignment. In the 2nd month of treatment, surgical intervention was indicated. The preferred surgical approach (*Fig. 7*) was the VISTA technique of Zadeh modified by Chang et al.,[8] which combined IZC bone screw anchorage and 3D lever-arm mechanics (*Fig. 8*) with simultaneous upper right deciduous canine extraction. The CBCT imaging (*Fig. 5*) showed the precise location of the impaction, so the initial vertical incision was performed between the central and lateral incisors to expose the crown of the impaction (*Fig. 9A*). A periosteal elevator was then used to detach the periosteum and expose the UR3. Bone covering the crown was removed down to the cementoenamel junction (*CEJ*). The impacted canine was carefully luxated with an

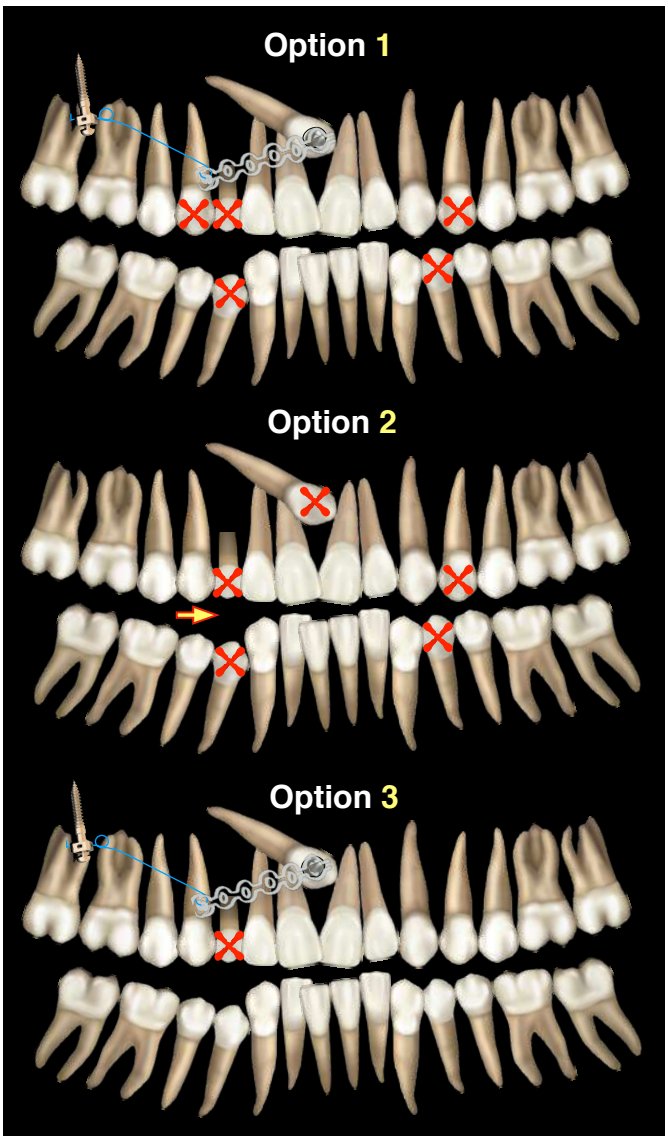

Fig. 6: *A three-part diagram shows three treatment approaches. See text for details.*

CEPHALOMETRIC SUMMARY

SKELETAL ANALYSIS	PRE-TX	POST-TX	DIFF.
SNA° (82°)	81°	80°	1°
SNB° (80°)	76°	75°	1°
ANB° (2°)	5°	5°	0°
SN-MP° (32°)	33°	33°	0°
FMA° (25°)	26°	26°	0°
DENTAL ANALYSIS			
U1 TO NA mm (4mm)	9	3	6
U1 TO SN° (104°)	118°	96°	22°
L1 TO NB mm (4mm)	6.5	7	0.5
L1 TO MP° (90°)	99°	112°	13°
FACIAL ANALYSIS			
E-LINE UL (-1mm)	0	-3	3
E-LINE LL (0mm)	-0.5	-1.5	1
%FH: Na-ANS-Gn (53%)	53%	53%	0%
Convexity:G-Sn-Pg' (13°)	20°	20°	0°

Table 1: *Cephalometric summary*

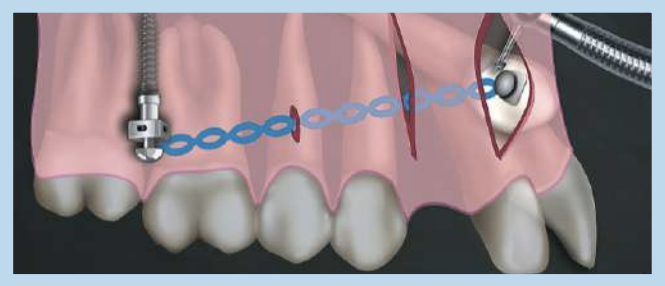

Fig. 7:
The VISTA technique is modified for submucosal retraction and uprighting of a labially positioned and transposed canine impaction. See text for details. Illustration is kindly provided by Dr. Rungsi Thavarungkul.

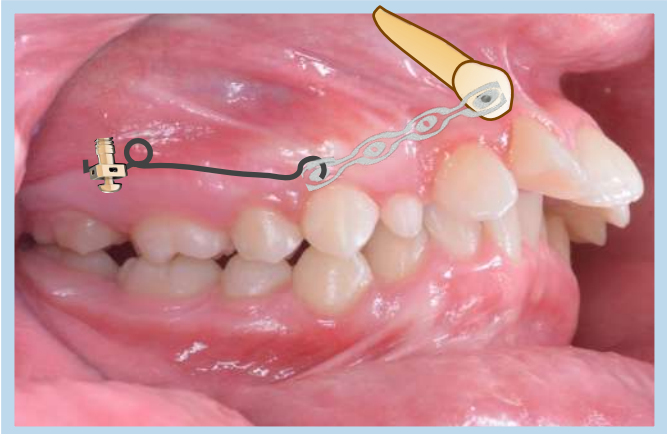

Fig. 8:
Diagram superimposed on an intraoral photograph illustrates the design of the implant recovery mechanism in the sagittal plane. The UR3 impacted against the UR2 root is accessed with a VISTA vertical incision, and a button is bonded on the labial surface. A grey chain of elastics applies distal and occlusal traction to the UR3, via a 3D lever arm inserted into the hole on an IZC OBS. See text and subsequent figures for details.

elevator to rule out ankylosis, and then a button was bonded in the center of the exposed enamel. A power chain was attached to the button, a second vertical incision was made in the vestibule superior to the edentulous space, higher than the normal UR3 position, and the power chain exited the submucosal tunnel (*Fig. 9B*). Subperiosteal decortication, of the alveolar bone surface in the UR3 retraction path was achieved with a #4 round carbide bur. An OrthoBoneScrew® (*OBS*) (*iNewton, Inc., Hsinchu City, Taiwan*) was inserted into the right infrazygomatic crest (*IZC*) and a 3D lever arm was inserted into the rectangular hole of the anchorage device (*Fig. 9C*). Finally, the power chain that was attached to the impaction delivered a distal traction force via the lever-arm anchored by the IZC OBS. Following activation of the mechanism, the two vertical incisions were sutured to ensure minimal damage to the mucosa (*Fig. 10*).

After the surgery, all erupted teeth were aligned in the upper arch, except for the UR2. The archwire sequence was: 1. 0.014-in CuNiTi, 2. 0.014x0.025-in CuNiTi, and 3. 0.017x0.025-in TMA. An open coil spring between UR1 and UR4 was used to open space.

The power chain was continually tightened at monthly appointments, and gradually the teeth could be seen moving slowly in the right direction. In the 11th month of treatment (*9 months after surgery*), the canine crown and button were visible beneath the transparent gingiva (*Fig. 11*). In the 12th month, the canine was more extruded, and the immature gums were removed. In the 13th month, the maxillary archwire was changed to a 0.016x0.025-in stainless steel wire. In the 17th month, a low torque bracket was bonded on the UR2 after the crown of the impacted canine was retracted. In the 18th month of treatment (*16 months after surgery*), a PSL fixed appliance was bonded on all lower teeth. Low torque brackets were chosen for the lower anterior segments and 0.014-in CuNiTi archwires were engaged on both arches. A high torque bracket was bonded on the UR3. Posterior

Fig. 9:
A. The first incision was made in the mucosa covering the crown of the impacted canine and the periosteal elevators were used to reflect the incision and expose the crown for bonding the button.
B. A second incision was then made at the site where the power chain exits the soft tissue (arrow).
C. An OBS (yellow arrow) was inserted in the IZC to anchor the 3D lever arm and the distal end of the 3D lever arm was inserted in the hole of the OBS (green arrow)

Fig. 10:
A. The power chain attached to the UR3 was activated by the 3D lever arm in the direction of the yellow arrow. B. The two incisions were then sutured for primary healing. C. The buccal view of the mechanics is illustrated with a drawing superimposed on the post-operative photograph. Purple lines show 1st and 2nd sutured incisions and a chain of elastics show the line of traction. Note both ends of the lever-arm are secured with bonded resin. See text for details.

bite turbos were placed bilaterally on the mandibular 1st molars to prevent biting the LR7 and LL7 brackets. In the 20th month, the canine erupted to the level of the occlusal plane, but its buccal gingiva was immature and bright red in color. The keratinized gingiva on the buccal side was not sufficient. At this time, another OBS was inserted into the left infrazygomatic crest, and bilateral IZC screws were used to retract the upper arch.

In the 23rd month of active treatment, a follow-up root coverage surgery was performed. After a baseline examination, the surgical site was anaesthetized. A subepithelial connective tissue graft was cut from the roof of the palate under the flap (*Fig. 12C*). Recipient sites were prepared by thorough scaling, root planing and demineralizing of the root surface with 20% EDTA. The VISTA approach began with a vestibular access incision mesial to the recession defect. A subperiosteal tunnel was created, exposing the facial osseous plate and root dehiscence. This tunnel was extended at least one or two teeth beyond the teeth requiring root coverage so as to mobilize gingival margins and facilitate coronal repositioning with a microsurgical periosteal elevator. Additionally, the subperiosteal tunnel was extended interproximally under each papilla as far as the

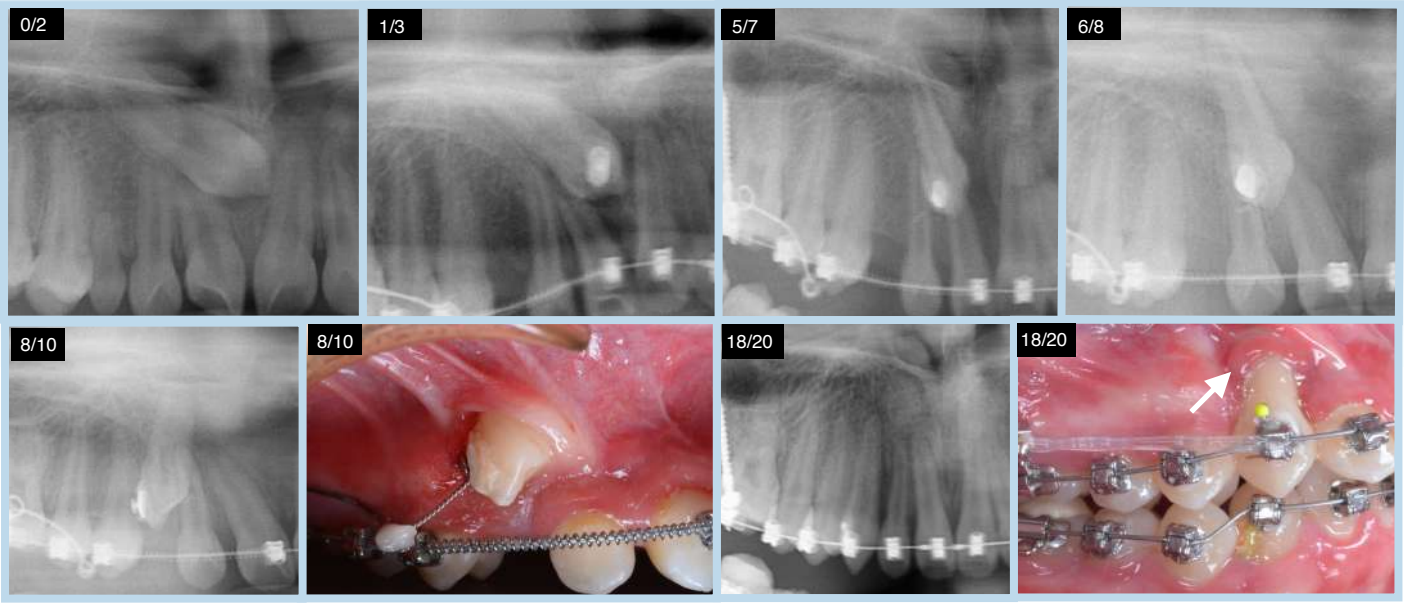

Fig. 11: *A panel of radiographs showing progress in the recovery of the impacted UR3*
Each radiograph is labeled with a code designating the time in months since VISTA surgery and initiation of traction (first number), and the number of months into active treatment (second number). ***(0/2)*** *is the immediate post-operative radiograph for the surgery performed two months into treatment.* ***(6/8)*** *shows the position of the UR3 after six months of traction, which corresponds to the eight month of treatment.* ***(8/10):*** *The radiograph and photograph show UR3 correctly positioned in the sagittal plane, and there were no obstructions for extrusions. The UR3 crown is visible underneath the overlying gingiva, which is immediately coronal to the MGJ. Note the line of traction for the lever-arm is buccal and occlusal.* ***(18/20):*** *The radiograph and photograph show the UR3 extruded to the occlusal plane. Brackets were bonded on the UR2 and UR3, and a CuNiTi archwire was used to align the arch. Note the large red area of immature, non-keratinized gingiva (white arrow). See text for details.*

embrasure space permitted, without making any surface incisions through the papilla. Once coronal advancement of the gingival margin had been established, the freshly prepared connective tissue graft was trimmed and adjusted to cover the dehiscence on the root through the subperiosteal tunnel (*Figs. 12D-F*). CTG was sandwiched between the underlying periosteum and the overlying coronally-advanced flap (*CAF*) and then stitched to the gum tissue surrounding the exposed root with the aim of providing enhanced blood supply (*Fig. 12G*). At the patient's one-month follow-up, the gingiva's condition around the UR3 was ideal (*Fig. 12H*). In the 26th month, both archwires were changed to 0.016x0.025-in SS wires.

Following 33 months of active treatment, all brackets were removed, and fixed retainers were bonded on the maxillary incisors (*UR2-UL2*) and the mandibular anterior segment (*LR3-LL3*). Maxillary anterior frenectomy and gingivectomy were performed with a diode laser to optimize the dental esthetics. The UR3 labial gingiva was a thick band of mature gingiva supporting the recovered UR3 (*Fig. 17*).

Lateral cephalometric radiograph (*Fig. 13*), post-treatment panoramic radiograph (*Fig. 14*), and model casts (*Fig. 15*) document the outcome following 33 months of active surgical and orthodontic therapy. The superimposition of pre- and post-treatment cephalometric tracings show

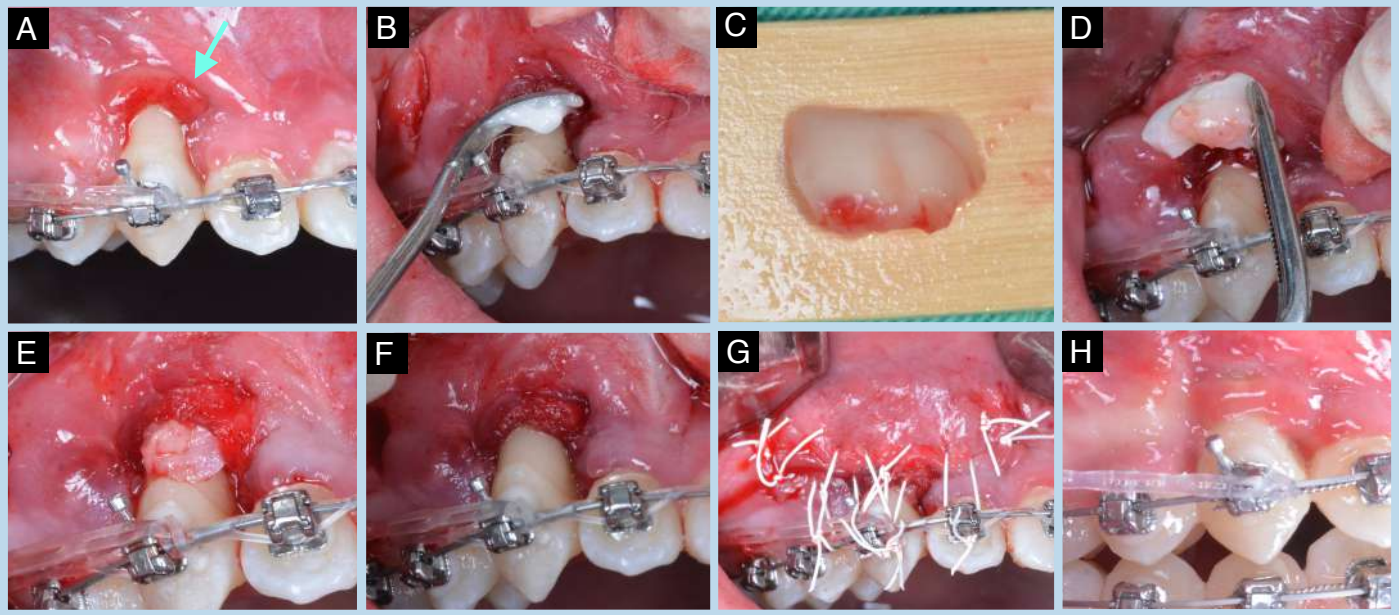

Fig. 12:
(A) *buccal gingiva was immature and bright red in color around UR3 (blue arrow).* ***(B)*** *Subperiosteal tunnel was created, exposing the facial osseous plate and root dehiscence. The root surface was conditioned with 20% EDTA.* ***(C&D)*** *Subepithelial connective tissue graft cut at the roof of mouth (palate) and tissue from under the flap.* ***(E-G)*** *CTG sandwiched between the underlying periosteum and the overlying CAF (coronally advanced flaps) and then stitched to the gum tissue surrounding the exposed root with the aim of providing enhanced blood supply to the CTG.* ***(H)*** *One month follow-up. See text for details.*

the late growth and dentofacial orthopedic changes associated with active treatment (*Fig. 16*).

Final Evaluation of Treatment

After 33 months of active orthodontic treatment, all teeth were well-aligned. The patient and his parents were very pleased with the outcome. The clinical examination revealed a well-maintained facial profile. The post-treatment facial and intraoral photographs show the recovered canine and adjacent UR2 were both stable, and no signs of re-intrusion, significant root resorption nor inflammation of the soft tissue were noted (*Fig. 17*).[1] The keratinized gingiva around the UR3 was acceptable, but requires long-term follow-ups to ensure that stability has

Fig. 13: *Post-treatment lateral cephalometric radiograph*

been achieved (*Fig. 12H*). The post-treatment panoramic film shows ideal axial inclination (*Fig. 14*). Superimpositions of pre- and post-treatment cephalometric tracings (*Fig. 16*) as well as cephalometric analysis (*Table 1*) document an acceptable post-treatment upper incisor torque (*axial inclinations*), which was decreased by 22 degrees. However, due to the complications of a non-extraction treatment for solving the crowding, the

Fig. 14: *Post-treatment panoramic radiograph*

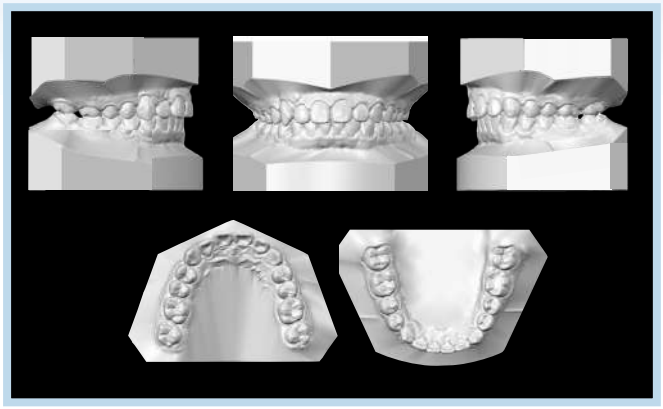

Fig. 15: *Post-treatment dental models (casts) radiograph*

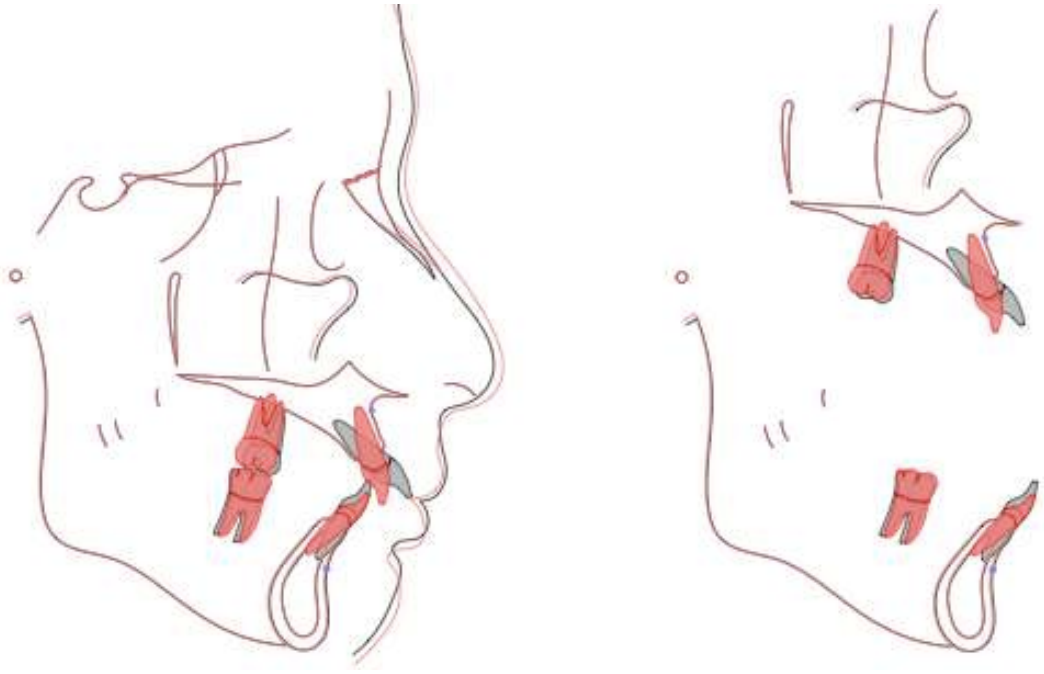

Fig. 16:
Superimposed cephalometric tracings show dentofacial changes after 33 months of treatment (red) compared to the pre-treatment position (black). The tracings reveal that post-treatment upper incisor torque (axial inclinations) was acceptable (Fig. 13), and had been decreased by 22 degrees. However, the axial inclination of the lower incisors, with an increase of 13 degrees due to the decision to solve crowing with a non-extraction treatment, was not satisfactory. The greatest improvement was the retraction and intrusion of the upper incisor, plus the flaring-out and intrusion of the lower incisor. The upper and lower posterior teeth were slightly retracted, and the mandibular plane angle was maintained. See text for details.

axial inclination of the lower incisors was increased by 13 degrees, which was not desirable. The greatest improvement was the retraction and intrusion of all the upper incisors as well as the flaring-out and intrusion of all the lower incisors. The upper and lower posterior teeth were slightly retracted, and the mandibular plane angle was maintained. Both pre-treatment and post-treatment data are within normal limits. There was slight growth of the mandible; nevertheless, the profile was well-maintained.

The American Board of Orthodontics (*ABO*) Cast-Radiograph Evaluation (*CRE*) score was 24 points, as shown in the supplementary CRE worksheet. The major residual discrepancies were occlusal relationships (*9 points*), marginal ridges (*7 points*), and alignment/rotations (*5 points*). The Pink and White dental esthetic score was 8 points as detailed in Worksheet 3 at the end of this case report. Further discrepancies were axial inclination, contact areas, tooth proportion, tooth-to-tooth proportion, root convexity, and midlines.

Fig. 17: *Post-treatment facial and intraoral photographs*

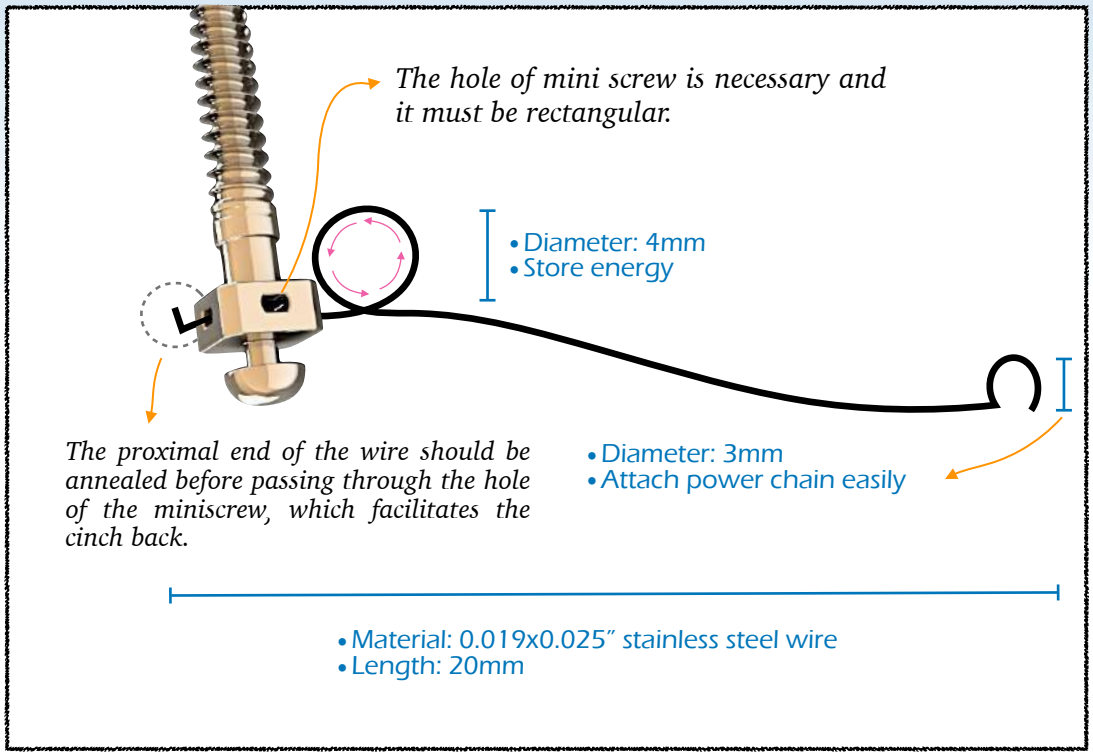

Fig. 18:
3D lever arm. The bending direction (purple arrow) of the helix is crucial. With the correct activation, it should deliver about the same force as a compression coil. See text for details.

Discussion

Torque Selection

Non-extraction leveling and aligning of a crowded dentition usually results in incisal flaring, which is intensified by the use of open coil springs to regain space for the impacted canines.[9] Bonding low torque brackets in the anterior segments of both arches decreases the flaring tendency. In the 14th month, the UR3 was pulled close to the main archwire. As it did not interfere with the UR2 root when moving, the UR2 was bonded with a low torque bracket, which was indicated to upright the tooth once it was aligned in the arch. A lateral force which moves a labially impacted canine into the arch is likely to tip the crown palatally, so a high torque bracket was indicated to flare out the canine once it was aligned in the arch.[10]

Infrazygomatic Screw (*IZC Screw*)

This screw plays a very important role. In the second month, an IZC screw was inserted in the upper right side, with the 3D lever arm applying traction to the impacted canine. An IZC screw without a lever arm is undesirable. If the main archwire, or a molar, is used as anchorage to pull, multiple complications such as occlusal canting or the bowing effect may occur, which may lead to failure in achieving the ideal molar relationship. There could even be insufficient anchorage to move the impaction.

IZC screws offer new horizons for dentofacial orthopedics since the location of the screws, buccal to the roots of the molars, is advantageous for moving the entire dental arch relative to the apical base of bone with determinate mechanics. Thus, conservative dentofacial orthopedics, with no extractions or orthognathic surgery, is capable of managing severe malocclusions by moving entire arches as segments. Modest bilateral forces of 200cN, applied to an entire arch as a segment, results in a relatively uniform PDL stress below the necrotic threshold. Avoiding PDL necrosis enhances the rate of tooth movement and reduces the risk of root resorption.[11,12]

VISTA and CTG in the management of gingival recession

Recent systematic reviews have identified advantages for autogenous subepithelial connective tissue grafts (*CTGs*) regarding root coverage and increased widths of keratinized tissue.[13] Additional studies examining sustained results of CTGs appear to further support the long-term efficacy of the CTG in maintaining root coverage.[5,14] Although considered as the current gold standard, there are a number of disadvantages when using CTG, including the need for harvesting at a distant donor site, limited tissue availability, and increased potential for post-harvesting morbidity. In patients with multiple contiguous gingival recession defects, these disadvantages are even more problematic, since optimizing esthetic results partly depends on the simultaneous treatment of all contiguous recessions.[5-7]

In this present case, the buccal gingiva was immature and bright red in color around the UR3 (*Fig. 12*). After the subperiosteal tunnel was created, exposing the facial osseous plate and root dehiscence, the root surface was then conditioned with 20% EDTA. A subepithelial connective tissue graft was cut at the roof of the mouth (*palate*) and tissue from under the flap and the CTG was sandwiched between the underlying periosteum. The overlying CAF (*coronally advanced flap*) was then stitched to the gum tissue surrounding the exposed root with the aim of providing enhanced blood supply to the CTG. One month later, the gingiva around the UR3 appeared healthy.

Multiple studies have documented simultaneous treatment of contiguous recession defects, primarily using large-envelope, coronally advanced, partial-thickness flaps, often including CTGs.[15] A number of studies have also described various tunnel approaches with CTGs or allografts that maintain papillary integrity and avoid vertical releasing incisions, while, at the same time, allowing for treatment of multiple contiguous recession defects.[16] Current tunnel preparation techniques primarily use an intra-sulcular approach to create either a sub- or supra-periosteal space to extend beyond the mucogingival junction. This allows graft tissue to be inserted under the gingival collar. The limitations of this tunnel access technique include the technically challenging nature of intrasulcular tunneling because of the need to obtain access through a small sulcular access point and the increased risk of traumatizing and perforating the sulcular tissues, which could potentially lead to unfavorable healing outcomes. As a consequence of these limitations, the approach of vestibular incision subperiosteal tunnel access (*VISTA*)[17] was developed to avoid some of the potential complications of intra-sulcular tunneling techniques.

3D Lever Arm

Utilizing a section of 0.019x0.025" SS wire, the 3D lever arm is fabricated with one helix and a 4mm diameter, U-shaped hook (*Fig. 18*) to secure a chain of elastics.[7] The terminal end of the wire is annealed before passing through the hole of the miniscrew to facilitate the cinch back bend. The length of the lever arm is ~20mm, which is sufficient for most labial impactions. A longer lever arm may be too flexible to deliver an adequate level of force. The direction of the helix depends on the mechanics; the helix should be loaded in the direction of the last bend.[8] The principle for helix force is to function like a compression coil in delivering a substantial force prior to deforming. Loaded as an extension coil (*opposite direction*), the helix would easily deform. That is why almost all spring-powered analogue watches are driven with compression coils. On the contrary, NiTi springs are effective as extension coil springs. The properties of NiTi and SS are quite different. NiTi wires have a low load-deflection rate, and they are difficult to deform (*bend*). SS is the opposite. It can be readily bent to almost any shapes, but it easily deforms unless it is loaded in the direction of the last bend, i.e., compression. If deformation occurs, the spring back property is greatly diminished. Contrary to NiTi, SS has a limited range of action prior to permanent deformation. For most orthodontic applications, SS is most effective when delivering compressive force.[18]

Conclusions

The VISTA method was designed as a flapless surgical technique to minimize trauma to soft tissue associated with gingival revisions.[14] It facilitates wound care, and the healing process is more comfortable for the patient. During the recovery process, adjacent teeth should not be bonded to allow them to physiologically move out of the path of canine movement. An OBS-anchored 3D lever arm must be precisely adjusted through multiple phases in order to recover labial impactions. An additional advantage is decreased tension of the wound edges which facilitate closure with direct loop interrupted sutures. The VISTA approach, as modified for the 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. Various treatment options exist for the treatment of gingival recession, however, treatment of gingival recession is always a challenge. Hence, the VISTA technique presented in this case report is aimed at overcoming the shortcomings of other treatment options and achieving better results.[6]

Acknowledgement

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References

1. Becker A, Zogakis I, Luchian I, Chaushu S. Surgical exposure of impacted canines: Open or closed surgery? Sem Orthod 2016;22(1):27-33.

2. Sajnani AK, King NM. Prevalence and characteristics of impacted maxillary canines in southern Chinese children and adolescents. J Investig Clin Dent 2014;5(1):38-44.

3. Kokich VG. Surgical and orthodontic management of impacted maxillary canines. Am J Orthod Dentofacial Orthop 2004;126(3):278-83.

4. Manne R, Gandikota CS, Juvvadi SR, Rama HR, Anche S. Impacted canines: Etiology, diagnosis, and orthodontic management. J Pharm Bioallied Sci 2012;4(Suppl 2):S234-8.

5. Zadeh H. Minimally invasive treatment of maxillary anterior gingival recession defects by vestibular incision subperiosteal tunnel access and platelet-derived growth factor BB. Int J Perio Restorative Dent 2011;31(6):653-60.

6. Su CW, Chang CH, Roberts WE. Management of an impacted maxillary canine with the vertical incision subperiosteal tunnel (VISTA) technique. J Digital Orthod 2018;50:52-71.

7. Lin JH, Chang CH, Roberts WE. VISTA and 3D OBS lever-arm to recover a labially-impacted canine: differential biomechanics to control root resorption. APOS Trends in Orthod 2019;9(1):7-18.

8. Chang CH, Hsu E, Roberts WE. Retrospective analysis of 51 impacted maxillary canines in 46 patients: Surgical correction with the OBS-3D lever arm. J Digital Orthod 2020;59:24-33.

9. Huang C, Chang CH, Roberts WE, Shern L. Extraction vs. non-extraction therapy: statistics and retrospective study. Int J Orthod Implantol 2016;44:76-86.

10. Parashar A, Aileni KR, Rachala MR, Shashidhar NR, Mallikarjun V, Parik N. Torque loss in en-masse retraction of maxillary anterior teeth using miniimplants with force vectors at different levels: 3D FEM study. J Clin Diagn Res 2014;8(12):ZC77–80.

11. Hsu YL, Chang CH, Roberts WE. Canine-lateral incisor transposition: controlling root resorption with a bone-anchored t-loop retraction. Am J Orthod Dentofacial Orthop 2016;150;1039-50.

12. Fuss Z, Tsesis I, Lin S. Root resorption-diagnosis, classification and treatment choices based on stimulation factors. Dent Traumatol 2003;19(4):175-82.

13. Lang NP, Löe H. The relationship between the width of keratinized gingiva and gingival health. J Periodontol 1972;43(10):623-7.

14. Su CW, Hsu YL, Chang CH, Roberts WE. Soft tissue considerations for the management of impactions. Int J Orthod Implantol 2011;24:50-59.

15. Zucchelli G, De Sanctis M. Treatment of multiple recession-type defects in patients with esthetic demands. J Periodontol 2000;71:1506–1514.

16. Rossberg M, Eickholz P, Raetzke P, Rat- ka-Krüger P. Long-term results of root coverage with connective tissue in the envelope technique: A report of 20 cases. Int J Periodontics Restorative Dent 2008;28:19–27.

17. Crescini A, Clauser C, Giorgetti R, Cortellini P, Pini Prato GP. Tunnel traction of infraosseous impacted maxillary canines. A three-year periodontal follow-up. Am J Orthod Dentofacial Orthop 1994;105:61–72

18. Amit G, JPS K, Pankaj B, Suchinder S, Parul B. Periodontally accelerated osteogenic orthodontics (PAOO) - a review. J Clin Exper Dent 2012;4(5):e292-e296.

Discrepancy Index Worksheet

TOTAL D.I. SCORE 37

OVREJET

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. 9	=	4 pts.
> 9 mm.	=	5 pts.

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

Total = 4

OVERBITE

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

Total = 5

ANTERIOR OPEN BITE

0 mm. (Edge-to-edge), 1 pt. per tooth
Then 1 pt. per additional full mm. Per tooth

Total = 0

LATERAL OPEN BITE

2 pts. per mm. Per tooth

Total = 0

CROWDING (only one arch)

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

Total = 7

OCCLUSION

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

Total = 8

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. Per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

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

SN-MP

≥ 38° = 2 pts.

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

≤ 26° = 1 pt.

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

1 to MP ≥ 99° = 1 pt.

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

Total = _____

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

Identify: Surgical exposure was performed to cover the impacted maxillary canines.

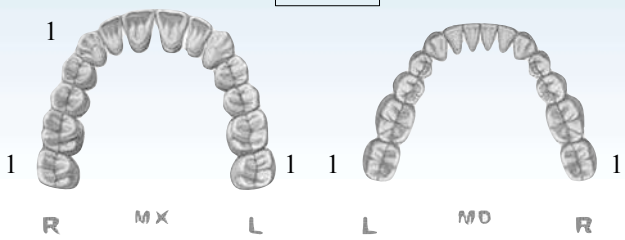
Total = 12

Cast-Radiograph Evaluation

Total Score: 24

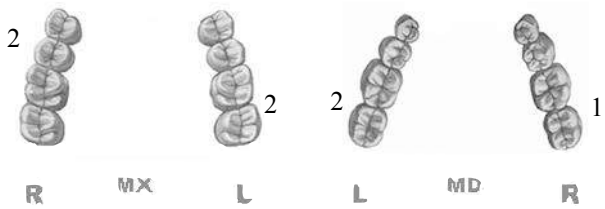
Alignment/Rotations

5



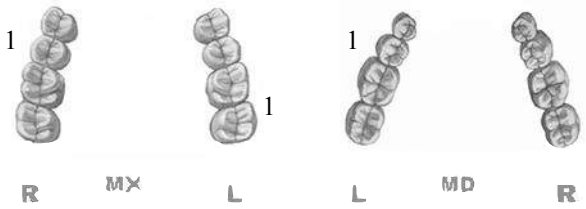
Marginal Ridges

7



Buccolingual Inclination

3

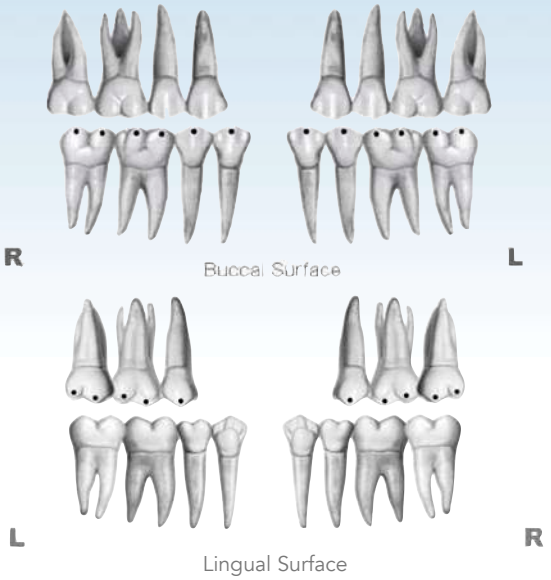


Overjet

4

Occlusal Contacts

0

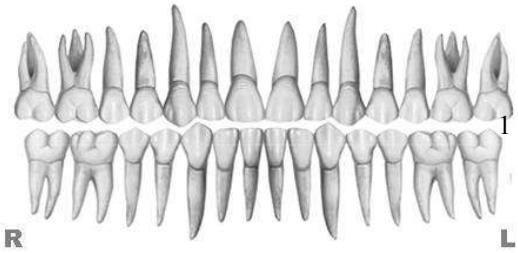


Occlusal Relationships

4

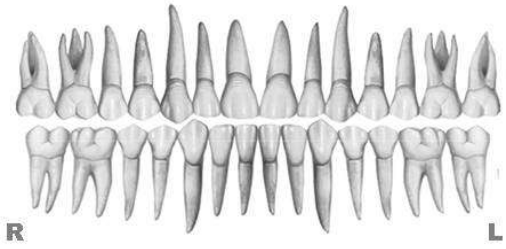
Interproximal Contacts

1



Root Angulation

0



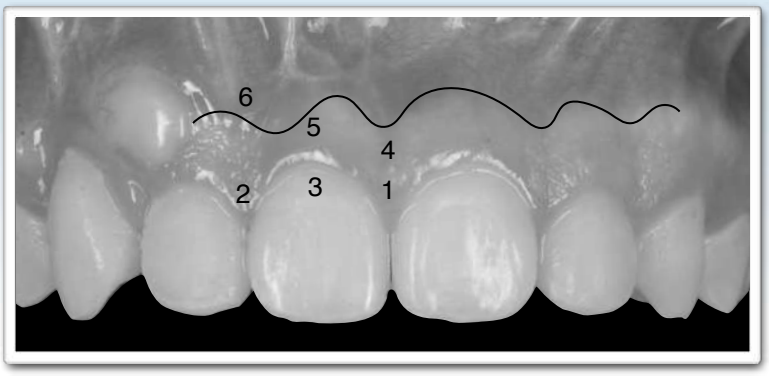
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

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

Total Score = 8

1. Pink Esthetic Score

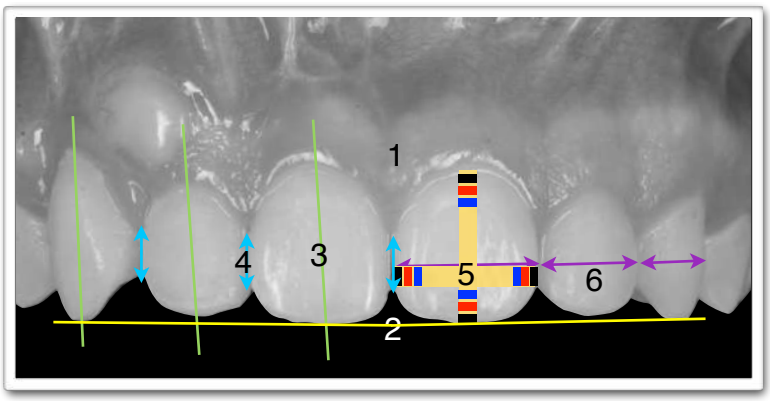
Total = 3



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

2. White Esthetic Score (for Micro-esthetic)

Total = 5



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	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	0	(1)	2
6. Tooth to Tooth Proportion	0	(1)	2

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VISTA surgical techniques	Interdisciplinary approach	Early orthodontic treatment	Early orthodontic treatment	Treatment for impacted teeth	Research design	ABO DI & CRE	ABO case report

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除包含原貝多芬矯正大師班的課程內容外，另外加入了骨釘與 VISTA 術式的操作課程，並新增了學術文章寫作與演講的訓練，讓醫師在進入德國碩士班之前，做好更充分的準備。

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66hrs

Module 1

1. Selecting your ideal first case
2. Bonding position
3. Bonding + BT + Ceph tracing
4. TADs + space closing + hook + spring
5. Finishing bending & fixed retainer

Practice: Clinical photography

Module 2

1. Four stages of efficient orthodontic treatment
2. Simple and effective anchorage system
3. Extraction vs. Non-extraction analysis

Practice: Patient photo management

Module 3

1. Soft & hard tissue diagnostic analysis
2. Big overjet correction
3. Damon diagnosis & fine-tuning

Practice: Ceph tracing

Module 4

1. Excellent finishing
2. Retention & relapse

Practice: Ceph superimposition & measurement

Module 5

1. Simplify your system
2. Extraction vs. non-extraction

Practice: Case report demo

Module 6

1. Class III correction
2. Class II correction

Topic: Early orthodontic treatment

Computer training (Mac): 1:30-2:30 pm

時間：週四全天 (9 am - 5 pm)

地點：金牛頓藝術科技 (新竹市建中一路 25 號 2 樓)

Module 7

1. Upper impaction
2. Lower impaction
3. Gummy smile correction

Topic: Modfied VISTA

Module 8

1. ABO DI, CRE workshop
2. Open bite

Topic: Modified 2X4 appliance in ortho treatment

Module 9

1. Implant-ortho combined treatment
2. Asymmetry

Topic: Interdisciplinary approach

Module 10

1. Minor surgeries in orthodontics
2. Digital orthodontics

Topic: Ortho-viewed interdisciplinary treatment

Module 11

1. Aligner & TADs
2. Keys to aligner learning

Topic: Pre-aligner treatment

Special lecture: 1:30-2:30 pm

*費用含課程視訊、iPad、課程電子書與材料。

+

透過數位影片反覆觀看，結合矯正與電腦教學，課堂助教協助操作，以及診間臨床見習，讓學員在短時間能快速上手，感染「熱愛矯正學，熱愛學矯正」的熱情。