# Correction of Generalized Interdental Spacing, Gummy Smile and Implant Site Development with Invisalign®

# **Abstract**

A 30-year-old male presented with a Class I malocclusion: congenitally missing lower lateral incisors, generalized anterior spacing in both arches, and a gummy smile. Motivation for orthodontic consultation was smile improvement without wearing braces. Clear aligners were used to retract the maxillary incisors, close upper anterior spaces, and prepare implant sites to restore the missing lower lateral incisors. Retraction of the maxillary incisors was associated with a relative intrusion of the central incisors to improve the gummy smile. After 26 months of aligner treatment, the patient declined further refinement to improve axial inclinations because he was satisfied with the results. Overall, a malocclusion with a Discrepancy Index of 10 was corrected to a Cast-Radiograph Score (CRE) of 12, with a Pink & White dental esthetic score of 5. (J Digital Orthod 2020;58:4-18)

#### Key words:

Invisalign®, aligner treatment, gummy smile, spacing, congenital missing lower incisors, implant site preparation, second order tooth movement

# Introduction

A 30-year-old male presented with chief complaints of spacing, missing teeth and a gummy smile (*Fig. 1*). The clinical exam revealed normal facial convexity, protrusive lips, Class I occlusion, missing lower lateral incisors, and generalized anterior spacing in both arches (*Fig. 2*). There was a total of 10.5mm and 3.5mm of interdental space in anterior segments of the mandibular and maxillary arches, respectively. No contributory medical or dental history was reported, nor were there any signs or symptoms of temporomandibular disorder (*TMD*). This case report demonstrates how to close interproximal spaces and create sites for implants with clear aligners. Second order tooth movement is difficult and time consuming with aligners. This technically challenging treatment procedure was facilitated with a digital custom appliance and two refinement procedures. The successful outcome after 26 months of active treatment is shown in Figs. 3 and 4. Pre-treatment (*Fig. 5*) and post-treatment (*Fig. 6*) radiographs illustrate morphology of the mineralized tissues. Superimposition of cephalometric tracings (*Fig. 7*) and cephalometric analysis (*Table 1*) document the dentofacial aspects of comprehensive treatment.

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

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■ Fig. 1: Pre-treatment facial photographs, 30 y/o male



Fig. 3: Post-treatment facial photographs, after 26 months of active treatment



Fig. 2: Pre-treatment intra-oral photographs



Fig. 4: Post-treatment intra-oral photographs

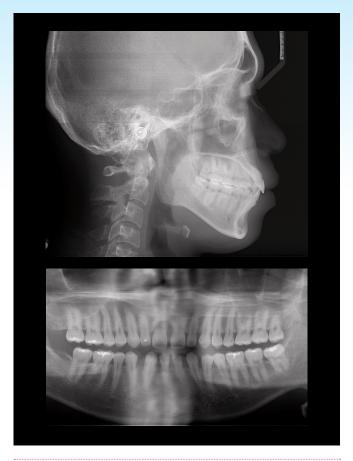
# Diagnosis

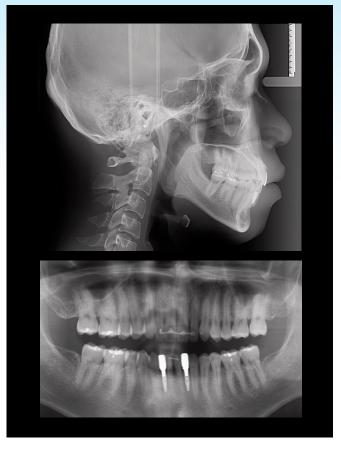
## Facial:

- Length: Long tapered face in the frontal plane
- Facial Convexity: Profile (G-Sn-Pg'=10°) was within normal limits (WNL) (Fig. 5).
- Smile: Excessive gingival exposure
- · Symmetry: WNL

## Skeletal:

- Intermaxillary Relationship: Maxillary protrusion (SNA 85°, SNB 80°, ANB 5°)
- Mandibular Plane: WNL (SN-MP 36°, FMA 29°)
- Vertical Dimension of Occlusion (VDO): Increased (Na-ANS-Gn 56%)
- · Symmetry: Mandible is deviated to the left about 2mm.



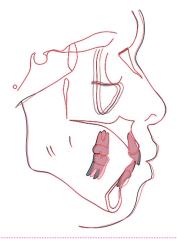


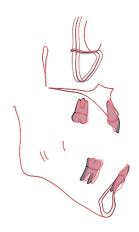
## Fig. 5:

Pre-treatment cephalometric and panoramic radiographs document the original dentofacial morphology. The panoramic film reveals missing lower lateral incisors, axial inclination problems and generalized lower anterior spacing.



Post-treatment cephalometric and panoramic radiographs reveal the dentofacial morphology immediately after Invisalign® attachments were removed. Upper and lower incisors were aligned and spaces were closed, but multiple second order alignment problems are noted in the lower anterior segment: 1) central incisors and implants are tipped to the right; and 2) left central incisors encroach on the implant space.





# Fig. 7:

Pre- and post-treatment cephalometric tracings are superimposed on the anterior cranial base (left), the maxilla (upper right), and the stable internal structures of the mandible (lower right). The upper incisors appear to be slightly intruded and tipped distally using Invisalign®. Lower incisors were slightly extruded and tipped distally.

CEPHALOMETRIC SUMMARY					
SKELETAL ANALYSIS					
	PRE-Tx	POST-Tx	DIFF.		
SNA° (82°)	85°	85°	0°		
SNB° (80°)	80°	80°	0°		
ANB° (2°)	5°	5°	0°		
SN-MP° (32°)	36°	36°	0°		
FMA° (25°)	29°	29°	0°		
DENTAL ANALYSIS					
U1 To NA mm (4 mm)	5	4	1		
U1 To SN° (104°)	99.5°	93.5°	6°		
L1 To NB mm (4 mm)	9.5	9.5	0		
L1 To MP° (90°)	96°	89.5°	5.5°		
FACIAL ANALYSIS					
E-LINE UL (-1 mm)	3	3	0		
E-LINE LL (0 mm)	5	5.5	0.5		
Convexity: G-Sn-Pg' (13°)	10°	9.5°	0.5°		
%FH: Na-ANS-Gn (53%)	56%	56.5%	0.5%		

■ Table 1: Pre- and post- treatment cephalometric analysis

#### Dental:

- Classification: Class I molar and canine relationship bilaterally
- Overbite: 3mm deep bite
- Overjet: 2mm
- Missing Teeth: Congenital absence of lower lateral incisors (Fig. 5)
- Spacing: 3.5mm in maxillary anterior, and 10mm in mandibular anterior

The ABO Discrepancy Index (DI) was 10 as shown in Worksheet 1 at the end of this report.

#### **Treatment Alternatives**

To close missing lower lateral incisor space, extraction of upper first premolars is an option, but space closure is challenging with Invisalign® and may result in undesirable side effects, 1 such as tipping and extrusion of upper anterior teeth which would exacerbate the gummy smile. Placing implants to restore mandibular incisors is a risky procedure because of the thin alveolar process associated with missing teeth in the lower anterior region. A better prosthetic option is to move the lower canines mesially to close space and substitute for the missing lateral incisors while simultaneously creating implant sites distal to the canines. This is a viable option with fixed appliances, but is well beyond the reasonable capability of aligners.<sup>1</sup>

The non-extraction treatment plan was:

- 1. Close all spaces except for the lower lateral incisor implant sites.
- 2. Intrude upper incisors to correct gummy smile.<sup>3,4</sup>
- 3. Restore missing lateral incisors with implantsupported prostheses.
- 4. Retract upper incisors to close space and help correct the gummy smile.

# Appliances and Treatment Progress

A digital scan with iTero Element® (Align Technology, Inc, San Jose, CA) was performed to start the analysis and planning. Multiple ClinCheck® (Invisalign System, Align Technology, Inc, San Jose, CA) modifications established a reasonable biomechanics design to reach the stated objectives. 1,3,4

An initial set of 25 aligners was planned. The duration of use for each aligner was 10-14 days depending on the specific objective(s). The treatment began with the delivery of the first 2 aligners. The patient was

instructed to wear the clear overlay appliances 20-22 hours per day, and to remove them only while eating or brushing his teeth.

The selected attachments required for optimal tooth movement were:

- Optimized attachment: UR3, UR4, UL4, LL4, LL5, LR4, LR5
- Vertical rectangular attachment: UL3, LL3, LR3

Attachments, made of composite produced by Tetric Evoceram (*Ivoclar Vivadent, Inc, NY, USA*), were placed during the second visit. After installing the attachments, aligners 3-11 were delivered to the patient with instructions to progress in the numbered sequence every 10 days. The objectives for the first set of aligners were primarily intrusion and retraction of upper incisors, along with space opening of lower lateral incisor implant sites.

Interproximal reduction (*IPR*) was performed prior to aligner 12. In the upper arch, IPR was performed from the mesial of UR3 to the distal of UL3. In the lower arch, IPR was performed on the distal of LR3 and on the mesial of both LL1 and LR1 (*Fig.* 8). The objectives of the selective IPR procedure was to create space, facilitate intrusive movement of the incisors, reduce black triangles between the incisors, improve smile esthetics, and enhance the anatomical form of the teeth.

After finishing with the original 25 aligners at 13

months, there wasn't enough intrusion of the upper incisors and the width of the implant sites was insufficient (*Fig. 8D*). The first refinement of 16 additional aligners commenced with the following selected attachments:

- Optimized attachment: UR3, UR4, UL3, UL4, LL3, LL4, LR3, LR4
- Vertical rectangular attachment: LL1, LR1

IPR was performed between the lower central incisors and distal surface of LR3 to create more space for right lateral incisor implant (*Fig. 8E*). Power ridges were used in aligners 1-13 to increase the axial inclination of the maxillary incisors. Five months later, after a total active treatment duration of 18 mo, preprosthetic aligner treatment was completed (*Fig. 8F*).

# **Implant**

There were 6mm spaces between the lower central incisors and canines bilaterally (*Fig. 8F*). A conebeam computed tomography (*CBCT*) scan was performed and the implant surgery was scheduled. The anatomical structure of the implant site was studied in multiple slices of the 3D image. Guided bone regeneration (*GBR*) surgery was required for each implant site because of labial bone concavity (*Fig. 9*). Two implant fixtures (Ø3x10mm) from the NobelActive® was chosen. A surgical stent was designed according to the 2B-3D rule⁵ to achieve precise implant placement and an optimal gingival

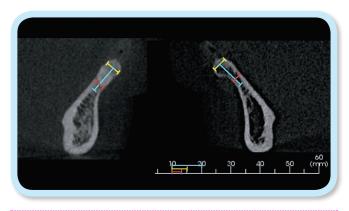


Fig. 8: The space closure and implant site development process is shown in progressive lower occlusal photographs from 0-18 months (M). The first set of aligners was completed at 9 months (D). Both implant sites were deficient in width, 2mm on the right side and 1mm on the left. IPR was utilized to create space (E), and addition aligner wear resulted in a 6mm wide space for both lateral incisor implant sites (F).

margin in all three dimensions: mesial-distal (M-D), buccal-lingual (B-L) and axial.

Under local anesthesia, a #15c scalpel blade was used for a mid-crestal and vertical incision. A sulcular incision was performed with a #12 blade from the distal line angle of lower right canine to the distal line angle of lower left canine on the buccal surface, and a full thickness soft tissue flap was reflected. Exposure of the bone revealed an adequate ridge to place a 3mm diameter implant. A surgical stent was fitted to guide the first lancer drill for the initial osteotomy, and the guide pin was placed. A periapical film was exposed to check the insertion path and orientation of the osteotomy as revealed by the guide pin (Fig. 10).

Following the specifications of the implant manufacturer, the fixtures were installed in the center of the ridge according to the 2B-3D rule: 2mm buccal bone thickness, and fixture 3mm apical to the expected crown margin.<sup>5</sup> The fixtures were



CBCT cuts provided cross-sectional views of the implant sites: LR2 (left) and LL2 (right).



■ Fig. 10:
Implant surgery and GBR grafts were placed to cover the exposed implants in the depth of curvature of the mandibular alveolar process.

fitted with cover screws, and the GPR surgery was performed utilizing freeze-dried bone allograft (*FDBA*) bone graft material (*Corticocancelleus graft, Maxxeus* ™ *Dental, OH, USA*) and resorbable collagen membrane. The flap was sutured with interrupted 5-0 GORE-TEX® (*Flagstaff, AZ*). After 3 weeks, the sutures were removed and the bone was allowed to heal for 6 mo prior to restoring the implants.

# **Orthodontic Finishing Stage**

The panoramic film showed that the lower left central incisor was tipped mesially and there was no occlusal contact of the molars. A second aligner refinement began at 19 months into treatment, and 19 additional aligners were produced to improve the occlusion and upright the tipped incisor. Overall, the total duration for aligner treatment was 26 months prior to restoring the implants.

# **Implant Prothesis Fabrication**

After 6 months of post-operative healing, the implants were well integrated. Second stage surgery was performed to expose the fixtures and connect Ø3.2x5mm healing abutments. Two weeks later, the healing abutments were removed, prosthetic abutments were seated with 15 N-cm of torque, and an impression was made. Two single, all ceramic crowns were fabricated by a commercial laboratory for the lower lateral incisors. The marginal integrity for each crown was verified with a dental explorer and an appropriate tightness of the contact area was confirmed with dental floss. After clinical adjustment and verification of fit and occlusion, the crown removing lugs on the lingual side were trimmed away. The permanent crowns were then luted into place with permanent cement.

## Retention

After 26 months of treatment, all aligner attachments were removed and fixed lingual retainers were bonded on all maxillary and mandibular incisors. Clear overlay retainers (Vivera®) were delivered for each arch. Traditional clear overlay retainers are compared to the advanced Vivera® material in Fig. 11. The patient was instructed to wear the retainers full time for the first six months and nights only thereafter. Instructions were provided for the home hygiene as well as for maintenance of the retainers.

# Treatment Results

Satisfactory smile esthetics, occlusal interdigitation, and functional alignment are documented in the post-treatment extra-oral and intra-oral photographs (Figs. 3 and 4). All spaces were closed, and Class I molar and canine relationships were achieved bilaterally. Three stages of aligner treatment over 26 months produced a final result that was close to the original 3D ClinCheck® projection.

# Discussion

# 1. Spacing

The etiology of interdental spaces may be heredity, functional disorder and/or an acquired habit. Inherited problems include tooth size to arch size discrepancies, congenitally missing teeth, macroglossia, microdontia, hypertrophic maxillary frenum, and supernumerary teeth blocking eruption of permanent teeth, resulting in impactions. Functional causes include crossbites and deviated



Fig. 11: Traditional clear retainers (upper) are compared to the Vivera® retainers (lower).

paths of eruption. Acquired malocclusions are due to pernicious habits with digits, lip and/or tongue, pathologic increase in tongue size, missing teeth, delayed eruption of permanent teeth, impactions and uncontrolled drift associated with periodontal disease.<sup>6</sup> Periodontally compromised patients usually require fixed retainers after orthodontic treatment<sup>7,8</sup> because the damaged or destroyed supracrestal fibers are inadequate to maintain arch integrity.

# 2. Posterior Open Bite

Aligner treatment is a form of indeterminate mechanics because the appliances engage all the teeth simultaneously. Unfortunately, neither anchorage nor active mechanics can be precisely defined. In addition there are two layers of aligner material between the posterior teeth, so aligners usually have an intrusive effect on the molars because of the wedge manner in which the jaws close. Although the ClinCheck® plan may be

directed at defined loads on certain teeth, other teeth must serve as anchorage for the mechanics to be in equilibrium. Furthermore, there is an inherent intrusive load on the molars due to material thickness. In the present case, for example, the posterior bite opened in the early stage of treatment (7<sup>th</sup> month), although the ClinCheck® plan was for the posterior teeth to remain rigid to achieve maximum anchorage (Fig. 12). This iatrogenic open bite problem may appear to be an overcorrection of upper incisor intrusion, but the etiology is difficult to define because of the indeterminate nature of the mechanics. Success with aligners in treating complex malocclusions is a trail and error procedure because the net effect of a sequence of aligners is only clear after that sequence of treatment is completed. For this reason staged treatment and multiple refinements are usually required.





Fig. 12:

In the 7<sup>th</sup> month, a side effect of posterior open bite was noted in the molar region (lower). The ClinCheck® was adjusted to 0mm anterior overbite (upper) to provide additional intermaxillary space to close the posterior open bite (yellow arrows). See text for details.

An additional complicating factor was the greater severity of the posterior open bite on the side of preferential chewing. When refinement aligners are designed, compensations can be programmed into the digital adjustment of the set-up. In retrospect, the patient's initial facial photographs were reexamined to determine if there was a hypertrophic masseter muscle that contributed to the asymmetry. There was no obvious facial asymmetry (*Fig. 1*) so the right side preference in mastication appears to be WNL.

# 3. Root Angulation

The lower left central incisor was mesially inclined after space closure, and the problem failed to be corrected during the first refinement, despite the fact that vertical rectangular attachments were added. During the implant surgical procedure, an error in the auxiliary placement was noted. Although the attachment on the lower right central incisor was parallel to its long axis, the left one was oriented mesially (Fig. 13).

The position of the inappropriate attachment was changed in the second refinement, and the ClinCheck® looked promising. However, there was no improvement in the axial inclination with additional aligner wear. The residual problem was diagnosed as an anatomical impairment of the lower incisor root striking cortical bone (Fig. 14), and it appeared that a third refinement of the aligners could correct the problem if lingual root torque was added. Unfortunately, the third refinement was not attempted because the patient decided to accept the result after 26 months of aligners and declined further treatment.

Correcting gummy smile without bone screw anchorage is challenging (Fig. 15). Overcorrection with sequential ClinCheck® planning may be effective for achieving differential intrusion of specific teeth.<sup>3,4</sup> For the present patient, the digital set-up of the opposing incisors was set at 0mm overbite, so that when the ideal normal overbite was achieved, there was in fact a premature contact on incisors (Fig. 12). On the other hand, there were two layers of aligner material between the molars which produced a relative intrusion that resulted in premature contact of the incisors. In any event

the iatrogenic intrusion of the molars required a substantial change during refinement to allow them to extrude back into occlusion. In this regard, horizontal gingiva bevel attachments on upper molars were prescribed to improve molar occlusal contact during the second refinement.

# 4. Aligners vs. Fixed Appliances

Aligners are an attractive "no braces" alternative for orthodontic treatment, but they have limitations<sup>1</sup> that both clinicians and patients must understand.

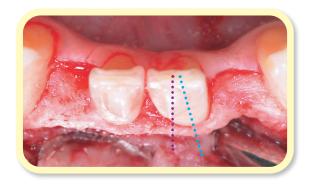


Fig. 13:

When the lower central incisors were exposed during the implant surgery, malalignment of the vertical auxiliary attachment was noted. It was oriented along the purple broken line, rather than along the blue broken line, which approximates the axial inclination of the tooth.



Cephalometric radiography shows the root tip of lower central incisor may have engaged cortical bone that is resistant to resorption. Correcting the tipped lower left central incisor is enhanced by also programming lingual root torque with ClinCheck®. The patient was satisfied with the current result and declined further refinement so that axial inclination problems were not corrected. See text for details.



Fig. 15:

The initial gummy smile (left) was corrected during aligner treatment (right). Several factors contributed to this favorable change: 1) retraction of maxillary incisors, 2) slight intrusion of the upper central incisors, and 3) training the patient to smile with less forced lip elevation.

First, like all removable alliances, aligners are very compliance dependent, so they tend to be more effective in adults who agree to make the commitment for full-time wear. Second, aligners have distinct limitations with respect to biomechanics. Because of the double layer of aligner material between the molars, aligners are more effective for open bite compared to deep bite malocclusions. Severe deepbite occlusion and a deep curve of Spee are relative contraindications for aligners.

In general, aligners are effective for first order tooth movement when crowding is managed with IPR. Third order alignment problems can be corrected with tipping, and auxiliary attachments are effective for moderate root movement. However, second order problems like space closure and implant site preparation are more challenging because it is difficult to apply second order moments. Vertical attachments (Fig. 13) are designed to achieve a mechanical couple, i.e. two parallel forces that are equal in magnitude, opposite in sense, and do not share a line of action. Although a couple can create a moment in a desired plane, the moments generated by aligner attachments tend to be relatively inefficient. These mechanics failed to achieve the desired outcome for the present patient (Figs. 6, 12 and 13).

Aligners are popular with patients because it is not necessary to wear braces, but the indeterminate mechanics they deliver are difficult to control. In effect, the ClinCheck® is a "magic wand" to help

the technician achieve a digital set-up that will result in appropriate loads on the teeth to achieve the desired changes. However, the loads applied are limited by the requirement that the force system be in equilibrium (*Newton's Laws*), so the only way to know the actual consequence of a planned treatment sequence is to observe the result. Consequently, unplanned side effects are inherent in aligner therapy and must be corrected with a continuing series of refinements. For the present patient, the correction was satisfactory, but it required 26 months. Aligners may be a viable alternative for achieving a satisfactory result without braces, but all concerned must understand the limitations of the process.

#### Conclusions

Invisalign® clear aligners are capable of managing interproximal spacing, gummy smile and implant site development. However, the mechanics are indeterminate, require multiple refinements, and demand a high level of patient cooperation. With adequate patient cooperation and treatment time, it is possible to achieve satisfactory outcomes in terms of occlusion, function and dentofacial esthetics without wearing braces. Overall, a malocclusion with a Discrepancy Index of 10 was corrected to a Cast-Radiograph Score (*CRE*) of 12, with a Pink & White dental esthetic score of 5.

Fig. 16 documents the current condition of the patient around 1 year and 9 months post-treatment.

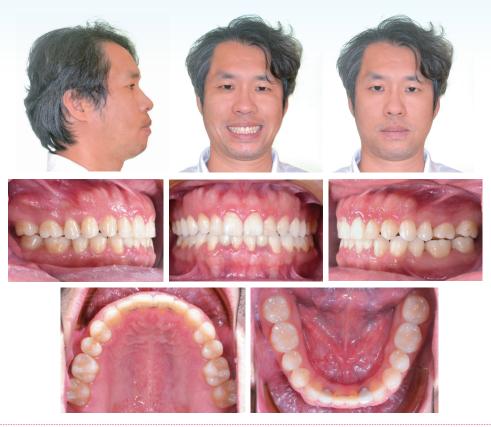


Fig. 16: Facial and intraoral photographs at 1Y9M follow-up

# References

- 1. Chiu GSC, Chang CH, Roberts WE. Interdisciplinary treatment for a compensated Class II partially edentulous malocclusion: orthodontic creation of a posterior implant site. Am J Orthod Dentofacial Orthop 2018;153(3):422-435.
- 2. Phan X, Ling PH. Clinical Limitations of Invisalign. J Can Dent Assoc 2007;73(3):263-6.
- 3. Turatti G, Womack R, Bracco P. Incisor intrusion with Invisalign treatment of an adult periodontal patient. J Clin Orthod 2006;40(3):171-4.
- 4. Simon M, Keilig L, Schwarze J, Jung BA, Bourauel C. Forces and moments generated by removable thermoplastic aligners: incisor torque, premolar de-rotation, and molar distalization. Am J Orthod Dentofacial Orthop 2014;145(6):728-36.
- 5. Chang CH. The 2B-3D rule for implant planning, placement and restoration. Int J Orthod Implantol 2012;27:96-101.

- 6. Gkantidis N, Psomiadis S, and Topouzelis N. Teeth spacing: etiology and treatment. Hellenic Orthodontic Review 2007;10:75-92.
- 7. Zachrisson BU. The bonded lingual retainer and multiple spacing of anterior teeth. Swed Dent J Suppl 1982;15:247-55.
- 8. Zachrisson BU. Multistranded wire bonded retainers: from start to success. Am J Orthod Dentofacial Orthop 2015;148(5):724-7.



# **Discrepancy Index Worksheet**

TOTAL D.I. SCORE

10

#### **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 = 0

## **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 = 0

# **OCCLUSION**

Class I to end on	=	0 pts.
End on Class II or III	=	2 pts. per sidepts.
Full Class II or III	=	4 pts. per sidepts.
Beyond Class II or III	=	1 pt. per mm. <u>pts.</u>
		additional

Total = 0

#### **LINGUAL POSTERIOR X-BITE**

1 pt. per tooth Total = 0

#### **BUCCAL POSTERIOR X-BITE**

2 pts. per tooth Total =

## **CEPHALOMETRICS** (See Instructions)

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

Each degree  $< -2^{\circ}$  \_\_\_\_ x 1 pt. = \_\_\_\_

Each degree  $> 6^{\circ}$  \_\_\_\_ x 1 pt. = \_\_\_\_

#### SN-MP

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

Each degree > 38° \_\_\_\_\_x 2 pts. = \_\_\_\_

 $< 26^{\circ}$  = 1 pt.

Each degree < 26° \_\_\_\_\_x 1 pt. = \_\_\_\_

 $1 \text{ to MP} \ge 99^{\circ}$  = 1 pt.

Each degree > 99° \_\_\_\_\_x 1 pt. = \_\_\_\_\_

Total = 0

# **OTHER** (See Instructions)

Supernumerary teeth x 1 pt. =Ankylosis of perm. teeth  $_{\rm x}$  2 pts. = Anomalous morphology  $_{\rm x}$  2 pts. = Impaction (except 3<sup>rd</sup> molars)  $_{\rm x}$  2 pts. = Midline discrepancy (≥3mm) @ 2 pts. =\_ Missing teeth (except 3<sup>rd</sup> molars)  $_{x} 1 pts. =$ \_x 2 pts. = Missing teeth, congenital 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 \_  $_x 2 pts. =$ 

Identify:

Total = 10

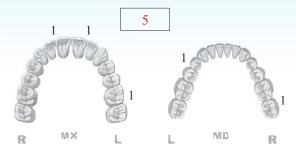
# **Cast-Radiograph Evaluation**

# Case #

#### **Patient**

**Total Score:** 

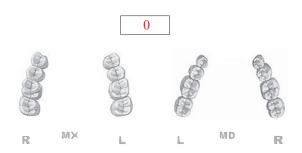
## **Alignment/Rotations**



# **Marginal Ridges**



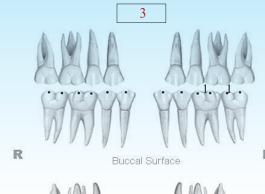
# **Buccolingual Inclination**



## Overjet

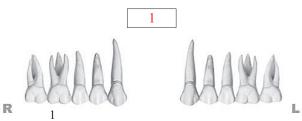


#### **Occlusal Contacts**

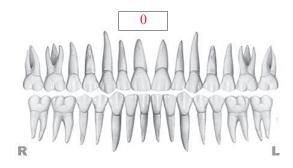




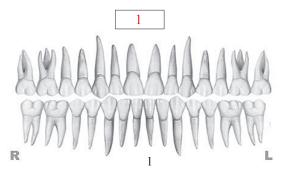
# **Occlusal Relationships**



# **Interproximal Contacts**



## **Root Angulation**



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

# **IBOI Pink & White Esthetic Score**

**Total Score: =** 

# 1. Pink Esthetic Score





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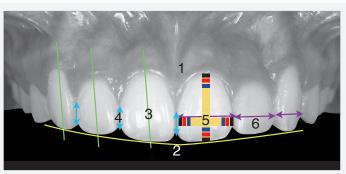
1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity ( Torque )	0	1	2
6. Scar Formation	0	1	2
1. M & D Papilla	(0)	1	2

1. IVI & D Fapilla	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 )





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

Total =

	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