Uprighting and Protracting a Horizontally Impacted Lower Third Molar in an Adult

SUMMARY

This case report for an adult male presents an innovative treatment modality to manage an acquired malocclusion that was associated with a poor dental prognosis for multiple molars. Compromised upper right and lower left 1st molars were extracted. The lower left third molar was a deep horizontal, bony impaction that was uncovered and uprighted. The asymmetric first and second molar extraction sites were closed by molar protraction. Through this dental conservation approach, the patient maintained a full dentition of healthy teeth and avoided the need of artificial prostheses. (IJOI 2014;34:58-77)

***Key word**: atypical extraction, impacted molar uprighting, surgical exposure, closed eruption technique, ramus screws, molar space closure.*

A 26-year-old male patient was referred by his dentist for orthodontic consultation (*Fig. 1*). His chief concerns were caries, a missing tooth and impacted 3rd molars (*Figs. 2-3*). There was no contributory medical history. Clinical examination revealed a hopeless maxillary right 1st molar due to severe caries, as well as a poor prognosis for a mandibular left 1st molar due to extensive loss of tooth structure. His mandibular right 2nd molar had been extracted many years ago by his previous dentist (*Fig. 2*). After 41 months of orthodontic treatment, the patient was treated to an acceptable result as documented in Figs. 4-9. The details for diagnosis and treatment will be discussed. The initial panoramic radiograph (*Fig. 7*) revealed a soft tissue, impacted maxillary left 3rd molar, mesially tilted mandibular right 3rd molar, and a horizontal bony impaction of the mandibular left 3rd molar.

Fig. 1: Pretreatment facial photographs

Fig. 2:

Pre-treatment intraoral photographs. The poor prognosis upper right and lower left 1st molars, missing lower right 2nd molar and mesial tilted 3rd molar were the major problems.

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Fig. 3. Pre-treatment study models

Fig. 4: Posttreatment facial photographs

Fig. 5:

Post-treatment intraoral photographs. The upper right and lower left 1st molars were extracted and the missing teeth spaces were replaced by their neighboring 2nd and 3rd molars. The lower right mesially tilted 3rd molar was uprighted and brought into a good position.

Fig. 6. Post-treatment study models

Diagnosis

Skeletal:

1. Skeletal Class I (*SNA 87°, SNB 86°, ANB 1°*)
2. Low mandibular plane angle (*SN-MP 25°, FMA 22°*)

Dental:

1. Bilateral Class I malocclusion
2. The overbite was 2 mm and overjet was 3 mm
3. Mild crowding about 3 mm in upper arch, and mild crowding about 2 mm in the lower arch
4. Maxillary left 1st premolar cross bite
5. Deep caries: Maxillary right 1st molar and mandibular left 1st molar
6. Mandibular right 2nd molar missing
7. Soft tissue, impacted maxillary left 3rd molar, mesially tilted mandibular right 3rd molar, and horizontal bony impacted mandibular left 3rd molar

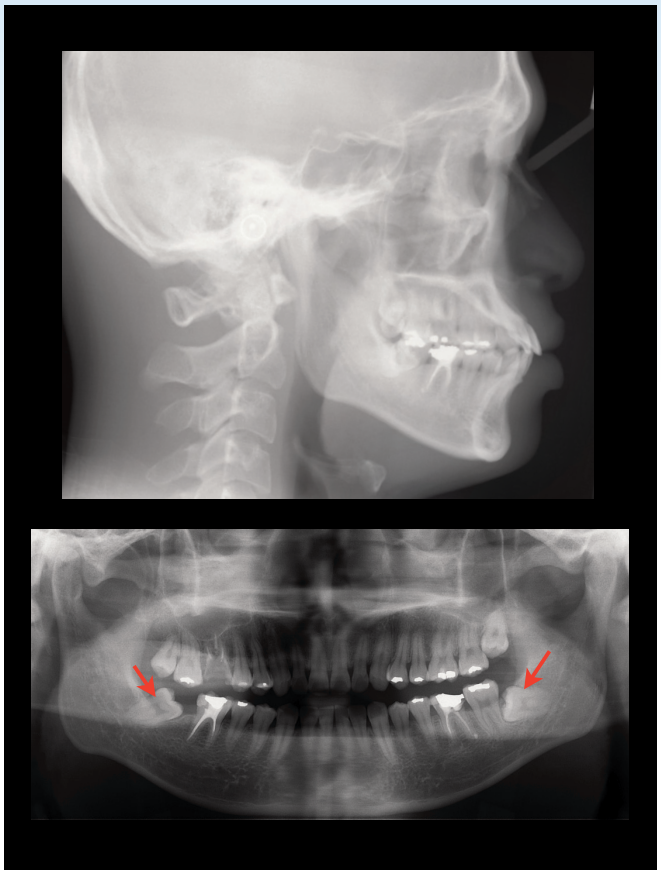

Fig. 7:

Pre-treatment pano and cepha radiographs. Note the lower right mesially tilted 3rd molar and lower left deeply horizontal impacted 3rd molar.

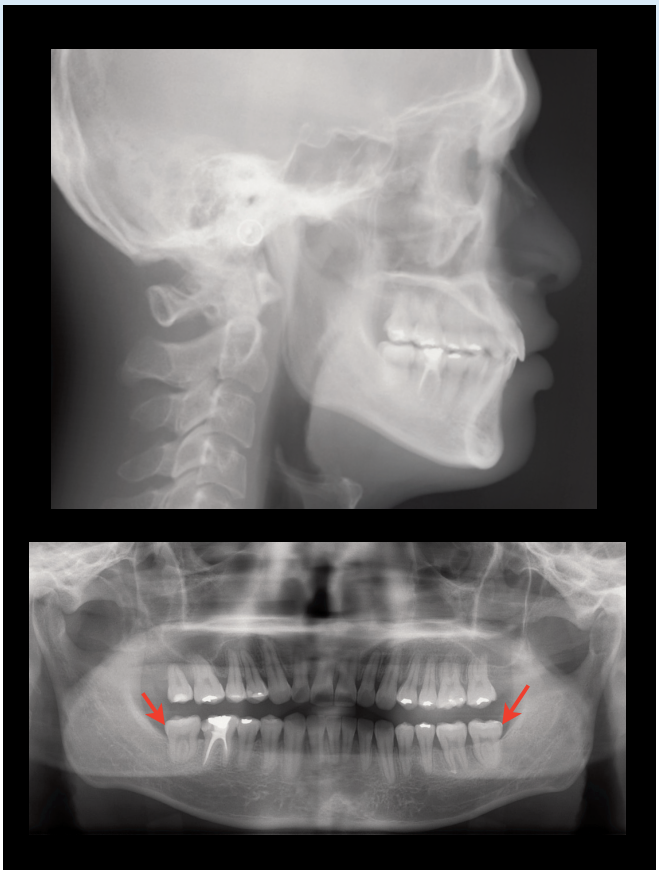

Fig. 8:

Post-treatment pano and cepha radiographs. The lower right and left 3rd molars were uprighted and protracted into an ideal occlusal relationship.

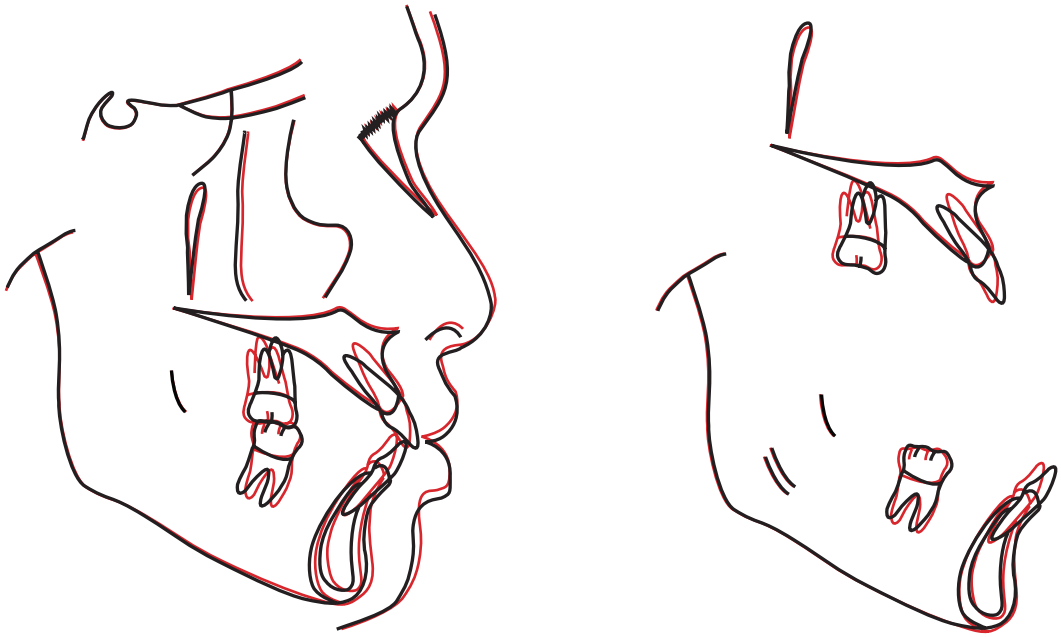

Fig. 9:

Superimposed tracings. The upper and lower anterior teeth were slightly retroclined with no affect on the patient's vertical dimension and facial profile after the treatment.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	87°	85°	2°
SNB°	86°	85°	1°
ANB°	1°	0°	1°
SN-MP°	25°	25°	0°
FMA°	22°	22°	0°
DENTAL ANALYSIS			
U1 TO NA mm	9 mm	6 mm	3 mm
U1 TO SN°	129°	116°	13°
L1 TO NB mm	8 mm	4 mm	4 mm
L1 TO MP°	106°	99°	7°
FACIAL ANALYSIS			
E-LINE UL	-1 mm	-2 mm	1 mm
E-LINE LL	2 mm	0 mm	2 mm

■ Table. 1: Cephalometric summary

8. Maxillary dental midline 1.5 mm right off the facial midline

Facial:

Acceptable profile and slightly protrusive lower lip

The ABO Discrepancy Index (*DI*) was 25[1] as shown in the subsequent worksheet.

Specific Objectives of Treatment

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition

- A - P: Maintain
- Vertical: Maintain
- Inter-molar Width: Maintain

Mandibular Dentition

- A - P: Maintain
- Vertical: Maintain
- Inter-molar / Inter-canine Width: Maintain

Facial Esthetics: Maintain

Treatment Plan

The patient had not previously considered an orthodontic approach to treat his debilitated malocclusion. Three treatment plans were offered, all of which featured the extraction of the maxillary right 1st molar. Only the third option included orthodontics.

Option A: Extract the maxillary and mandibular left 3rd molars. Restore the maxillary right edentulous space with a conventional fixed partial denture (*bridge*), and place a crown on the mandibular left 1st molar. The mandibular right edentulous area would not be treated (*Fig. 10*).

Option B: Extract both left 3rd molars, as well as the mandibular right 3rd molar. Restore the mandibular left 1st molar with a single crown. Place implant-

supported crowns to replace the maxillary and mandibular right 2nd molars (*Fig. 11*).

Option C: Extract the maxillary left 3rd molar, and the mandibular left 1st molar. A full fixed orthodontics appliance was indicated to align and level the dentition. Since the patient's lips are competent with an acceptable protrusion, close all the edentulous space to eliminate the need for prostheses.

After a through discussion and extensive communication, the patient preferred the orthodontics option. All spaces were closed and the treatment was finished with detailing bends in the terminal archwires. The fixed appliances were removed and the corrected dentition was retained with clear overlay retainers in both arches (*Fig. 12*).

Fig. 10

Treatment option A. The upper right 1st molar, upper left and lower left 3rd molars were going to be extracted. The upper right 1st molar was going to be restored by conventional crown and bridge, whilst the lower left 1st molar by a single crown.

Fig. 11:

Treatment option B. The upper right 1st molar, upper left and lower left and right 3rd molars were going to be extracted. The upper right 1st molar and lower right 2nd molar were going to be restored by dental implants, and the lower left 1st molar by single crown.

Fig. 12:

Treatment option C. The upper left 3rd molar, upper right and lower left 1st molars were going to be extracted. The meisally tilted lower right 3rd molar and horizontal impacted lower left 3rd molar were going to be uprighted, and all 3 quarters of molars except upper left were going to be protracted to develop an ideal occlusal function.

Appliances and Treatment Progress

After the extractions, an 0.022" slot Damon D3MX bracket system (*Ormco*) was bonded on both arches with standard torque in the anterior segments. The archwire sequence for the upper arch was .014" CuNiTi, .014"x.025" CuNiTi, .017"x.025" TMA, .019" x0.25" SS, and for the lower arch was .014" CuNiTi, .016" CuNiTi, .014"x.025" CuNiTi, .017"x.025" TMA, .019"x0.25" SS. In the 10th week of the treatment, when the lower arch wire was .016 CuNiTi, soft tissue primarily on the buccal surface of the mandibular right 3rd molar was removed with a diode laser to obtain better access for precise bracket bonding.

NiTi tension (*closed-coil*) springs were activated with a ligature wire to close the edentulous space in the upper right and lower left segments in the 6th and 8th months of treatment, respectively (*Figs. 13-1 and 13-2*). A left Class II elastic (*3.5 oz*) was used to correct the midline discrepancy. The mandibular right 3rd

Fig. 13-1:

Right lateral view on the 8th month of the treatment. The Ni-Ti spring was applied on upper right area to close the space with a ligature wire to control the magnitude of the acting force. The power chain was also used to reinforce the force.

Fig. 13-2:

Left lateral view on the 8th month of the treatment. The Ni-Ti spring was applied on lower left area to close the space with a ligature wire to control the acting force. The power chain was also used to reinforce the force.

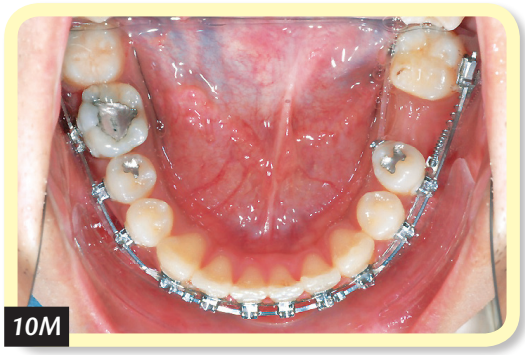

Fig. 14:

Mandibular occlusal view on the 10th month of the treatment. 2 buttons were bonded on the lower left 2nd premolar and molar, and the power chain were attached on them to close the space.

molar was brought into an ideal occlusal position to close the mesial space by using a precisely bonded bracket and power chain in the 10th month of the treatment. On the mandibular left side, buttons were bonded on the lingual surface of the mandibular 2nd premolar and 2nd molar, and a power chain was activated between them (*Fig. 14*).

After 22 months of active treatment, the maxillary right and the mandibular left edentulous spaces were closed (*Fig. 15-1 and 2*), however, the mandibular left 3rd molar did not erupt spontaneously and was still impacted in the original position (*Fig. 16*). Three months later, it was surgically exposed as describe in the next section.

Fig.15-1:

Maxillary occlusal view on the 22th month of the treatment. The upper right edentulous space was closed.

Fig.15-2:

Mandibular occlusal view on the 22th month of the treatment. Note the lower left 1st molar space was closed.

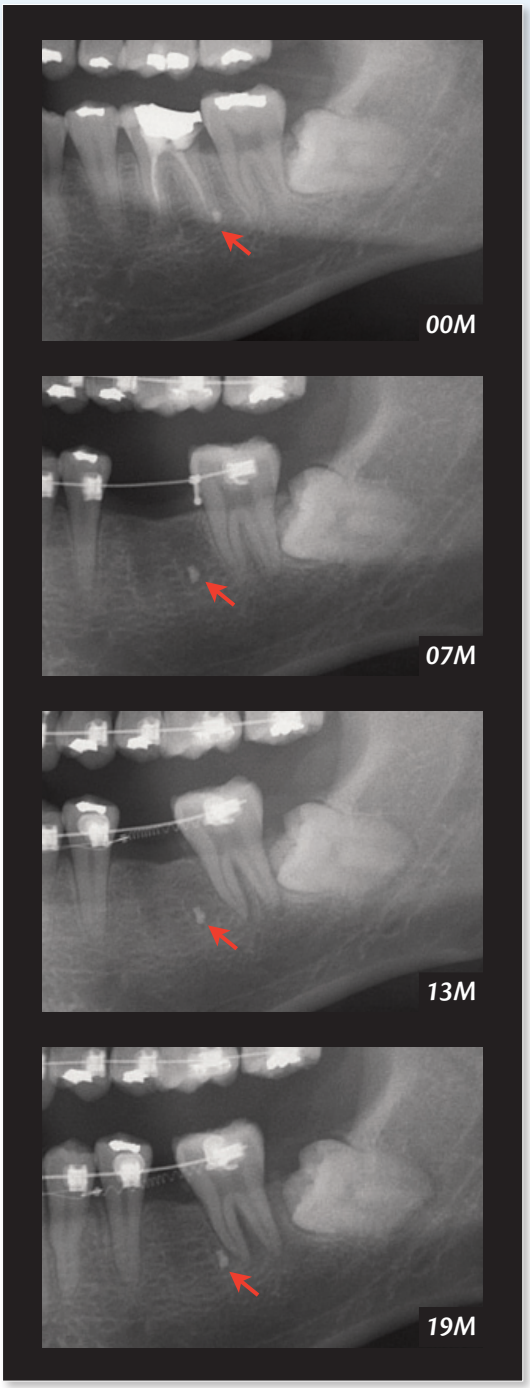

Fig 16:

Progress x-ray revealed that the lower left 3rd molar didn't erupt spontaneously as the 2nd molar was protracted. The intrabony pushed-out endodontic filling material (red arrow) of lower left 1st molar acted as a good indicator for the molars protraction distance.

Surgical Procedures for Molar Uprighting

To preserve as much keratinized tissue as possible, a closed eruption technique was chosen. Following the injection of local anesthesia, a #15 scalpel blade was used to make a sulcular incision on the distal surface of the mandibular left 2nd molar. The incison was extended beyond the mucogingival junction to achieve a vertical release to improve access. The 2nd incision was along the dental ridge superior to the impacted molar.

A full thickness flap was reflected, exposing the clinical crown of the impacted molar, which was buccal to the adjacent 2nd molar. The bone covering the 3rd molar anatomic crown was removed with a high speed round carbide bur (*Fig. 17-1*). Bone removal was extended to the distal to establish a path of movement for uprighting the tooth. Then an elevator was used to gently luxate the 3rd molar to rule out ankylosis.[2] An eyelet was bonded on the occlusal surface of the #38 under strict moisture control conditions (*Fig. 17-2*).

After the surgical exposure, a miniscrew (*2x12 mm, OrthoBoneScrew, Newron's A, Inc.*) was inserted into the ramus area of the left mandible to serve as anchorage to upright the 3rd molar (*Fig. 17-2*). It was important for the patient to occlude his teeth before and after the miniscrew insertion to make sure there was no interference. A power chain was attached on the eyelet of the 3rd molar and fed through a slit in the flap to access the miniscrew. The flap was closed with 6-0 nylon interrupted sutures (*Fig. 17-3*). A panoramic radiograph was taken after the surgery.

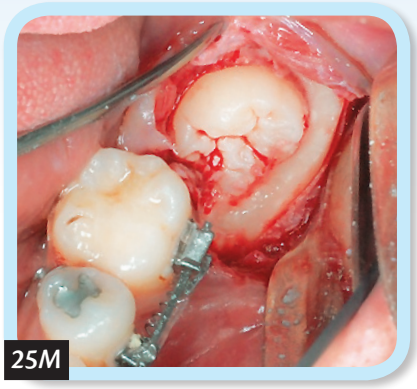

Fig. 17-1. Surgical exposure.

One week later, all the sutures were removed, and the power chain was progressively stretched during the next several appointments. The panoramic radiograph was taken in the 27th month of treatment to evaluate the position of the molar being uprighted. A thick over-growth of fibrous connective tissue was noted due to the chronic irritation associated with the closed eruption technique (*Fig. 18-1*). The overlying soft tissue was removed with a diode laser equipment to expose the clinical crown at the same appointment (*Fig. 18-2*).

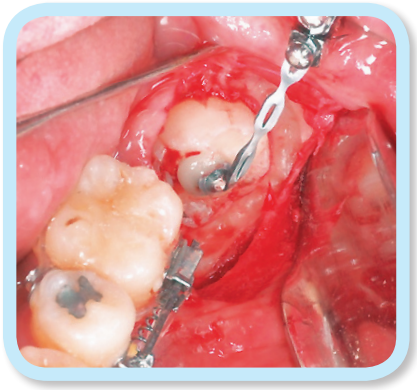

Fig. 17-2:
Miniscrew insertion on ramus area with a power chain attached to it.

Fig. 18-1:
2 months after the sutures were removed, the over-growth tissue over lower left 3rd molar was noted.

Fig. 17-3. Suture of surgical site.

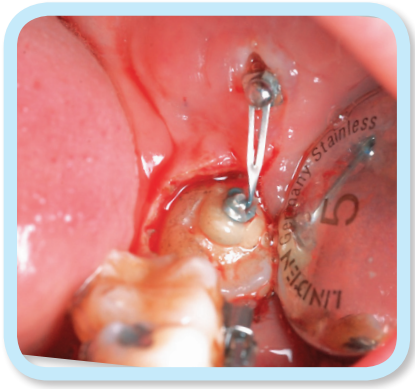

Fig. 18-2:
The over-growth soft tissue was removed by diode laser.

Orthodontic Finishing

Because of the buccal tipping and mesial out rotation of the 3rd molar, power chains were used to apply force to the buccal and the lingual aspects (*Figs. 20-1, 20-2*). In the 29th month of treatment, a buccal tube and lingual button were bonded on the mandibular left 3rd molar (*Fig. 19, 20-1*), and the ramus miniscrew was removed. The following month the mandibular arch wire was changed from a .019" x.025" SS to a .016" CuNiTi that was inserted in the buccal tube of the mandibular left 3rd molar (*Fig. 21*).

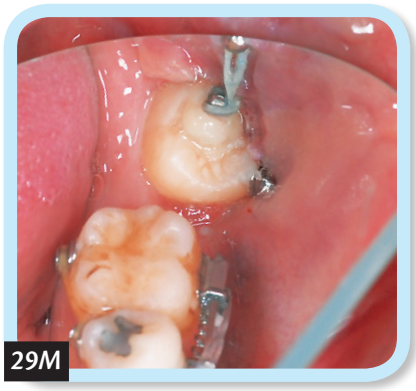

Fig. 19:

Buccal tube bonding of the 3rd molar after 1.5 months of over-growth soft tissue removal.

Fig. 20-1:

Lingual button bonding over the 3rd molar with power chain attachment.

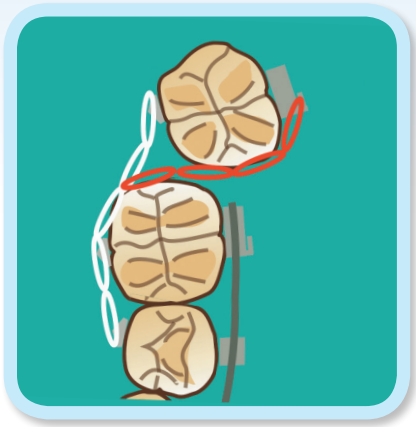

Fig. 20-2:

It would be better to hang the power chain on the buccal tube (red) of the 3rd molar than the lingual button (white) to correct the buccal inclination and distal-in rotation at the same time.

Fig. 21: .016" CuNiTi archwire insertion to the buccal tube.

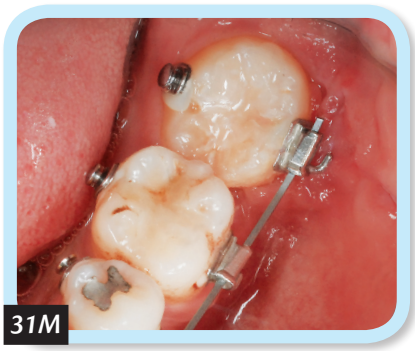

Fig. 22:

The main wire was changed to .014"x.025" CuNiTi archwire.

With sequential archwire changes, the previously impacted molar was gradually aligned into an ideal position (*Figs. 22-24*). Fig. 25 is a sequential series of panoramic radiographs that shows treatment progress in aligning the lower left 3rd molar. Unfortunately, the lower left space closure caused a further deterioration in the midline discrepancy. In the 35th month of treatment, another miniscrew was inserted in the left infrazygomatic crest to serve as an anchorage to correct the maxillary midline discrepancy (*Fig. 26*). Right Class III and left Class II elastics (*3.5 oz, 1/4"*) were used to assist in the midline correction.

In the 37th month of active treatment, enamel reduction and recontouring of the maxillary central

Fig. 23:
The main wire was changed to .016"X.025" SS archwire as finishing archwire.

Fig. 24. Finishing of the treatment.

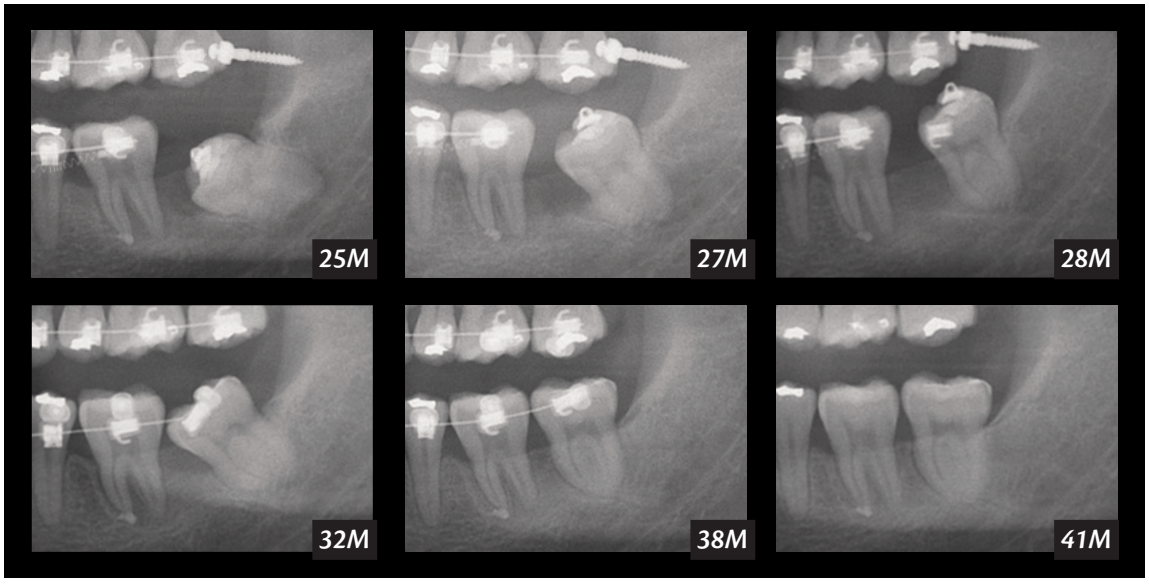

Fig. 25:
The panoramic radiographic view of lower left 3rd molar uprighting treatment progress. The horizontal impacted 3rd molar was up-righted by the force provided by the ramus screw and power chain that were attached to it.

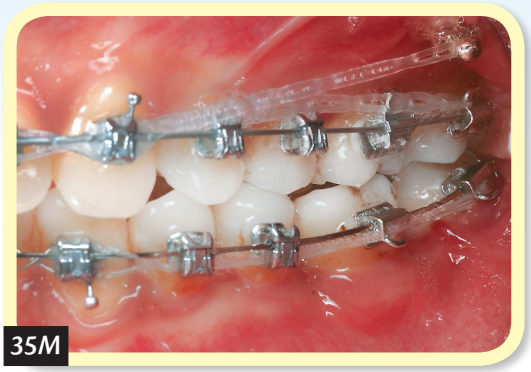

Fig. 26:
Upper left miniscrew insertion on IZC for midline correction.

and lateral incisors was performed (*Fig. 27*) for 3 reasons:

1. Improve the upper anterior tooth size ratio.
2. Change the triangular shaped central incisors to a more esthetic rectangular contour.
3. Obtain space to correct the excessive overjet.

Fig. 27:
Upper anterior teeth frontal photo before and after reshaping.

An Ivory's separator (*Figs. 28 and 29*) was used between the incisors to improve access and control the amount of enamel removed. A diamond-coated fissure bur is recommended for gross enamel removal followed by a finishing bur for more refined reshaping. The resulting rough enamel surface was smoothed out with dental polishing band (*Fig. 28*).

Fig. 28:
Ivory's separator (upper) was used for teeth contour reshaping. Dental polishing band (lower) was used to refine the reshaped surface of the tooth.

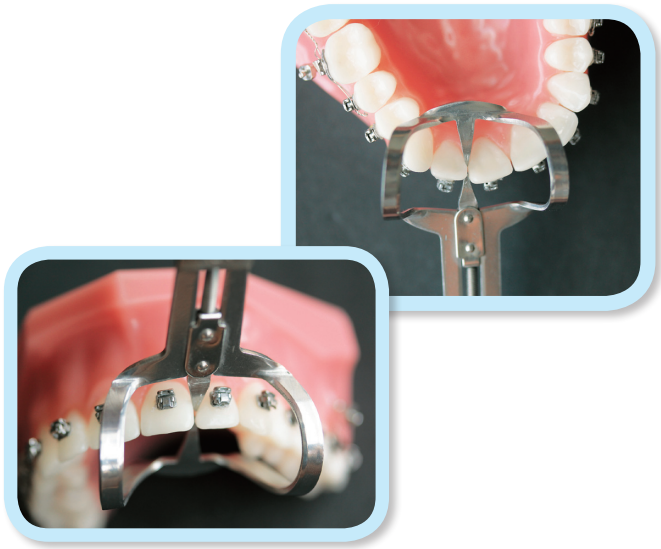

Fig. 29:
Ivory's separator was used on interdental area to separate 2 neighboring teeth when reshaping the anterior teeth contour.

Bracket repositioning was performed repeatedly throughout treatment as indicated by the sequential panoramic films. Wire bending was performed for detailing the occlusion during the final stages of the treatment.

One month before the completion of active treatment, the upper archwire was sectioned distal to the cuspids, and up and down elastics were used to improve the articulation of the posterior teeth. After 41 months of active treatment, all appliances were removed (*Fig. 30*). Upper and lower clear overlay retainers were delivered for both arches.

Fig. 30:
Pre- and post-treatment upper anterior teeth frontal photo. The teeth alignment, shape, and gingival margin contour were improved after the treatment.

Results Achieved

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

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

Maxillary Dentition

- A - P: Incisors slightly retracted and uprighted
- Vertical: Maintained
- Inter-molar / Inter-canine Width: Maintained

Mandibular Dentition

- A - P: Incisors and molars slightly retroclined
- Vertical: Maintained
- Inter-molar / Inter-canine Width: Maintained

Facial Esthetics: Improved lower lip position

Superimpositions: Upper arch slightly retracted. Upper and lower incisor were uprighted (*Fig. 9*).

Retention

The upper and lower clear overlay retainers were delivered. The patient was instructed to wear them full time for the first 6 months and nights only thereafter. Instructions for home care and maintenance of the retainers were provided.

Final Evaluation of Treatment

The ABO Cast-Radiograph Evaluation score[1] was 16 points. The major discrepancies were in the left occlusal relationships (*4 points*), occlusal contacts (*3 points*), and marginal ridges (*3 points*).

Collectively, 3 quadrants of molar extraction spaces were successfully closed. Due to the asymmetry of the space closure mechanics, the occlusal relationship on the left side was slightly compromised and the midline of the upper arch was 1.5 mm to the right of the mandibular midline. The facial profile was improved because of correction of the protrusive lower lip. The patient was satisfied with the treatment outcome (*Fig. 31*).

Fig. 31:
Post-treatment photo. The patient was satisfied with the treatment outcome.

Discussion

Atypical extraction patterns are common for orthodontic treatment of adults primarily because of tooth loss resulting from caries. Currently in Taiwan the mean DMFT (*decayed, missing and filled teeth*) index for 12 to 17-year-old adolescents is 2.58, 3.78, 4.23, 4.52, 4.72 and 5.14, respectively.[3] These results are far greater than the World Health Organization (*WHO*) 2010 goal, which is a DMFT of 2 in 12-year-old children. Dentitions mutilated by caries are common, and the dental treatment plans to correct the problem are progressively more complicated if tooth loss is asymmetric.

Lower posterior teeth play an important role in occlusal function, particularly in maintaining the vertical dimension of occlusion (*VDO*). The current patient complained about difficulties chewing on the right side before treatment because of a fractured upper right 1st molar and a missing lower 2nd molar. Without treatment, his chewing function would probably further deteriorate and eventually compromise the lower left 1st molar. Vanarsdall and Swartz[4] described the common sequelae for a missing mandibular 1st molar as (*1*) mesially inclined 2nd and/or 3rd molar, (2) distal drift of the premolars, (3) extrusion of the maxillary molars, (*4*) altered gingival form due to constriction of the edentulous ridge, (5) infrabony defect mesial to the inclined molar, (*6*) stepped marginal ridges, (*7*) food impaction, and (*8*) posterior collapse. Chang, Chang and Roberts[5] have noted a similar pattern.

There are many treatment options for replacement of missing teeth, including orthodontic space closure, single tooth implants, and tooth-supported restorations.[6] The present patient preferred a treatment plan with the least need for restorative treatment. Asymmetric extractions, particularly molars, increase the complexity of orthodontic

treatment. Despite these mechanical problems, patients usually benefit from extraction of molars with a questionable prognosis rather than removing healthy premolars. Furthermore, the cost of treatment is often considerably less because expensive surgical and restorative procedures are avoided.[6,7]

According to William and Hosila,[8] maxillary 1st molar extraction treatment is less likely to affect the profile than premolar extraction. The present patient had an acceptable profile with a slightly protrusive lower lip. During treatment, the hopeless upper right 1st molar and poor prognosis, lower left 1st molar were successfully replaced by the 2nd and 3rd molars within their own quadrant. The missing lower right 2nd molar space was closed by 3rd molar protraction, thus avoiding the need for artificial prothesis fabrication and improving the facial profile by slightly retracting the lower lip.

The chance of successful 3rd molar eruption is much higher when the 1st molars are extracted, compared to when premolars are extracted.[8] However, for the case under discussion the lower left 3rd molar did not erupt spontaneously after the 1st molar extraction and protraction of the 2nd molar. This is probably because it was horizontally impacted under a layer of dense cortical bone.

Many methods for molar uprighting have been described in literature.[9] Most approaches require at least partial exposure of the clinical crown. Lin[9] reviewed two viable methods for uprighting horizontally impacted molars: Bach (*Fig. 32-1*) and Chang (*Fig. 32-2*). The first approach inserts an .014"

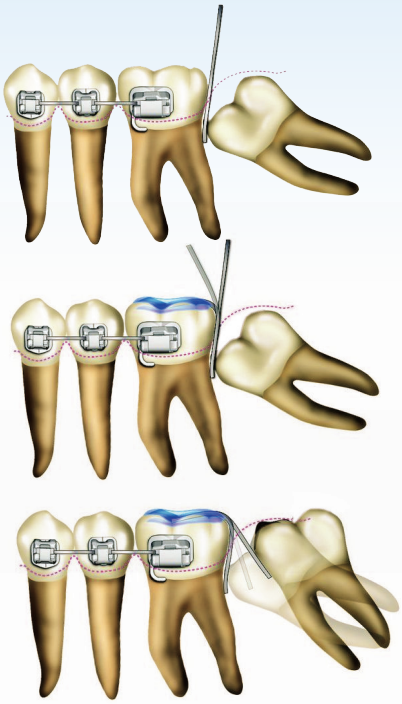

Fig. 32-1:
Bach's method for molar uprighting, which is suitable for soft tissue impacted molars.

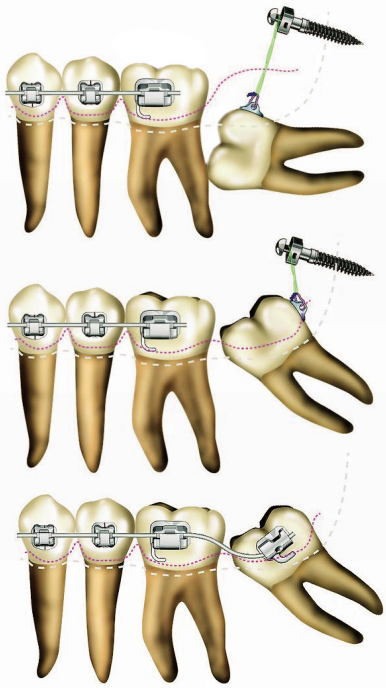

Fig. 32-2:
Chang's method for molar uprighting, which is indicated for deeply horizontal bony impacted molars.

x .025" CuNiTi wire down to the occlusal level of the impacted molar, then flexes the wire onto the occlusal surface of the adjacent molar and secures it with light-cured composite resin. After several months, the impacted molar is uprighted and erupts spontaneously. Thus, surgical exposure is not required, but occlusal interference may occur due to composite on the occlusal surface of the molar in occlusion. A significant interference may require placing a bite turbo on the opposite side of the arch for bilateral occlusion during the uprighting phase. The Bach method is not indicated for openbite patients nor bony impactions. The Chang method was performed in the 25th month of treatment, following one year of observation to determine if the impacted molar would begin to erupt. In retrospect, the surgical procedure should have been performed earlier to decrease treatment time. If it does not begin to erupt within 6 months after the 2nd molar is protracted, surgical uncovering is indicated.

Closed eruption technique was used for the present patient in an attempt to preserve keratinized tissue, especially on the buccal surface. However, the buccal position of the 3rd molar and the overlying fibrous tissue response prevented the tooth from erupting. Thus the 2nd surgical procedure was needed to remove the overlying soft tissue. In retrospect, an apically positioned flap may have been a better initial surgical approach to keep the path of eruption open and avoid the 2nd surgery.

The position of the miniscrew for lower molar uprighting is very important. Care must be taken not to cause occlusal interference when the miniscrew is inserted. The ramus area is often covered with thick soft tissue that may hasten the loosening of the miniscrew; a longer size (*2x14 mm*) miniscrew is indicated to help to solve this problem.

In brief, there are 6 keys to success for treatment of lower impacted 3rd molars: (*1*) precise diagnosis and a pragmatic treatment plan, (*2*) proper flap design usually apically positioned to increase keratinized gingiva, (*3*) gently luxate the impaction to rule out ankylosis and speed up extrusion, (*4*) trim away bone in the path of eruption down to the cementoenamel junction (*CEJ*), (*5*) bond on a button with a power chain, and (*6*) insert a ramus screw for distal and occlusal traction.

The impacted molar was uprighted and extruded until there was enough clinical crown height for bracket bonding in an ideal position: 90° to the long axis of the 3rd molar root. However, it may have been better to bond the bracket earlier with a compromised angulation to enhance the rate of tooth movement (*Fig. 33-1 and 2*).[10]

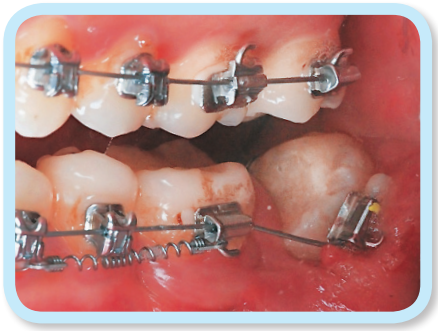

Fig. 33-1:
The lower left 3rd molar tube was put with a more mesially angulation to help correct the tilted molar.

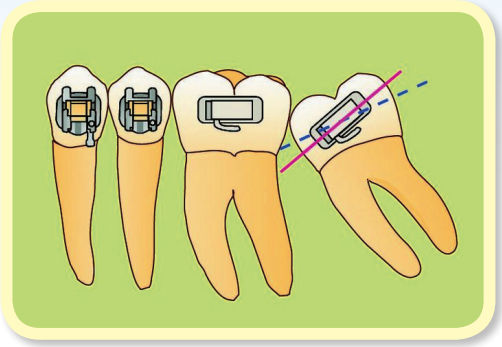

Fig. 33-2. Cartoon illustration of molar tube bonding positon.

Fig. 34:
The lingual force can facilitate the process of extraction space closure and prevent mandibular 2nd and 3rd molars rotating distally-out.

Space closure is a challenge for 1st molar extraction sites. Precise control of tooth movement during closure of extraction spaces in 3 dimensions is of paramount importance in meeting treatment goals. The large mesial root surface of mandibular molars enhances their anchorage value which may result in lingual tipping of the incisors.[11] When protracting the 2nd and 3rd molars to close a first molar space, there is a tendency to tilt mesially and roll lingually when subjected to a mesially directed force. Sandler et al.[12] advise that active space closure should not be attempted before the lower teeth are well aligned and in a full-sized working arch wire. For the present patient, a . 016x .025 stainless steel archwire was placed in the lower arch. Balancing lingual force was applied by a power chain and 3 buttons bonded on the lingual surface of 3rd molar, 2nd molar and 2nd premolar (*Fig. 20-23, 34*).[5] This lingual force can facilitate the process of extraction space closure and prevent mandibular 3rd molar rotating distal-out. Another method to prevent the molars from tilting mesially is to apply an adequate root mesial moment during protraction. After the treatment, the total amount of space closure was measured: 11mm for the lower left 1st molar area, and 9.5 mm for the upper right 1st molar area.

The buccolingual width of the edentulous ridge is an important factor for molar protraction treatment time. The best timing of extraction is just before teeth protraction.[7] The edentulous alveolar ridge might undergo resorption with time after extraction of the tooth. From a traditional perspective, this problem is thought to prolong treatment time, narrow the ridge, cause gingival dehiscence, root resorption, or other periodontal problems for the teeth being protracted. However, Roberts et al.[13, 14] have noted that these problems do not occur when the periodontium is healthy on teeth adjacent to the extraction site. For the present patient, the maxillary right 1st molar and mandibular left 1st molar were extracted just before the start of orthodontics treatment; furthermore, the adjacent teeth were

periodontally healthy. Both factors may have contributed to the satisfying results obtained.

Conclusion

Mesially tilted or impacted molars are commonly seen in dental practice. If the molar is deeply impacted, a miniscrew inserted into the ramus is effective anchorage for uprighting. There are 6 keys to ensuring success when treating deeply impacted molars: (*1*) precise diagnosis and a pragmatic treatment plan, (*2*) proper flap design, usually an apically positioned flap, to increase keratinized gingiva, (*3*) gently luxate the impacted tooth to rule out ankylosis, (*4*) adequate bone trimming to open a clear path of tooth movement, (*5*) bond buttons and activate them with power chains to rotate the tooth as it erupts, and (*6*) place a ramus screw for anchorage.

Asymmetric extraction patterns increase the complexity of orthodontic treatment, especially when permanent molars are involved. However, patients usually benefit from extraction of molars with a questionable prognosis rather than removing healthy premolars. This type of treatment could become more popular with further development of temporary anchorage devices. It is hoped that the careful study of this case report will broaden the scope of possibilities for clinicians faced with this type of malocclusion.

Acknowledgment

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 25

OVERJET

0 mm. (edge-to-edge)	=	
1 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	3 pts.
7.1 – 9 mm.	=	4 pts.
> 9 mm.	=	5 pts.

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

Total = 2

OVERBITE

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

Total = 0

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 = 1

OCCLUSION

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

Total = 0

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 1

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° 1 x 1 pt. = 1

1 to MP ≥ 99° = (1 pt.)

Each degree > 99° 7 x 1 pt. = 7

Total = 8

OTHER (See Instructions)

Supernumerary teeth	_____	x 1 pt. =	_____
Ankylosis of perm. teeth	_____	x 2 pts. =	_____
Anomalous morphology	_____	x 2 pts. =	_____
Impaction (except 3rd molars)	_____	x 2 pts. =	_____
Midline discrepancy (≥3mm)		@ 2 pts. =	_____
Missing teeth (except 3rd molars)	1	x 1 pts. =	1
Missing teeth, congenital	_____	x 2 pts. =	_____
Spacing (4 or more, per arch)	_____	x 2 pts. =	_____
Spacing (Mx cent. diastema ≥ 2mm)		@ 2 pts. =	_____
Tooth transposition	_____	x 2 pts. =	_____
Skeletal asymmetry (nonsurgical tx)		@ 3 pts. =	_____
Addl. treatment complexities	6	x 2 pts. =	12

Identify: 1. Molars protraction x 3
2. Lower left horizontal bony impacted 3rd molar uprighting x 3

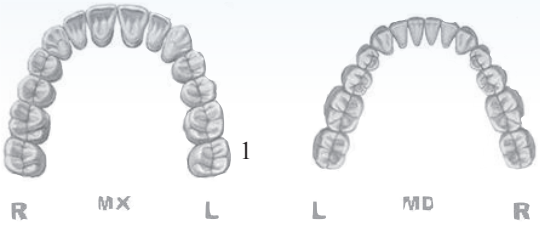
Total = 13

Cast-Radiograph Evaluation

Total Score: 16

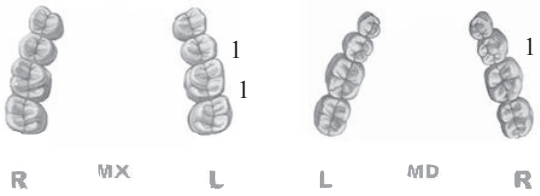
Alignment/Rotations

1



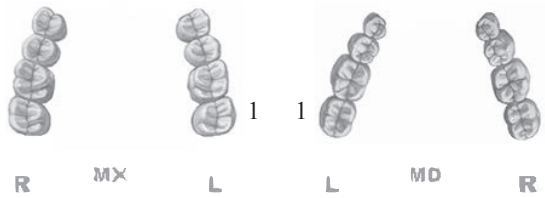
Marginal Ridges

3



Buccolingual Inclination

2

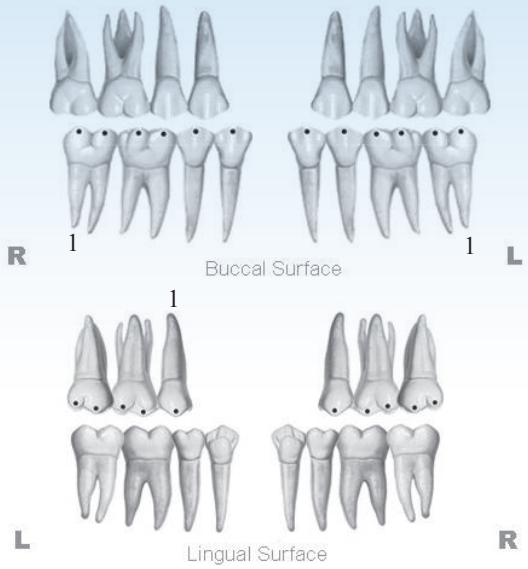


Overjet

1

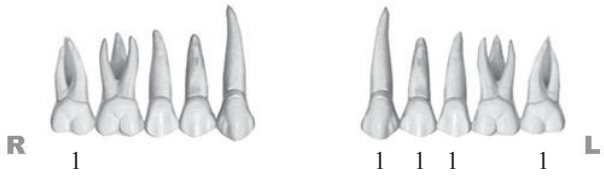
Occlusal Contacts

3



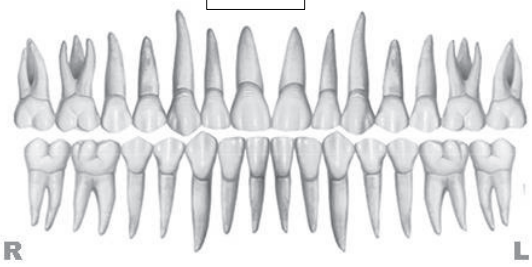
Occlusal Relationships

5



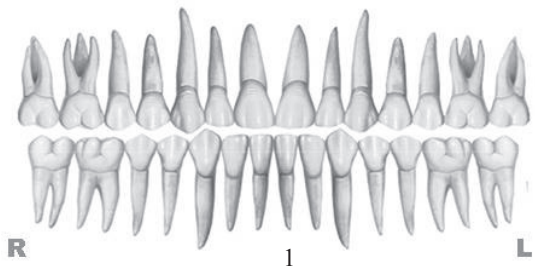
Interproximal Contacts

0



Root Angulation

1



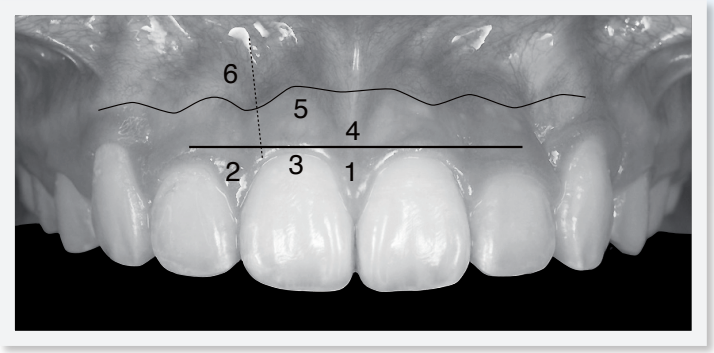
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 3

1. Pink Esthetic Score

Total = 1

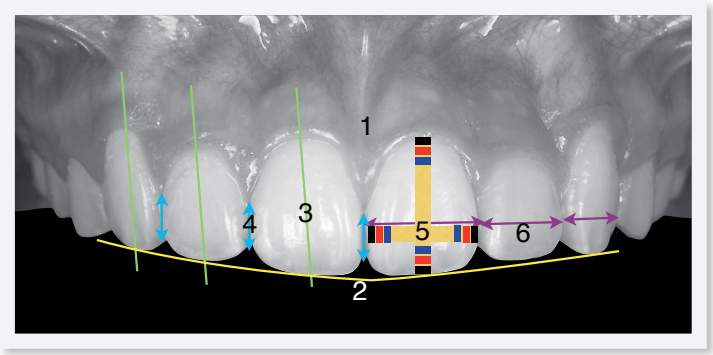


1. Mesial Papilla	0	1	2
2. Distal Papilla	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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-esthetics)

Total = 2



1. Tooth Form	0	1	2
2. Mesial & Distal Outline	0	1	2
3. Crown Margin	0	1	2
4. Translucency (Incisal thrid)	0	1	2
5. Hue & Value (Middle third)	0	1	2
6. Tooth Proportion	0	1	2

1. Midline	0	(1)	2
2. Incisor Curve	(0)	1	2
3. Axial Inclination (5°, 8°, 10°)	0	(1)	2
4. Contact Area (50%, 40%, 30%)	(0)	1	2
5. Tooth Proportion (1:0.8)	(0)	1	2
6. Tooth to Tooth Proportion	(0)	1	2