Beethoven
Clinical Education

此診間訓練課程除了包含診間見習之外，並新增學術文章寫作與演講的訓練。醫師不僅可以於貝多芬矯正中心就近學習張慧男醫師的診間技術與經驗，也同時培養醫師期刊寫作與高效簡報的技巧。

34hrs

Chairside Learning 6hrs

Participants will have a chance to conduct chairside learning and observe clinical treatment process in Beethoven Orthodontic Center.

ABO Writing Training

Medical Writing Training 12hrs

Medical writing skills are crucial for clinicians, educators and researchers. This training contains academic medical writing on case reports. Participants will have a chance to publish articles for journals like Journal of Digital Orthodontics (JDO).

Presentation Workshop 10hrs

The presentation workshop designed to help participants utilize the most frequently used presentation tools in Keynote to manage patient clinical records and create simple but effective patient communication presentation.

VISTA & 4 other Minor Surgeries for Orthodontic Practice

VISTA Hands-on Workshop 3hrs

The VISTA (vertical incision subperiosteal tunnel access) surgical techniques for impacted cuspids will discuss the following topics:

1. VISTA with screw placement
2. VISTA with connective tissue graft
3. Suture technique

TADs & Surgeries Hands-on Workshop 3hrs

The workshop covers bonding on a typodont, TAD placement, and 4 minor surgeries for orthodontic practice.

*全系列課程修畢，完成兩篇案例報告文章後，即可取得赴德國碩士班進修資格證書。

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Master Degree in Specialized Orthodontics

黃金陣容師資團隊

Scientific Director
德國國立杜易斯堡-埃森大學 IMC 口腔醫學院院長

Univ. Prof. Dr. Dr. Dr. h. c. mult. Ulrich Joos, FRCS, FDSRCS

德國國立杜易斯堡-埃森大學 IMC 口腔醫學院院長
德國明斯特大學口腔顎面外科醫院及門診部榮譽教授
英國皇家外科學會榮譽院士 (FRCS, FDSRCS)
德國外科基金會 DCS 創辦人
德國杜易斯堡 MVZ 醫療中心創辦人
歐洲顱顎面外科協會 EACMFS 主席

1972年至1978年為其學術養成重要階段，先後完成牙醫、醫學學士，隨後認證為口腔顎面專科醫師。1983年於佛萊堡大學任教期間(C3-Professor)，取得德國特許任教資格，後續擔任歐洲及歐盟各國口腔顎面外科相關學會的領導者，智利顎面外科協會榮譽會員及匈牙利學術榮譽博士(1990-1994)，法國口腔顎面等外科協會副主席(1995)，1998至2002年兩度擔任歐洲顱顎面外科協會主席，德國杜易斯堡-埃森大學IMC口腔醫學碩士學位委員會主席(2003)，同年獲頒西班牙口腔顎面外科協會榮譽會員，海德拉巴裂(口蓋唇裂)協會國際顧問委員會榮譽會員(2005)，匈牙利塞格德大學榮譽博士及教授(2012)，英國皇家外科學會榮譽院士(2018)，30年職涯內培育超過300名口腔顎面專科醫師。

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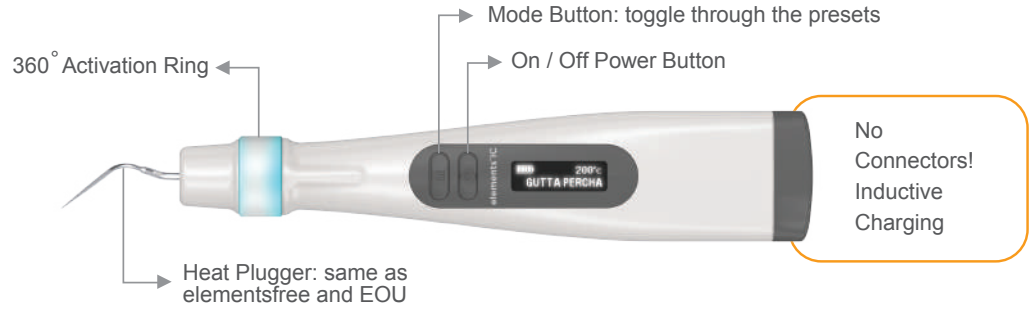

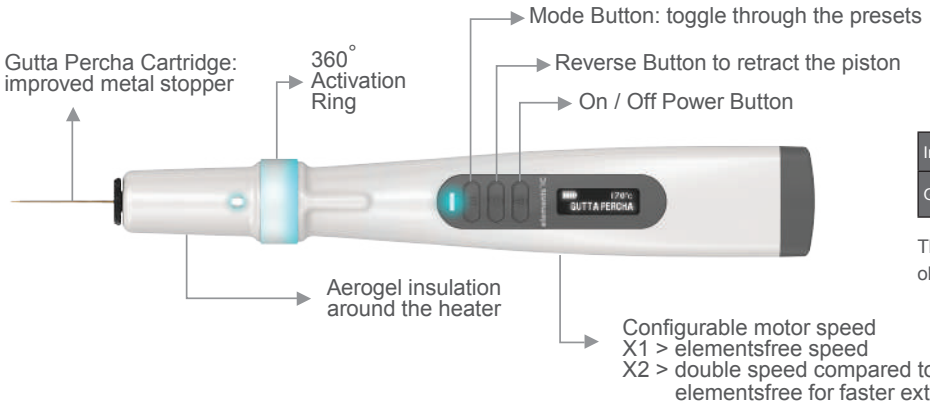

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Management of Maxillary Impactions: Four Surgical Techniques

(J Digit Orthod 2022;65:56-82)

A. Uncovering via Excision (E), the Open-Window Technique

Kokich et al.[1] suggested that a palatal impaction will spontaneously emerge after obstructing soft and hard tissue are removed along the desired path of eruption. The open window via excision (E) method is optimal for most palatal impactions. In addition to excising overlying soft tissue, bone obstructing eruption must be removed down to the cementoenamel junction (CEJ). In effect, the entire clinical crown must be exposed in the desired path of eruption. Post-operative (post-op) periodontal dressing is required for deep impactions to prevent healing tissue from covering the exposed crown and obstructing eruption. Adequately exposed teeth usually erupt into the oral cavity spontaneously. Since the entire palate is covered by attached mucosa, there is little problem in achieving an adequate keratinized gingiva to support a tooth recovered from the palate.[2] The following case demonstrates the step-by-step method for surgical exposure and recovery of a palatally impacted canine.[3,4]

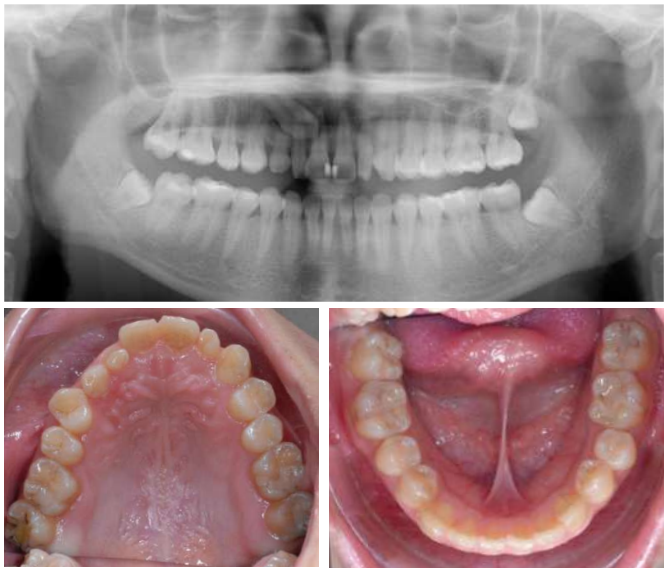

Fig. 1:
Pre-treatment panoramic radiograph and intraoral occlusal photographs show an impacted upper right canine (UR3) and a retained primary upper right canine (URc).

Case Report 1

A 19-year-old female had an impacted upper right permanent canine (UR3), and the associated deciduous canine (URc) was retained (Fig. 1). A cone beam computed tomography (CBCT) scan was utilized to determine the three dimensional (3D) location of the impaction. The CBCT slice revealed that the impacted UR3 was located palatal to the apical portion of the upper right lateral incisor (UR2) root (Fig. 2). This preoperative diagnosis was helpful for planning the treatment. The 3D position of the impaction relative to the roots of the incisors help determine the appropriate surgical approach (Figs. 3-6).

Joshua Lin,
Lecturer, Beethoven Orthodontic Center (Left)
Chris H. Chang,
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Editor-in-Chief, Journal of Digital Orthodontics (Right)



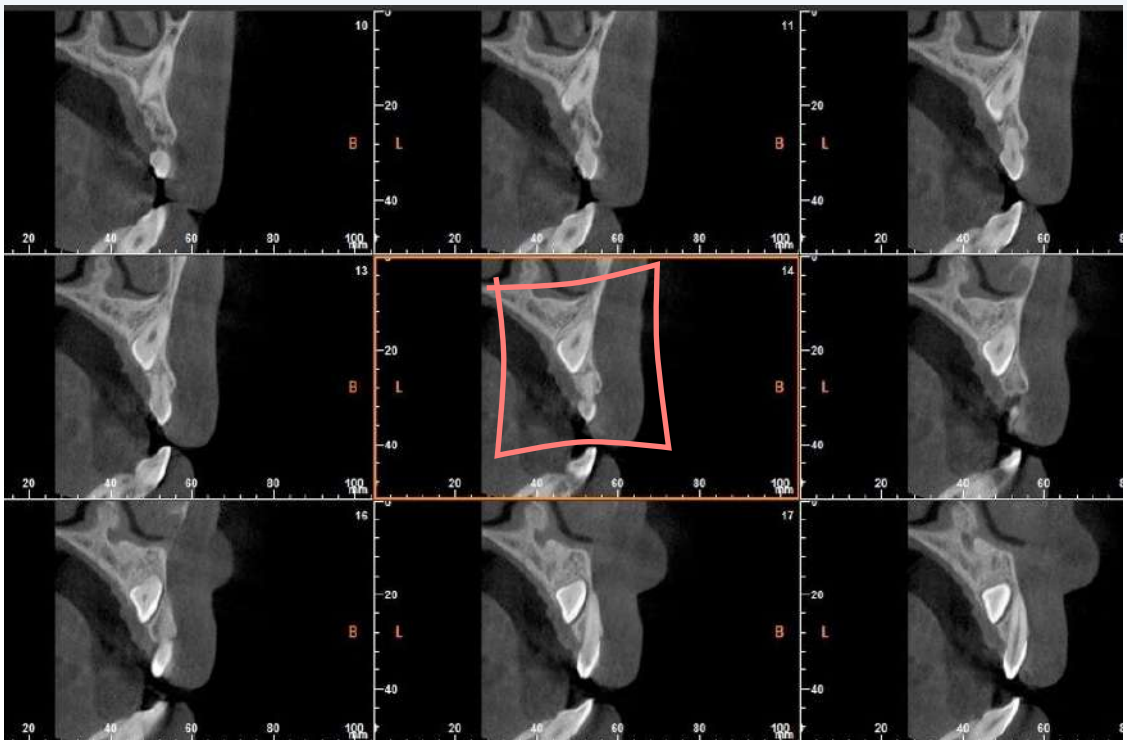


Fig. 2:
Pre-treatment CBCT slices provide precise documentation for the 3D position of the impacted canine: palatal side of the right lateral incisor (UR2) and partially covered with bone (pink square).

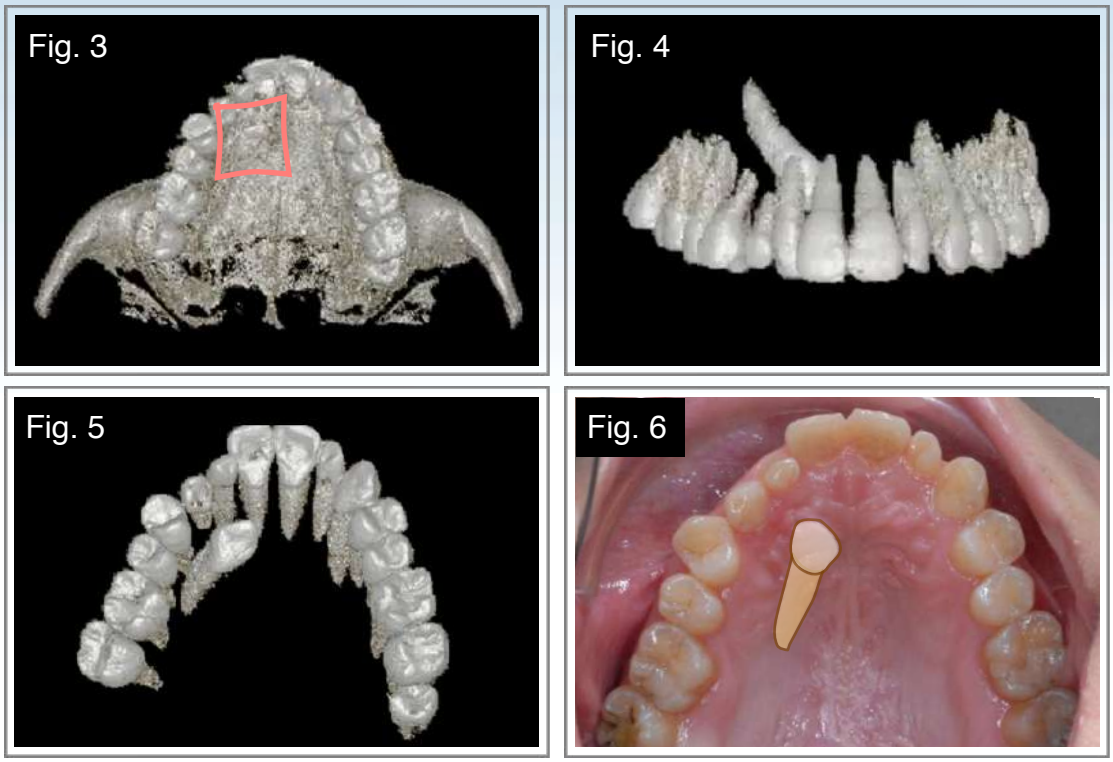
Treatment Plan Options

Option 1: Retain the impacted UR3 and restore the URc to simulate a permanent canine. The risks for this conservative approach are: 1. inadequate root structure of the primary tooth to sustain normal function for an appropriate clinical crown, and 2. impaction-related pathological complications such as root resorption of the adjacent teeth, cyst formation, decreased arch circumference, referred pain etc.[5,6]

Option 2: Extract the UR3 and restore the URc to the shape of a permanent canine. Complications due to a retained impaction are controlled, but prognosis for the restored deciduous canine is questionable because of a poor crown-to-root ratio to resist functional loading.

Option 3: Surgical exposure

1. Facilitate natural eruption if the canine has an acceptable axial inclination.



Figs. 3-6:
Three views constructed from the CBCT scan (3-5) provide documentation for the position of the canine impaction, which is shown as a drawing superimposed on the upper occlusal photograph (6). The upper left image (3) shows that the UR3 is a partial bony impaction (pink square).

2. The two-step approach is to create a lateral window for tooth eruption. The wound is packed with periodontal dressing to avoid obliteration of the desired path for eruption by healing tissue. After the canine has erupted spontaneously, a bracket is bonded on the crown.

3. A one-step approach is feasible when the orientation of an impaction permits bonding a bracket in a favorable location at the time of the surgical exposure.

For the current patient, surgical exposure provided a window for spontaneous eruption, but the attachment for orthodontic traction was not bonded until after the UR3 erupted.

Step-by-Step Surgical Procedure

Step 1. The incisive nerve was block anesthetized. An explorer was used to locate the impaction under the soft tissue and mark the crown (Fig. 7). The tactile feedback when probing a tooth and adjacent bone is distinct; an enamel surface is smooth and hard while bone is rough and easier to penetrate.

Step 2. An electrosurgical unit was used for a circular, soft tissue cut around the explorer penetration mark (Fig. 8). The electrocautery achieved along the wound edges resulted in excellent hemostasis (Fig. 9).

Step 3. A periosteal elevator and a surgical curette were used to elevate and remove the overlying soft

Step 1

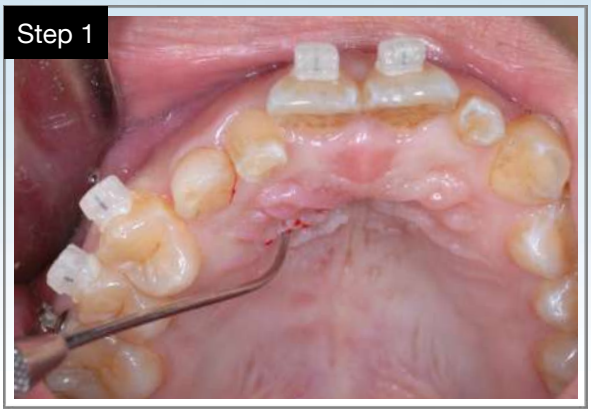


Fig. 7:
Under local anesthesia, a surgical explorer is used to mark the crown for the impaction.

Step 2

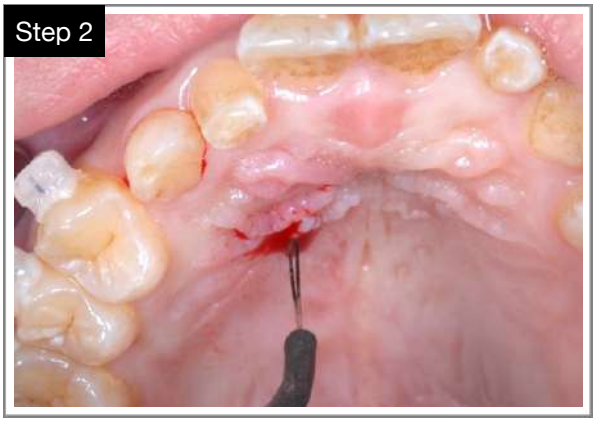


Fig. 8:
An electrosurgical unit was used to cut a circle around the probing mark.

Fig. 9:
Almost no bleeding occurred after using the electrosurgical unit.

Step 3

Fig. 10:
With a clear surgical view, a small part of the impacted UR3 could be seen penetrating the bone (white arrow).

Step 4

Fig. 11:
Bone covering enamel was removed with a carbide bur in a high-speed hand-piece.

Step 5

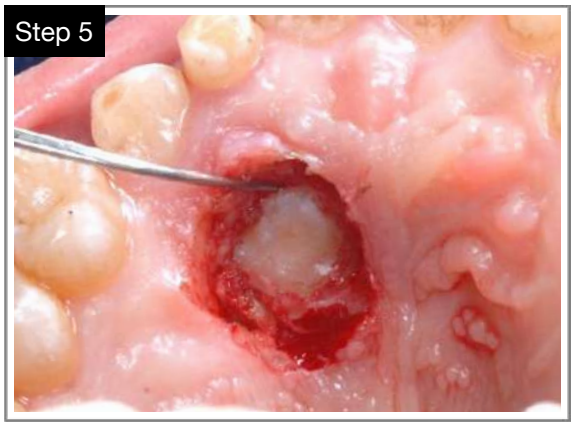


Fig. 12:
The perimeter of the exposed crown was probed with an explorer to ensure that no bone that would inhibit eruption was covering the crown.

tissue. The surgical area featured a smooth incision with minimal oozing (Fig. 10).

Step 4. The bone covering the crown was removed with a carbide bur in a high-speed hand-piece (Fig. 11). A carbide bur is more efficient for cutting bone than a diamond bur.

Step 5. Following hemostasis, an explorer is used to ensure that no bone is obstructing the planned path of movement for the impaction (Fig. 12).

Step 6. The soft tissue margins of the wound are trimmed as needed, bleeding is controlled with an electrosurgical unit (Fig. 13), and the cavity is irrigated with normal saline solution.

Step 7. COE-PAK® periodontal dressing is applied to the wound and pressed into the undercuts of the teeth for retention (Fig. 14). Before handling the COE-PAK®, surgical gloves were coated with petroleum jelly to avoid the dressing sticking to the gloves (Fig. 15).

Fig. 13:
Soft tissue bleeding was stanched with the electrosurgical unit.

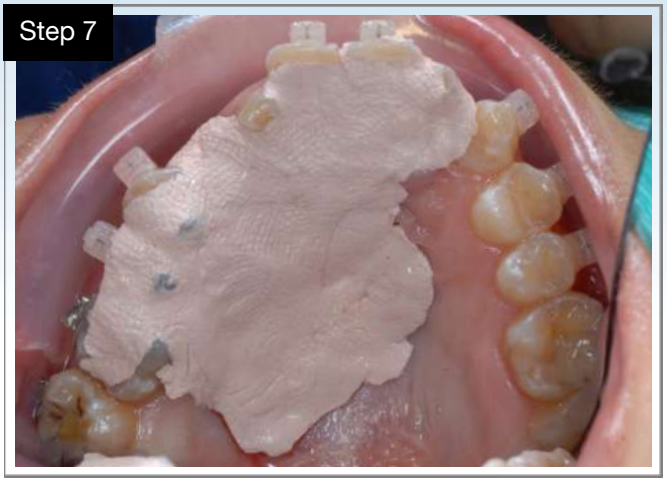


Fig. 14:
The wound was covered with the periodontal dressing COE-PAK®.

Fig. 15:
Glove finger tips were coated with petroleum jelly (Vaseline®) as needed from a reservoir applied to the back of a glove to avoid sticking to periodontal dressing as it is pressed into the dental undercuts.

Step 8. Moistened gauze was used to press the COE-PAK® to place to close the wound and control bleeding. The patient was provided an analgesic and post-operative instructions.

COE-PAK® was removed three days later. Epithelialization (healing) of the surrounding

mucosa was visible and exposed bone was covered with a thin layer of soft tissue. The surgical window was now surrounded by epithelium in preparation for spontaneous eruption of the impaction (Figs. 16 and 17).

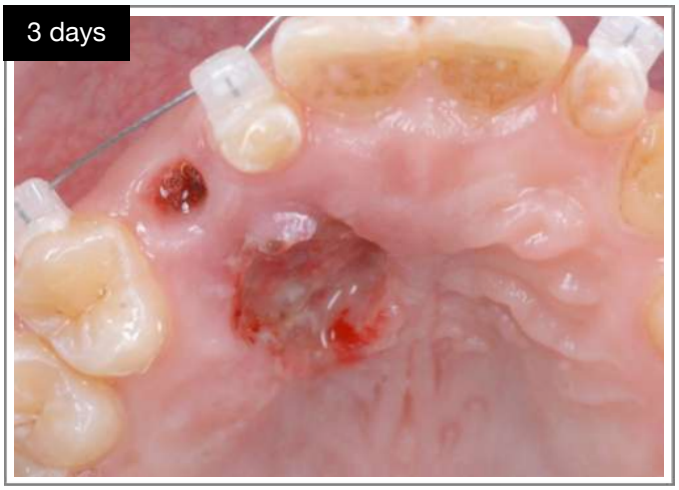


Fig. 16:
Three days post-op, the dressing was removed. The wound edges were covered with epithelium and no bone was exposed.

Fig. 17:
One week post-op, the window was stable and the crown was surrounded by epithelium.

Discussion of the Excision (E) / Open-Window Technique

Important tools to facilitate the uncovering of impactions are: 1. cone bean CT (CBCT) scan, 2. electrosurgical unit, 3. high-speed hand-piece with a carbide bur, and 4. COE-PAK® periodontal dressing.

Cone Bean CT Scan

Three-dimensional CBCT images (Fig. 2) are considered the standard of care for impaction recovery procedures. Three dimensional (3D) imaging is essential for assessing the position of a completely impacted tooth relative to the surrounding dentition, anatomic structures, bony encapsulation, and soft tissue covering. These data are necessary for selecting the appropriate surgical technique and the force system to precisely align an impacted tooth without damaging the roots of adjacent teeth. An additional consideration is planning a path of tooth movement that avoids dense cortical bone.[7] Moreover, any obstacles in the designed pathway of eruption should be removed during the surgical procedure.

Electrosurgical Unit

Electrosurgery (Figs. 8-10) allows the operator to control bleeding while removing the soft tissue covering the impaction. Different-shaped tips are available to accommodate the needs and preference of the clinician. Large amounts of tissue can be precisely removed and re-contoured because the spontaneous hemostasis provides a clear operative area.

High-Speed Hand-Piece with a Carbide Bur

Soft and hard tissue covering the impaction was carefully assessed preoperatively with CBCT imaging. The treatment plan selected was the open-window technique to create an unobstructed path of tooth movement for the impacted tooth. All obstacles were removed as needed. Dense bone, supernumerary teeth, and pathology (odontoma, cysts etc.) can prevent the spontaneous eruption of an impaction.[2,4,5] A high-speed hand-piece with a carbide bur (Fig. 11) was used to remove the dense bone covering the crown. Carbide burs are preferred over diamond burs for cutting bone.

Periodontal Dressing

Choosing an appropriate periodontal dressing material is probably the most important step in the entire surgical procedure. The goal for this operation is to create a path of eruption for the impacted tooth. The periodontal dressing, COE-PAK®, prevents ingrowth of the surrounding soft tissue and bone to cover the impaction, maintains the window for eruption, controls bleeding, and enhances patient comfort during the healing process (Fig. 14). The periodontal dressing was easily removed 3 to 5 days postoperatively (post-op) (Figs. 16 and 17).

Summary of Excision (E) / Open-Window Technique

Excision of tissue inhibiting eruption is best planned with CBCT imaging. Utilizing the precise surgical methods described above results in predictable recovery of most palatal impactions.

B. Apically Positioned Flap (APF)

An APF is a common periodontal surgery designed to decrease pocket depth, maintain an adequate zone of keratinized tissue, and lengthen the clinical crown for a prosthesis. A gingivectomy to uncover an impaction decreases the width of keratinized tissue, but an APF increases keratinized gingiva via a secondary healing process. Kokich[1] recommends an APF to uncover an impaction if it is at, or apical to, the MGJ.

Case Report 2

A 9-yr-old female with a high, labially-flared impacted right maxillary central incisor (UR1) was treated using the APF technique (Figs. 18 and 19). The adjacent UR2 erupted mesially into the space for the UR1, and the width of the surrounding keratinized tissue for the UR2 and UL1 was less than 1mm. Lateral intra-oral photographs (Fig. 20) show that the attachment of the labial frenum is very coronal, and that the width of keratinized gingiva is narrow between the UR2 and UL1.[7] This periodontal problem may lead to plaque accumulation, poor oral hygiene care, and gingival recession.

Treatment Plan Options

Option 1: Retain the impacted incisor and provide a removable partial prosthesis to restore esthetics, function, and phonetics. However, this restorative solution may not satisfy the patient's expectation

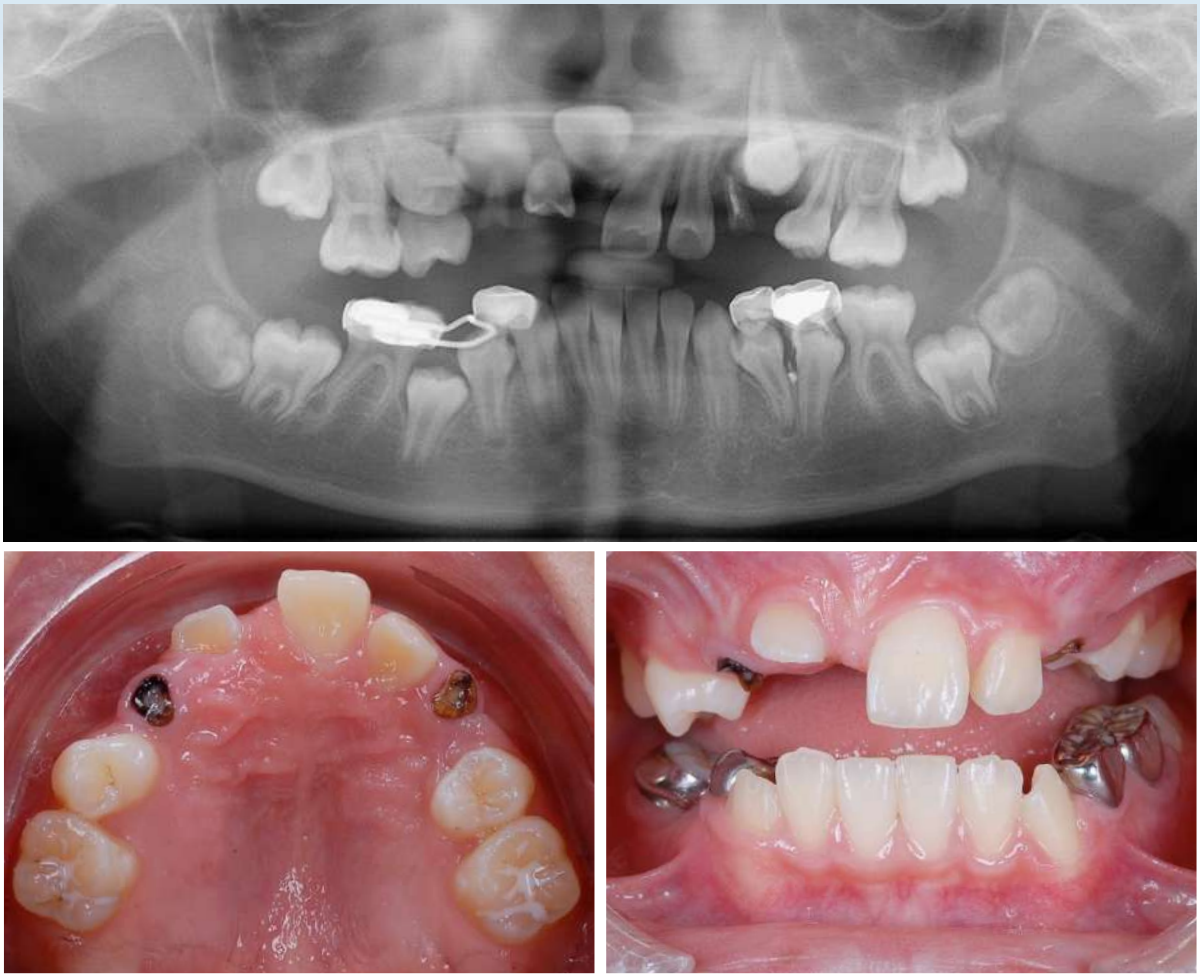


Fig. 18:
Pre-treatment panoramic radiography and intraoral photographs document the oral morphology associated with an impacted upper right central incisor (UR1) compared to an upper left central incisor (UL1) in occlusion. CBCT imaging was indicated.

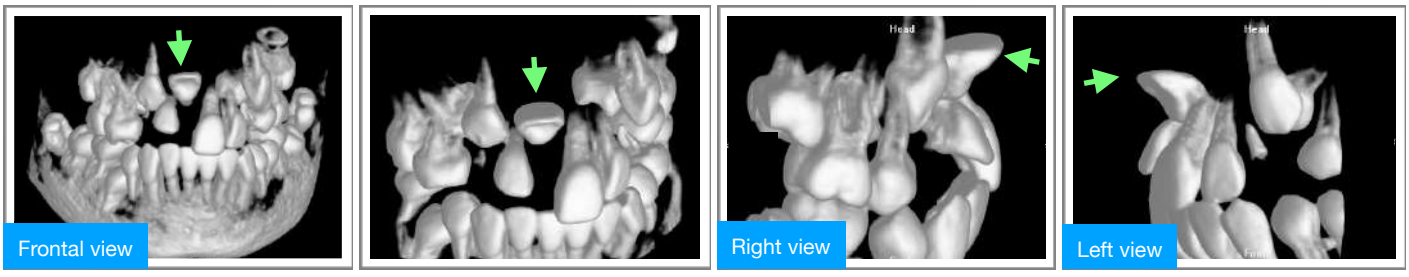


Fig. 19: *Four 3D views of the CBCT scan show the impacted central incisor (green arrows). See text for details.*

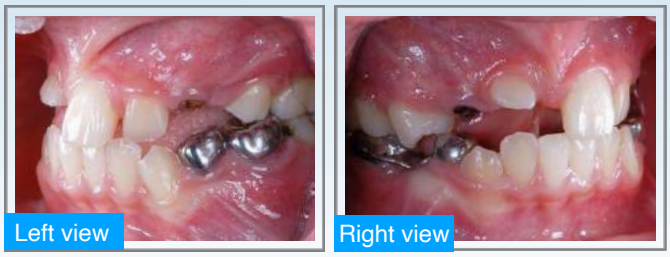


Fig. 20:
Left and right intra-oral views document the low fibrous attachment of the labial frenum between the UR2 and UL1

for esthetics (chief complaint). For the 9-year-old girl and her family, a missing maxillary central incisor is an emotional issue. Furthermore, retaining an impacted tooth may result in pathologic complications such as root resorption of the adjacent teeth, cyst formation, loss of arch length, referred pain, etc.[5] All considered, this treatment option was rejected by both the patient and her parents.

Option 2: Extract the impacted UR1, and restore the tooth with a bridge after UR2 fully erupts and the dentition is mature. The difficult extraction surgical procedure will be referred to an oral surgeon to be performed under general anesthesia in a hospital. The missing UR1 will be temporarily restored until the permanent prosthesis is constructed at about 16-18 years of age. Then the UR2 and UL1 will be prepared as bridge abutments. Replacing a single central incisor with a fixed prosthesis is expected to result in some degree of esthetic compromise. The patient and her patents rejected this option.

Option 3: Surgical approach and orthodontic traction :

1. Regain adequate UR1 space with active orthodontic treatment.
2. Surgically expose the impaction, and bond an attachment for orthodontic traction.
3. Use an APF to reposition the labial frenum more apically and to increase the quantity of keratinized gingiva in the maxillary anterior esthetic zone.

After a thorough discussion of the pros and cons for each treatment approach, the patient and her parents selected Option 3.

Step-by step surgical procedure

Step 1: After space was created between UR2 and UL1 (Fig. 21), the impaction was surgically exposed and a flap was reflected (Fig. 22).

Step 2: The UR1 was surgically luxated with a periosteal elevator to rule out ankylosis. A button

Fig. 21:
After 7 months of active orthodontic treatment, space for the UR1 was created with open coil spring.

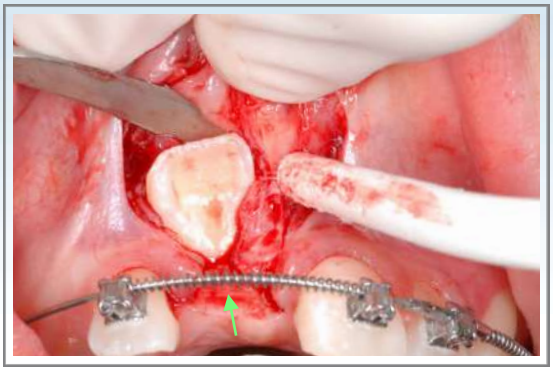


Fig. 22:
A partial-thickness flap reflection technique (green arrow) was used to expose the impacted UR1.

Fig. 23:
A button with a power chain attached was bonded on the labial side of UR1.

Fig. 24:
The apically flap was positioned about 5mm superior to the alveolar crest to provide additional keratinized gingiva as the wound healed.

with a power chain was bonded on the labial surface of the crown (Fig. 23).

Step 3: The flap and the labial frenum were repositioned more apically to increase the attached gingiva as the impaction erupted (Fig. 24).

Sutures were removed 10 days later. The power chain attached to the UR1 was ligated by power thread to the main archwire to redirect traction toward the occlusal plane. At monthly intervals, power thread was replaced to reactivate traction (Fig. 25).

In the 7th month (4 months after surgery), a 0.022-in Damon 3MX® bracket was bonded on the UR1 and a 0.014-in CuNiTi archwire was placed in the upper arch to achieve alignment (Fig. 26). After 30 months of active treatment, all appliances were removed, and the clear overlay retainers were delivered for both arches. The patient was instructed to wear them full time for the first 6 months and nights only thereafter.

Discussion of the Apically Positioned Flap (APF) procedure

When managing a high impaction (Fig. 19), the quantity of keratinized, attached gingiva is an important issue.[4,8] To increase the band of attached gingiva, the flap was apically positioned with the APF technique. To achieve positive longterm outcomes for an APF requires three objectives: increased keratinized gingiva, maintenance of vestibular depth, and apical repositioning the labial frenum.[9] However, the secondary healing process required is relatively painful, may result in scarring,

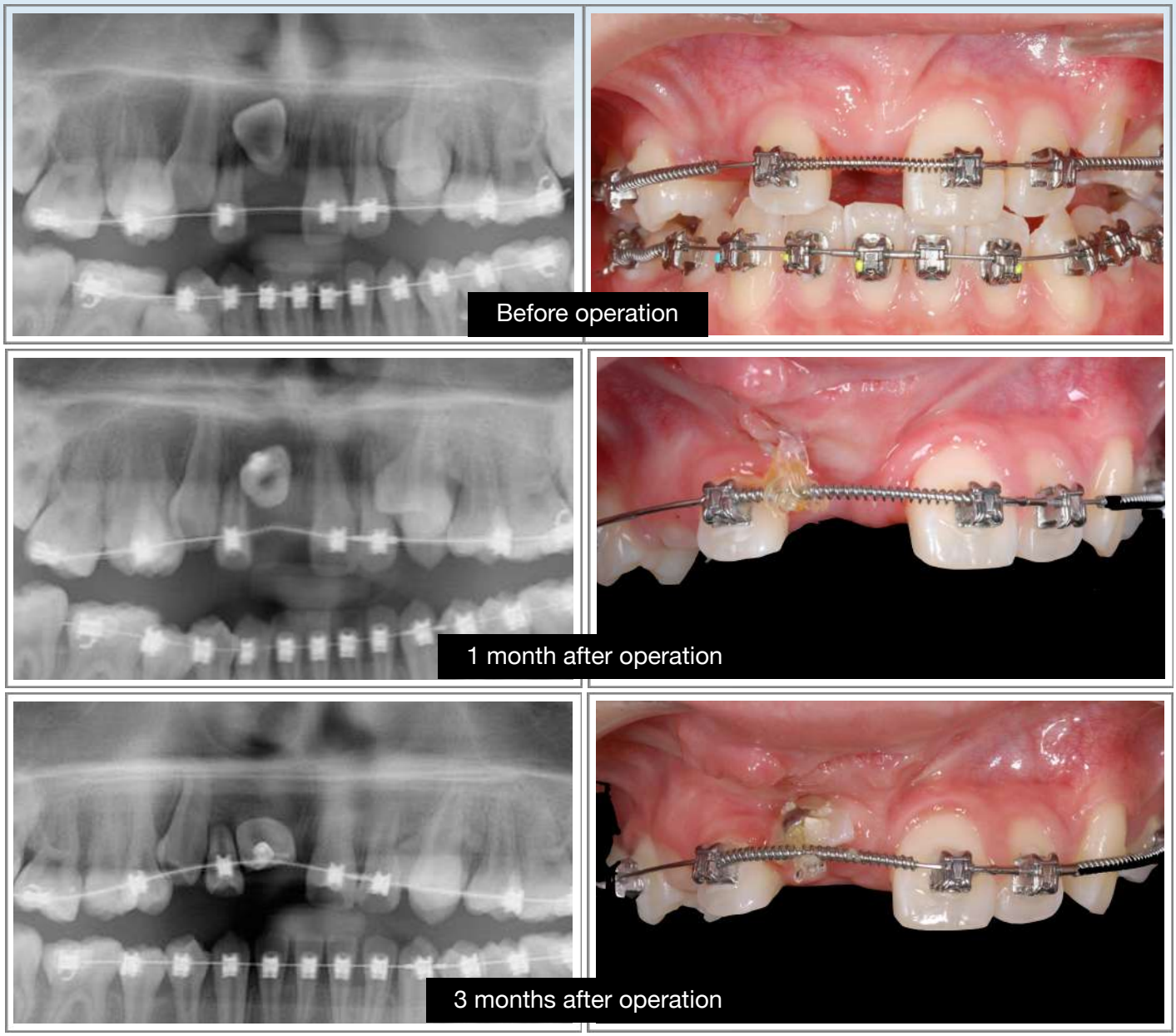


Fig. 25:
A series of panoramic radiographs are matched to intraoral frontal radiographs at three time intervals: Before operation (upper), 1 month after operation (middle), and 3 months after operation (lower).

and has a tendency to relapse, i.e., intrusion of the recovered impaction (Fig. 27). Despite the potential limitations, the patient and her parents desired the APF approach because it offered the potential for the most ideal outcome. At the end of treatment, a connective tissue graft (CTG) was recommended to increase attached gingiva on the UR1, but the family

Fig. 26:
In the 7th month (4 months after surgery), a 0.022-in Damon 3MX® bracket was bonded to UR1 and a 0.014-in CuNiTi archwire was placed in the upper arch.

Fig. 27:
After 30 months of active treatment, the result was near ideal with only a small amount root resorption of the previously impacted UR1. However, visible scar tissue near the surgical area compromised the periodontal result.

declined because they were satisfied with the outcome, particularly with the patient's smile.

Summary of APF

Recovering a deeply impacted canine is a significant orthodontic challenge.[9] Many factors must be considered, such as patient age, esthetics, occlusion, operative procedure, patient comfort, and periodontal support. Conservative correction of the complex problem entails risks that must be carefully controlled with precise appliances and minimally invasive surgery. The APF approach is often preferred because of the potential for a near ideal periodontal outcome. The vertical parallel incisions to elevate the flap allow good surgical access while reducing the potential for scar formation, but a tooth extruded following an APF is subject to relapse (intrusion).

C. Closed Eruption (CE)

The CE technique is preferred for most labially impacted teeth, particularly if they are located apical to the mucogingival junction (MGJ). The APF technique is difficult or impossible to use for most very high impactions.[10-15]

Some clinicians believe that CE with orthodontic traction simulates the natural tooth eruption process to produce the most ideal periodontal results.[13] The CE technique is the most predictable for high impactions particularly on the labial surface.[1]

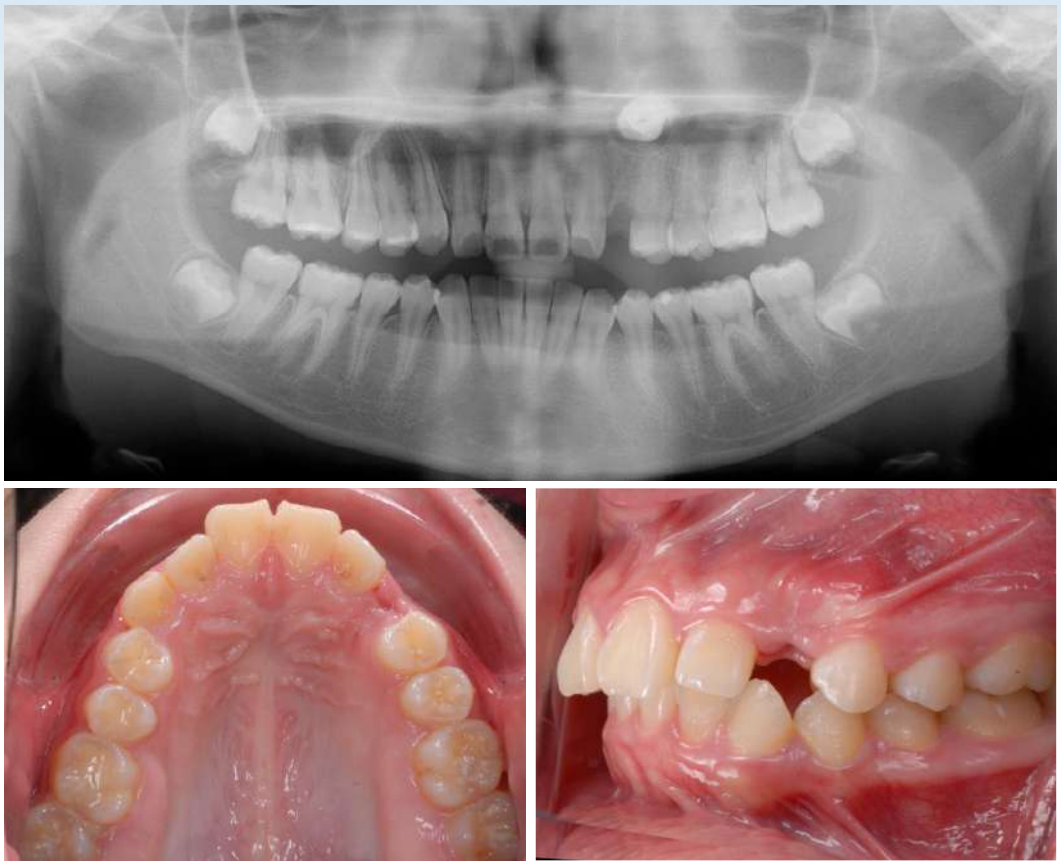


Fig. 28:
Pre-treatment panoramic radiography and intraoral photographs show a deeply impacted upper left canine (UL3) which is apical to adjacent teeth and about 14 mm away from the alveolar crest.

Case Report 3

A 13-year-7-month girl presented with a labially impacted canine that was positioned about 14mm apical to the alveolar ridge (Figs. 28 and 29).

Treatment Plan Options

Option 1: Retain the impacted canine, and provide a removable partial denture to temporarily maintain esthetics, function, and phonetics. An implant is suggested after about the age of 20 to permanently restore esthetics and function.

Option 2: Extract the impacted UL3, and provide a removable partial denture until an implant-supported prosthesis can be constructed after about age 20 years.

Option 3: Surgical uncovering followed by orthodontic traction:

Correct the width of the UL3 space, surgically expose the impaction, and bond an attachment for active orthodontic traction. The CE technique was chosen because the impaction was apical to the MGJ.

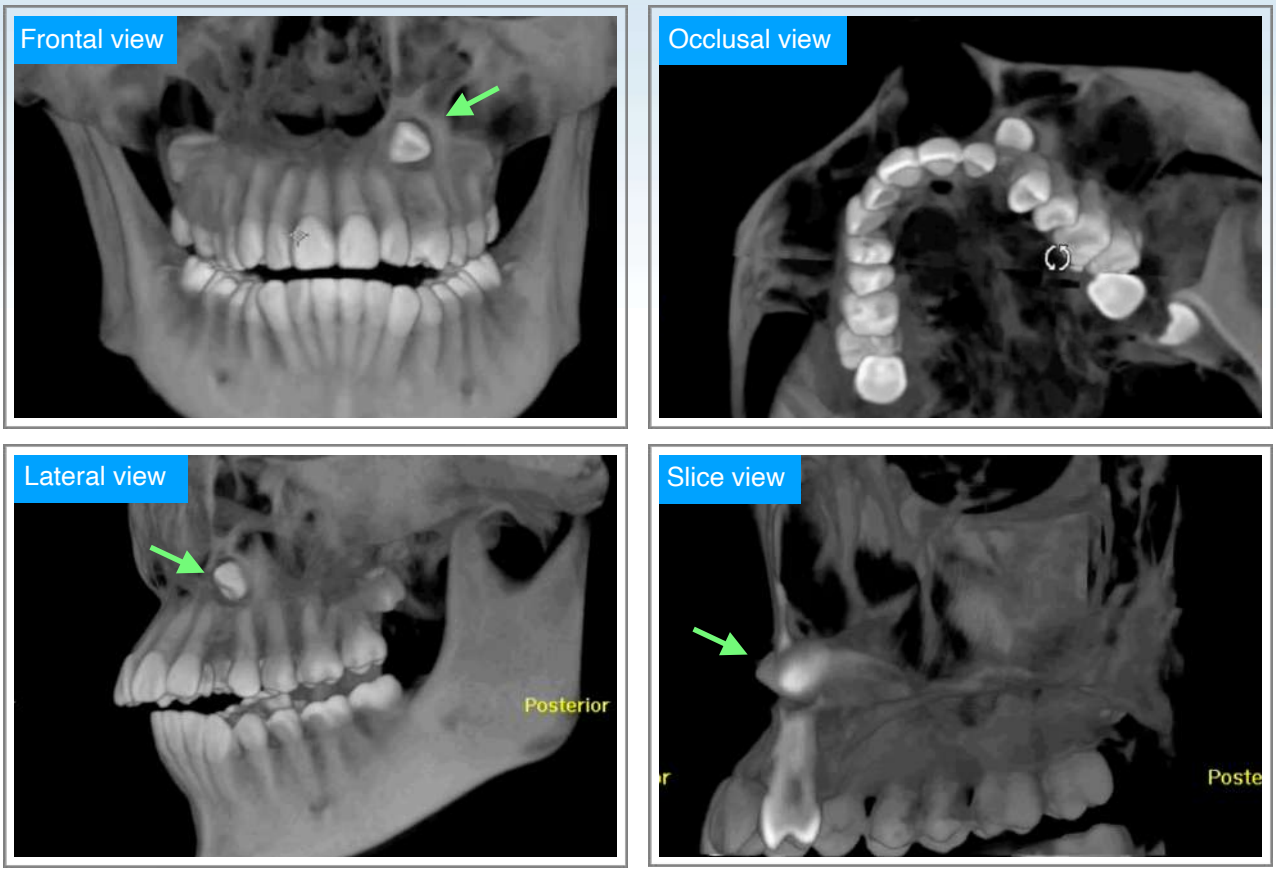


Fig. 29:
Four different images constructed from a CBCT scan show the high labial impaction of an UL3. Green arrows point to the impaction in all images except the occlusal view (upper right).

After a detailed discussion of the pros and cons for each approach, the patient and her parents chose Option 3.

Step-by-Step Surgical Procedure

Step 1: Four months of orthodontic treatment was required to open an adequate space for the impacted UL3 (Fig. 30).

Step 2: The UL3 was surgically exposed and the covering bone was removed with a carbide bur in a high-speed hand-piece (Figs. 31A and B). The impaction was luxated with an elevator to rule out ankylosis, and two buttons were bonded on the buccal and palatal surfaces. Two different-colored power chains were used to differentiate the distinct elements of the force system (Figs. 31C and D).

Step 3: The traction force was anchored with a 2x12-mm OrthoBoneScreww® (OBS, iNewton, Inc., Hsinchu City, Taiwan) that was inserted to the infrazygomatic crest. A 3D lever arm made with 0.019x0.025-in stainless steel (SS) provided traction to move the impacted canine toward the occlusal plane (Fig. 31E). The wound was primarily closed,

Fig. 30:
After 4 months (4M) of active orthodontic treatment, an adequate UL3 space was created with an open coil spring.

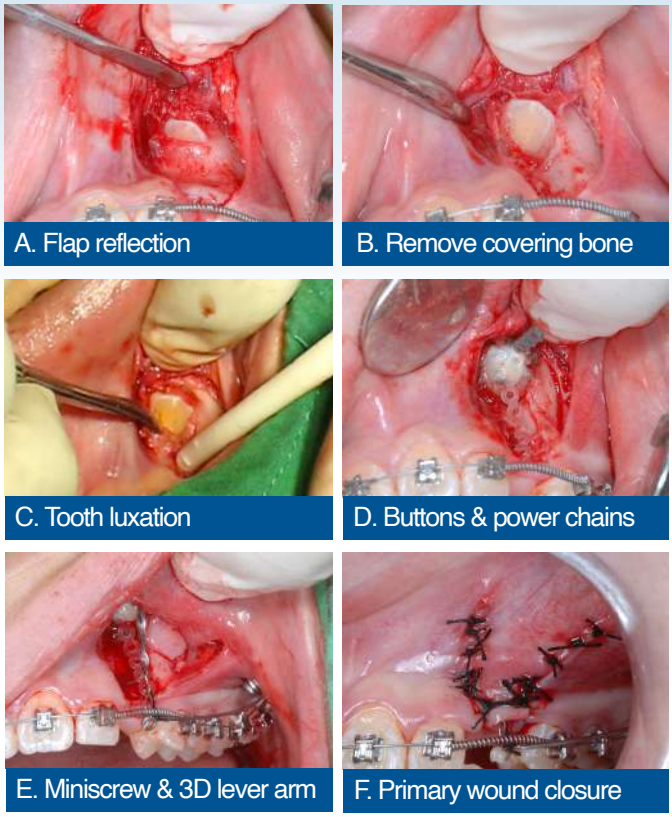


Fig. 31:
Six surgical steps are illustrated for the recovery of a UL3 impaction with the closed eruption technique.

and the traction force was readily activated by adjusting the 3D lever arm (Fig. 31F).

Discussion of CE

The CE technique is usually the most appropriate option to achieve optimal soft tissue healing and esthetics when recovering a labial or transalveolar impaction that is apical to the MGJ. Three stages of soft tissue transition are commonly observed: 1. gingival collar redness, 2. a red patch, and 3. keratinization.[4,16]

Stage 1: *Gingival collar redness*

During the initial period of rapid forced eruption, a collar of redness is often observed around the gingival margin. This is the color of the non-keratinized epithelium tissue inside of the periodontal crevice when it is everted (Fig. 32). This normal gingival response is often misinterpreted as poor healing or gingival inflammation because it is associated with high probing depth in the gingival sulcus. Patients should be instructed to maintain proper oral hygiene at the red soft tissue margins

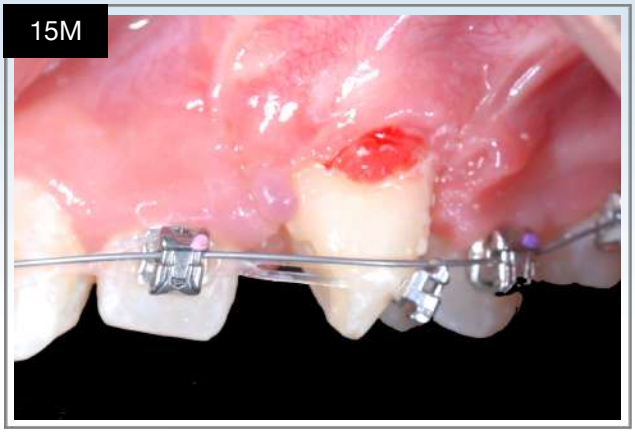


Fig. 32:
Fifteen months in treatment (15M), gingival collar redness with a deep probing depth was noted on the UL3. See text for details.

because gingival collar redness is a normal condition when teeth are rapidly extruded.

Stage 2: *The red patch*

As an impaction is rapidly extruded into the oral cavity, a bright red patch of tissue may appear at the gingival margin. During this stage, probing depth decreases from around 5mm to 3mm, which is within the normal range. However, the color of the gingival margin may be bright red in contrast to the normal pink color of gingiva (Fig. 33).

Stage 3: *Keratinization*

When an impacted tooth is aligned and maintained, the surrounding gingival tissue progressively matures. Completion of the keratinization process for new gingiva requires about 4-6 weeks (Fig. 34).

Soft Tissue Healing: APF vs. CE

Uncovering labial impactions may involve gingival excision (E), apically positioned flap (APF), or closed eruption (CE) techniques.[8,9,12,17] For the present patient (Fig. 29), it was relevant to consider the APF and CE techniques. APF maintains the depth of the vestibule while increasing the width of attached (keratinized) gingiva. However, the surgical method requires secondary healing which may involve considerable pain and scarring. Some reports suggest an intrusive relapse of the impaction may occurs with the APF technique.[11] In contrast, the

Fig. 33: *Nineteen months in treatment (19M)*
The impaction was aligned along the occlusal plane, A "red patch" appeared coronal to the original gingival margin and probing depth was improved to within the normal range (~3 mm).

Fig. 34: *Twenty months in treatment (20M)*
There was maturation of the periodontal support for the UL3. the entire process of keratinization required about 4 to 6 weeks.

closed eruption technique (CE) involves primary healing, which is more comfortable, esthetic and less prone to scar formation. The principal disadvantage for CE is a failure to increase the width of keratinized gingiva supporting the recovered canine.

If a patient is at risk for gingival inflammation due to insufficient keratinized tissue, soft tissue augmentation with connective tissue graft (CTG) may be indicated after CE technique. On the other hand, scarring of the gingiva is a major risk for the APF method in patients with a high smile line.[9]

Vermette et al.[11] compared the APF with CE techniques. They found superior results in terms of gingival, periodontal, and pulp status with the closed eruption (CE) technique. Furthermore, Becker et al.[12] concluded that good long-term esthetic results are routinely achieved by managing impacted maxillary incisors with the CE method.

Summary of CE Technique

Closed eruption (CE) technique is indicated to deeply impacted teeth. A subsequent soft tissue augmentation procedure (CTG) is usually necessary to enhance the keratinized gingiva for recovered impactions.

D. Modified Vestibular Incision Subperiosteal Tunnel Access (VISTA)

Access to the surgical site is obtained by vestibular incision subperiosteal tunnel access (VISTA). Zadeh[18] developed VISTA as a novel, minimally invasive approach for managing isolated recession and multiple contiguous defects in the maxillary anterior region. VISTA offers the opportunity to coronally reposition the margins on teeth with gingival recession and/or osseous defects.[19,20] It is a flapless surgical technique with minimal soft tissue trauma that provides good surgical access and is much more comfortable for the patient. The VISTA technique can be applied with connective tissue and particle bone grafts when managing gingival recession with osseous defects. Since no flap is reflected, tension across the wound is decreased, which facilitates closure with direct loop interrupted sutures.[19,20]

Chang et al.[4] modified the VISTA technique for managing maxillary anterior impactions with or without tooth transposition. The modified VISTA

Fig. 35:
A pre-treatment panoramic radiograph (upper) and intraoral photographs (lower) show a retained upper left primary canine (ULc) associated with a deeply impacted upper left canine (UL3). The latter is is malposed near the apex of UL5 which is about 11mm away from the alveolar ridge.

approach provides a much more comfortable experience for patients with a facilitated wound healing process that is particularly well suited for surgical management of labial impactions in the esthetic zone. This method is a minimally invasive approach for producing optimal dental esthetics.

Case Report 4

A 12-year-old male patient was referred for orthodontics evaluation of a deeply impacted UL3 (Fig. 35). Clinical examination revealed a 5-mm overjet with an asymmetric molar relationship that was Class II on the left and Class I on the right (Figs. 36 and 37). A panoramic radiograph (Fig. 35) showed all permanent teeth were present, the maxillary left primary canine (ULc) was retained, and there was a complete transposition of the deeply impacted UL3 and the adjacent UL4. CBCT (cone-beam computed tomography) imaging was required to precisely locate the impaction relative to the adjacent dentition (Fig. 38).

Treatment plan options

Option A: Extract the retained canine, move the UL4 into the canine position and align the impacted canine to the first premolar position. This conservative approach retains the transposition but still requires surgical exposure and extrusion of the impacted canine. Disadvantages for this option are compromised dental esthetics and function, particularly the ipsilateral loss of canine guidance. Bilateral infrazygomatic crests (IZC) bone screws are needed to correct the asymmetric Class II molar relationship and anchor the extrusion of the impaction.

Option B: Extract the retained ULc and all four first premolars. Uncover the impacted UL3, extrude it into occlusion, and close all extraction

Fig. 36:
Pre-treatment dental models (casts) show a 5mm overjet associated with an end-on Class II molar relationship on the left side, and Class I occlusion on the right side.

Fig. 37:
A pretreatment lateral cephalometric radiograph shows a protrusive upper lip and excessive overjet of ~5 mm.

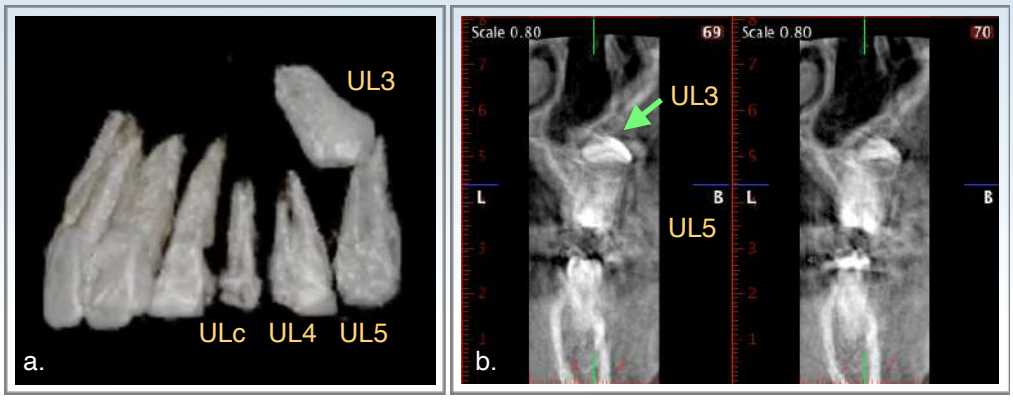


Fig. 38:
a. 3D image of the maxillary dentition documents the relative position of the impacted UL3.
b. Sagittal cuts (slices) through the UL4 to UL5 region of a CBCT image shows a cross-section through the crown of the impacted UL3 (green arrow).

spaces. The disadvantages for this option are the loss of four permanent teeth. However, with IZC bone screw anchorage, ideal canine guidance, symmetry and dental esthetics can be achieved.

Option C: Extract only the retained URc. Correct the transposition with bone screw anchored, submucosal mechanics applied with a modified VISTA approach.[18] Once the impacted canine is sufficiently protracted, extrude and align it in the arch. This treatment plan is clinically challenging, but the potential outcome is near ideal dental esthetics, function, and canine guidance. The disadvantages for this option include increased treatment time and the potential for UL4 root resorption.

After a careful discussion of the pros and cons for each option (Table 1), the patient and his parents preferred option C. However, they preferred to avoid IZC bone screws, but were informed that osseous anchorage was necessary to achieve the optimal outcomes they desired.

	Extraction tooth	Surgical approach	Switch UL3 & UL4 position	Canine guidance	Anterior esthetics	Posterior function	Miniscrew
A	ULc	Yes	No	No	Compromised	Compromised	Yes
B	ULc, All 1st premolars	Yes	No	Yes	Good	Fair	Yes
C	ULc	Yes	Yes	Yes	Good	Good	Yes

Table 1: *Treatment alternatives and their relative pros and cons*

Fig. 39:
All maxillary brackets were bonded from UR6 to UL6 except for the impacted UL3, UL4, and the incompletely erupted second molars. An open coil spring was placed between the UL2 and UL5 to create space for the impacted canine. See text for details.

Treatment Progress and Step-by-Step Surgical Approach

Treatment was initiated in the maxillary arch utilizing a 0.022-in passive self-ligation system (Damon Q®, Ormco, Brea, CA) with standard-torque brackets on the incisors. All maxillary teeth were bonded except for the incompletely erupted second molars (UL7s) and the left first premolar (UL4). No bracket on the UL4 allows it to react as a free body during the space opening to accommodate the permanent canine (Fig. 39). The latter was accomplished with an open-coil spring placed between the left lateral incisor (UL2) and the second premolar (UL5). One month later, surgical approach of the impacted UL3 was carried out using a modified VISTA technique (Fig. 40). Overall, the archwire sequence for maxillary alignment was: 0.014-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, and 0.016x0.025-in SS.

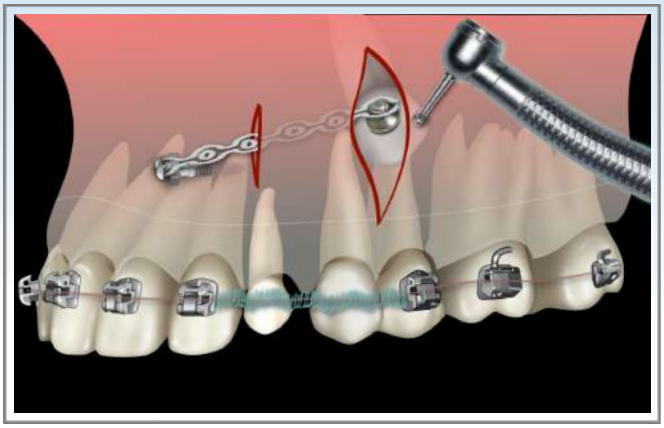


Fig. 40:
A drawing illustrates the modified VISTA technique with OBS anchorage to protract the impacted UL3 to correct the transposition with the UL4. See text for details.

Step 1: After local anesthesia, the first VISTA incision was made to transect the the impacted UL3 (Figs. 41a and 41a'). The VISTA technique provides broad access to the vestibule permitting visualization of the underlying alveolar bone and impacted tooth. Since the crown of the impaction was covered with bone, an explorer was used to penetrate bone to outline it. The enamel surface of the crown is smooth and hard, while adjacent bone is crunchy and irregular.

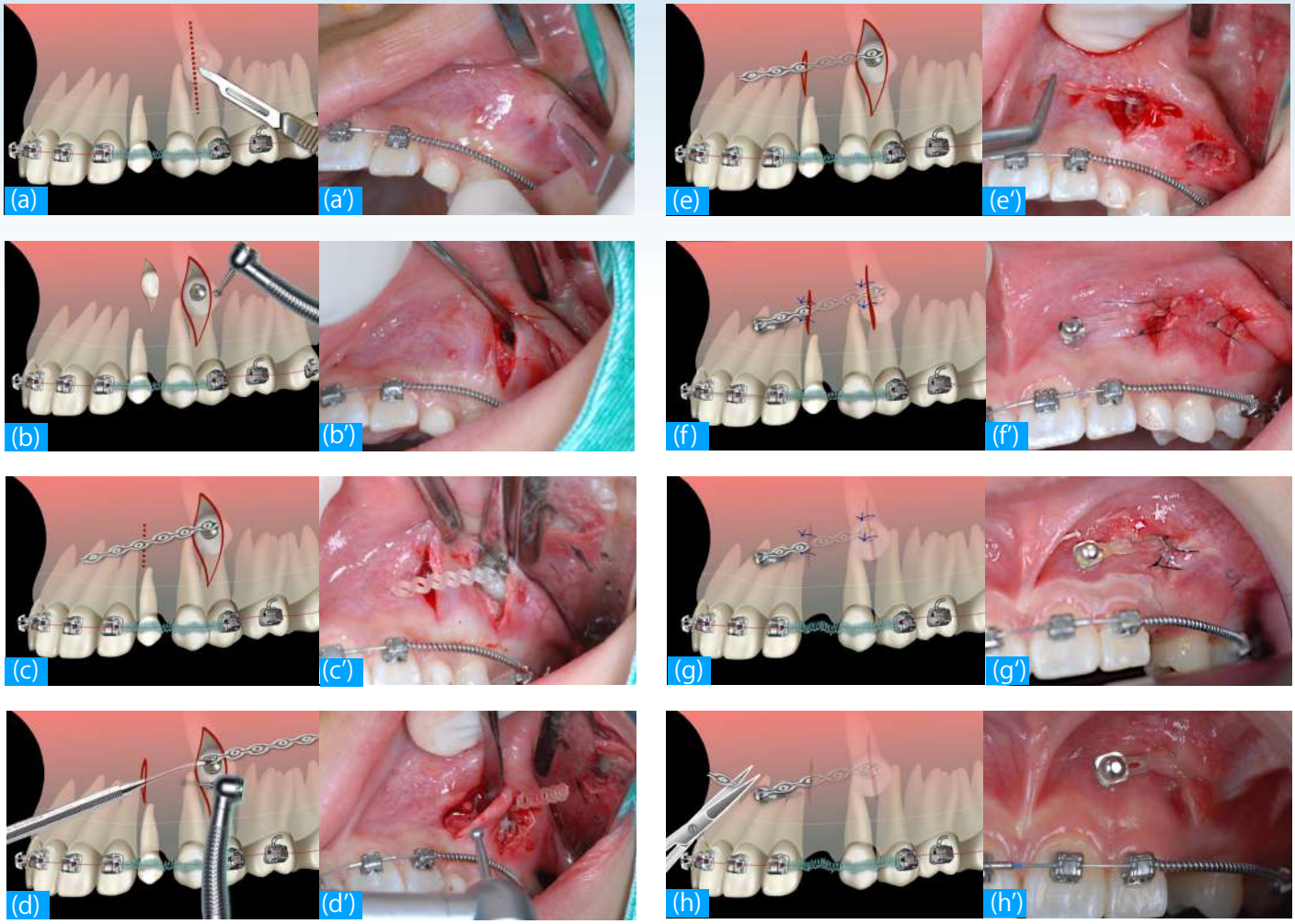


Fig. 41: *A series of illustrations (a-h) are matched to clinical photographs (a'-h') to show the surgical details step by step.*
(a) The first vertical incision was made to expose the impaction area.
(b) The bone covering the UL3 crown was removed down to the CEJ.
(c) A button with an elastic chain attached was bonded to the crown of the impaction. The second incision was made apical and medial to the ULc.
(d) A full-thickness (subperiosteal) tunnel was made with a periosteal elevator and bony contours interfering the planned path of tooth movement were removed with a bur.
(e) The power chain attached to the UL3 was passed through the subperiosteal and exited via the second vertical incision.
(f) A 1.5x8-mm bone screw was inserted interdentally between the roots of UL1 and UL2. The elastic chain was stretched and attached to the bone screw to apply traction to move the impacted UL3 anteriorly. Both vertical incisions were sutured with Nylon 6-0 and the ULc was extracted.
(g) The UL3 impaction is uprighted for about one month.
(h) Reactivation is accomplished by engaging the second loop in the chain and trimming the disengaged loop with surgical scissors.

Bone was removed to totally expose the labial surface of the UL3 crown (Figs. 41b and 41b').

Step 2: Surgical luxation of the UL3 with a periosteal elevator confirmed that is was not ankylosed. A button with a power chain was bonded on the crown (Figs. 41c & 41c').

Step 3: A second vertical incision was made apical to the ULc (Figs. 41c & 41c') and a periosteal elevator reflected a full-thickness tunnel to connect the two vertical incisions (Figs. 41d and 41d'). Bony contours along the line of force for protraction of the canine were removed with a high-speed handpiece. To prevent soft tissue irritation the power chain attached to the canine was passed through the tunnel (Figs. 41e and 41e').

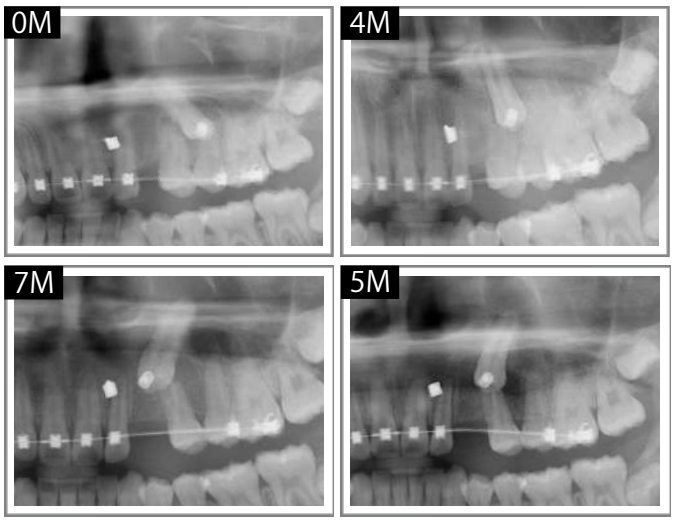


Fig. 42:
Panoramic radiographs in clockwise order document the movement of the UL3:
0M: Immediately post-operative,
4M: after 4 months of anterior traction,
5M: the crown of UL3 is passing the apical area of UL4,
7M: 7 months after surgery, the UL3 crown was moved mesial to the root of UL4 .

Step 4: A bone screw (OBS, 1.5x8-mm, iNewton, Inc., Hsinchu, Taiwan) was inserted interdentally between the roots of maxillary left central and lateral incisors (Figs. 41f and 41f'). The retained ULc was extracted and protraction of the UL3 was activated by stretching power chain and engaging it on the bone screw (Figs. 41g and 41g').

Step 5: To control bleeding and decrease the tendency for scarring, the soft tissue wound was carefully closed with interrupted sutures, which were removed one week later. The power chain was reactivated every month by progressively engaging the next loop on the screw head and the residual loop was trimmed away with scissors (Figs. 41h and 41h'). Follow-up panoramic radiographs were taken every 2 to 3 months to evaluate the movement of the impacted UL3 (Fig. 42).

Step 6: In the 10th month, the crown of the impacted UL3 had been moved to the center of the edentulous position between UL2 and UL4, which was defined as the ideal mesio-distal position for the canine. The UL4 bracket was

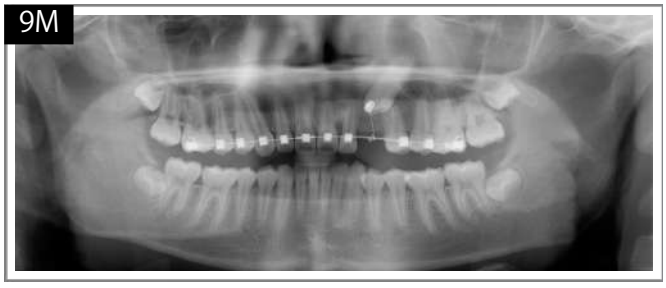


Fig. 43:
Nine months after surgery, the power chain was replaced by a ligature wire that extended into the oral cavity. Power thread tied to the .017x.025-in low friction TMA arch wire applied traction to extrude the UL3. The power thread was replaced monthly to reactivate traction.

Fig. 44:
In the 19th month, the UL3 was adequately extruded to permit the bonding of a bracket.

Fig. 45:
A torque spring was used on the UL3 for palatal root movement.

bonded and a new open-coil spring was placed between UL2 and UL4 on a 0.017×0.025-in low friction TMA arch wire (Fig. 43). Under local anesthesia, the power chain and the miniscrew were removed, but no suture was needed. Power thread was used to extrude the impacted UL3 to the occlusal plane, and it was reactivated at monthly intervals.

Step 7: In the 19th month, a high torque Damon Q® canine bracket was bonded on the UL3 (Fig. 44), and a new .014 CuNiTi main archwire was engaged to level the entire arch. One month later, the upper arch wire was changed to .014x.025-in CuNiTi and a torque spring was inserted on the UL3 for lingual root movement (Fig. 45).

After 30 months of active treatment, all appliances were removed, and clear overlay retainers were delivered for both arches. The patient was instructed to wear it full time for the first 6 months and nights only thereafter (Fig. 46).

Fig. 46: Post-treatment panoramic radiograph and intraoral photographs

Unfortunately there was scar formation, an insufficient band of keratinized gingiva, and recession on the UL3 relative to the contralateral canine. In addition, a soft tissue dehiscence was apparent near the mesial papilla. A CTG was recommended but the family were quite satisfied the orthodontic outcome and the patient's smile. They declined additional surgery but agreed to routine follow-up to monitor the soft tissue problems. The 2-year follow-up records document a very good but not ideal outcome. The gingival margins on the upper canines were improved but were still asymmetric. Overall dental health was stable because the patent was maintaining good oral hygiene (Fig. 47). The patient and her family were very pleased with the longterm result.

Summary of Modified VISTA and Miniscrew (OBS) Anchorage

For the present patient, the VISTA technique was modified with two specific vertical incisions to manage a labially impacted canine that was horizontally oriented in a transverse position.

A 1.5x8-mm OBS (iNewton, Inc., Hsinchu, Taiwan) was inserted between the roots of UL1 and UL2. The power chain was stretched from the button on UL3 to the miniscrew (OBS) between the UL1 and UL2. To control soft tissue irritation, most of the power chain was passed through the subperiosteal tunnel. Wound edges were carefully approximated and sutured. The patient reported mild pain for the first few days post-op but

Fig. 47:
Two-year follow-up records include a panoramic radiograph and intraoral photographs. Overall periodontal heath is stable and oral hygiene is excellent. Periodontal compromises associated with the UL3 were acceptable for the family, and they declined further treatment.

Upper Impaction	E	APF	CE	VISTA
B/P position	P	B	B or T	B or T
Relationship to MGJ	-	Coronal	Apical	Apical
Quantity of KG	-	< 2mm	CTG or not	CTG or not
Transposition	-	No	No	Yes

Table 2:
The decision making table for distinguishing between four surgical techniques: excision (E), apically positioned flap (APF), closed eruption (CE), and vestibular incision subperiosteal tunnel access (VISTA). There are four diagnostic considerations in selecting the surgical method: buccal (B), palatal (P), relationship to the mucogingival junction (MGJ), quality of keratinized gingiva (KG), and transposition (T).

experienced no discomfort during protraction of the impacted UL3 (Fig. 41).

The modified VISTA technique is minimally invasive method for conservative management of a deeply impacted canine. The superior line of force for the power chain minimized the risk of root resorption as the transposition of the UL3 and UL4 was corrected (Figs. 40-46).

Connective tissue grafting for gingival dehiscence

Although the treatment goals were achieved, the final outcomes were not ideal: (1) the facial gingival level was elevated on the UL3 compared to the UR3; (2) a gingival fenestration was found on the distal aspect to the papilla between the UL2 and UL3; (3) scar formation was noted on the apical area of the UL3 gingival margin; and (4) there was only about 1 mm of attached gingiva on the UL3.[21-23]

Scar formation is common for most soft tissue surgery. The vertical incisions of the VISTA technique limit the extent and potential for scar formation. Since there is no sulcular incision, the VISTA technique is less likely to result in gingival recession.[1,18]

The elevated gingival margin and dehiscence may reflect an osseous fenestration on the UL3. A CBCT scan was indicated for a definitive diagnosis. Then the defect could be repaired with connective tissue graft supplemented with bone particles.[18] Despite concerns of the clinician with immediate periodontal outcome and two year follow-up, the family declined further evaluation and treatment. They were pleased that the severe, transposed impaction was corrected and were satisfied with the compromised periodontal outcome (Fig. 47).

Comparison of 4 Surgical Techniques

The first three surgical techniques discussed illustrate the necessity to fit the treatment to the specific problem (Table 2).[1] The open window, excision (E) method is optimal for most palatal impactions because they usually erupt spontaneously into the oral cavity. The closed eruption technique (CE) and apically positioned

flap (APF) are common procedures for labial impactions. The choice depends on the position of the impaction, complexity of the surgery, and the condition of the supporting soft tissue. One of the main problems for CE is the difficulty in releasing tension on the flap. APF shares the same problem when the wound is closed, so it is difficult to precisely control the flap margin. The CE and APF techniques are not indicated for transpositions because they are limited to applying vertical traction on the impaction which may result in severe root resorption on adjacent teeth. The VISTA approach[18] allows for horizontal movement (protraction or retraction) of the impaction high in the alveolar process to position it between the roots of the lateral incisor and first premolar before it is extruded into position. OBSs provide excellent osseous anchorage to support the specialized mechanics required to recover complex canine impactions that are anteriorly positioned and/or transposed with adjacent teeth (Table 2).

Conclusions

At Beethoven Orthodontics Center, palatal impactions continue to be managed by the time-honored open window method: excision (E). An impacted canine is uncovered and the desired path of movement is cleared of soft tissue and bone to allow for spontaneous eruption. Closed eruption (CE) is indicated for deeply impacted canines that are not transposed or horizontally displaced. An apically positioned flap (ARF) is rarely used anymore because of the uncomfortable secondary healing and tendency for scar formation. Opening the space and waiting for auto-eruption is a wiser choice if the the impacted tooth is correctly positioned in the arch. The VISTA technique with OBS anchorage is indicated for complex impactions that are high in the alveolar process, transposed and/or horizontally displaced. Subperiosteal correction of the impaction relative to the rest of the arch is best accomplished before the impaction erupts into the oral cavity.

References

1. Kokich VG. Surgical and orthodontic management of impacted maxillary canine. Am J Orthod Dentofac Orthop 2004;126(3):278-283.
2. Tseng SP, Chang CH, Roberts WE. Palatally impacted maxillary canine. News & Trends in Orthodontics 2011;21:26-36.
3. Hsu YL, Chang CH, Roberts WE. Ortho Bone Screw. The dream screw for next generation's orthodontists. Int J Orthod Implantol 2011;23:34-49.
4. Chang CH, Su B, Hsu YL, Roberts WE. Soft tissue considerations for the management of impactions. Int J Orthod Implantol 2011;24:50-59.
5. Shafer WG, Hine MK, Levy BM, editors. A textbook of oral pathology. 2nd ed. Philadelphia: WB Saunders; 1963. p. 2–75.
6. Becker A, Chaushu S. Etiology of maxillary canine impaction: a review. Am J Orthod Dentofac Orthop 2015;148(4):557-67.
7. Archer HW. Oral and maxillofacial surgery. Vol. 1. Philadelphia: Saunders Co.; 1975.
8. Hsu YL, Chang CH, Roberts WE. Early intervention for multiple impacted teeth: More comprehensive

clinical assessment with the iSAS method. News & Trends in Orthodontics 2010;20:32-46.

9. Chang CH. Advanced Damon Course No. 9: Impacted and transposed teeth, Beethoven Podcast Encyclopedia in Orthodontics 2011, Newton's A, Inc., Taiwan.

10. Kokich VG, Mathews DP. Surgical and orthodontic management of impacted teeth. Dent Clin North Am 1993;37(2):181-204.

11. Vermette ME, Kokich VG, Kennedy DB. Uncovering labially impacted teeth: closed eruption and apically positioned flap techniques. Angle Orthod 1995;65(1):23-32.

12. Becker A, Brin I, Ben-Bassat Y, Zilberman Y, Chaushu S. Closed-eruption surgical technique for impacted maxillary incisors: a postorthodontic periodontal evaluation. Am J Orthod Dentofacial Orthop 2002;122(1):9-14.

13. Crescini A, Clauser C, Giorgetti R, Cortellini P, Prato GP. Tunnel traction of infraosseous impacted maxillary canines. A three-year periodontal follow-up. Am J Orthod Dentofac Orthop 1994;105(1):61-72.

14. Fournier A, Turcotte JY, Bernard C. Orthodontic considerations in the treatment of maxillary impacted canines. Am J Orthod 1982;81(3):236-39.

15. Wong-Lee TK, Wong FCK. Maintaining an ideal tooth-gingiva relationship when exposing and aligning an impacted tooth. Br J Orthod 1985;12(4):189-92.

16. Mantzikos T, Shamus I. Forced eruption and implant site development: an osteophysiologic response. Am J Orthod Dentofac Orthop 1999;115(5):583-91.

17. Becker A. The orthodontic treatment of impacted teeth. London: Martin Dunitz; 1998.

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

19. Chen CK, Chang CH, Roberts WE. Class III with multiple gingival recession: vestibular incision subperiosteal tunnel access (VISTA) and platelet-derived growth factor BB. Int J of Ortho Implantol 2014;35:22-36.

20. Chang HF, Chang CH, Zadeh HH. Soft tissue graft - vertical incision subperiosteal technique access (VISTA). News & Trends in Orthodontics 2010;19:90-92.

21. Peck L, Peck S, Attia Y. Maxillary canine-first premolar transposition, associated dental anomalies and genetic basis. Angle Orthod 1993;63(2):99–109.

22. Koutzoglou SI, Kostaki A. Effect of surgical exposure technique, age, and grade of impaction on ankylosis of an impacted canine, and the effect of rapid palatal expansion on eruption: A prospective clinical study. Am J Orthod Dentofacial Orthop 2013;143(3):342–52.

23. Sachan A, Chaturvedi TP. Orthodontic management of maxillary canine first premolar transposition - a conservative approach. Int J Orthod Milwaukee. 2013;24(4):59–62.

2022-2023 第十四年度

貝多芬 矯正精修班

時間：週二上午 09:00-12:00

地點：金牛頓教育中心（新竹市建中一路 25 號 2 樓）

上課日期：

2022　5/10、6/7、7/12、8/16、9/6、10/4、11/15、12/6

2023　1/10、2/7、3/7

- **09:00 ~ 10:00　精選文獻分析**
- **10:00 ~ 10:30　精緻完工案例**
- **10:50 ~ 12:00　臨床技巧及常犯錯誤分享**

全新的第十四年度 2022-23 貝多芬精修班，是由國際知名講師張慧男醫師主持，並偕同貝多芬牙醫團隊住院醫師群共同主講。

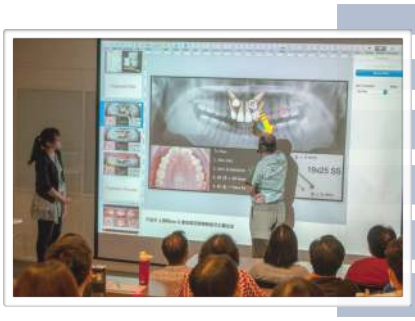
每月一次的課程之中，包含了：

1. 精選矯正權威期刊 AJODO 的文章做文獻分析與評讀。
2. 精緻完工 ABO 案例報告，其中因應數位矯正的世界趨勢，Insignia 與 Invisalign 病例為課程探討的主要內容之一。
3. 分享臨床上常犯的錯誤以及解決方法。

2022-23 貝多芬精修班內容豐富精彩，讓您經由每個月一次的課程，在面對各式的臨床案例時，更能游刃有餘、得心應手。

學習目的：

研讀最新趨勢文章可以窺知世界文獻公認的治療方式，而藉由評論文章的優缺點不僅能夠訓練判斷與思考能力，更可以清楚比較作法上的不同，達到完整理解治療方向、內容與穩定性的目標。



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* TADs made of Ti alloy have a lower failure rate compared to SS when placed in thin cortical bone. These results are consistent with a biocompatibility-related tendency for less bone resorption at the bone screw interface.
Reference: Failure Rates for SS and Ti-Alloy Incisal Anchorage Screws: Single-Center, Double Blind, Randomized Clinical Trial (J Digital Orthod 2018;52:70-79)

** The overall success rate of 93.7% indicates that both SS and TiA are clinically acceptable for IZC BSs.
Reference: Failure rates for stainless steel versus titanium alloy infrazygomatic crest bone screws: A single-center, randomized double-blind clinical trial (Angle Orthod 2019;89(1):40-46)

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