Implant-Orthodontic Combined Treatment for Gummy Smile with Multiple Missing Teeth

Abstract

This case report describes the interdisciplinary treatment of a 29-year-old woman presenting with a chief complaint of excessive gingival display ("gummy smile"). Her acquired, asymmetric right Class II malocclusion was complicated by three missing posterior teeth in the maxillary arch. Orthodontics was indicated to correct smile esthetics, reduce lip protrusion and align the dentition before utilizing prosthetics to improve the occlusal function. Mandibular second premolars were extracted to retract the lower incisors. The maxillary dentition was also retracted as well as intruded with miniscrews to close the missing molar spaces and correct the gummy smile. The maxillary right first premolar space was prepared for an implant-supported crown. A marked improvement in smile esthetics and occlusal function was achieved. (Int J Ortho Implantol 2013;32:16-32)

History and Etiology

The patient's primary concerns were protrusive lips and a gummy smile. A functional exam documented hypermentalis activity when closing the lips, and excessive gingival display upon smiling (*Fig. 1*). Intraoral examination revealed that the missing maxillary teeth (*#3, 5 and 14*) were restored with two fixed partial dentures (*FPDs*): a three unit acrylic prosthesis on the left side and a five-unit metal prosthesis on the right (*Fig. 2*). The casts (*study models*) showed an asymmetric Class II malocclusion on the right side with a mandibular midline discrepancy that was deviated 2 mm to the right (*Fig. 3*). There was no additional contributing medical or dental history. With combined implant and orthodontics treatment, the patient was treated to a pleasing result as documented in Figs. 4-6.

Fig. 1: Pretreatment facial photographs

Fig. 2: Pretreatment intraoral photographs

Fig. 3: Pretreatment study models

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Fig. 4: Posttreatment facial photographs

Fig. 5: Posttreatment intraoral photographs

Fig. 6: Posttreatment study models

Radiographs before and after treatment are shown in Figs. 7 and 8, respectively. Fig. 9 documents the treatment with superimposed cephalometric tracings.

Diagnosis

Skeletal:

1. Retrusive mandible (*SNA 82°, SNB 78°, ANB 4°*)
2. Increased mandibular plane angle (*SN-MP 42°, FMA 36°*)

Dental:

1. Class II molar relationship (*right*), 2mm midline discrepancy with the mandible to the right
2. Multiple teeth missing (*#3, #5, #14*)

Facial:

1. Convex profile with protrusive lips
2. Excessive gingival display when smiling

As shown in the subsequent worksheet, the Discrepancy Index (*DI*) was 25, calculated with a modification of the American Board of Orthodontics DI, which assessed additional treatment complexity related to the gummy smile and compromised implant site.

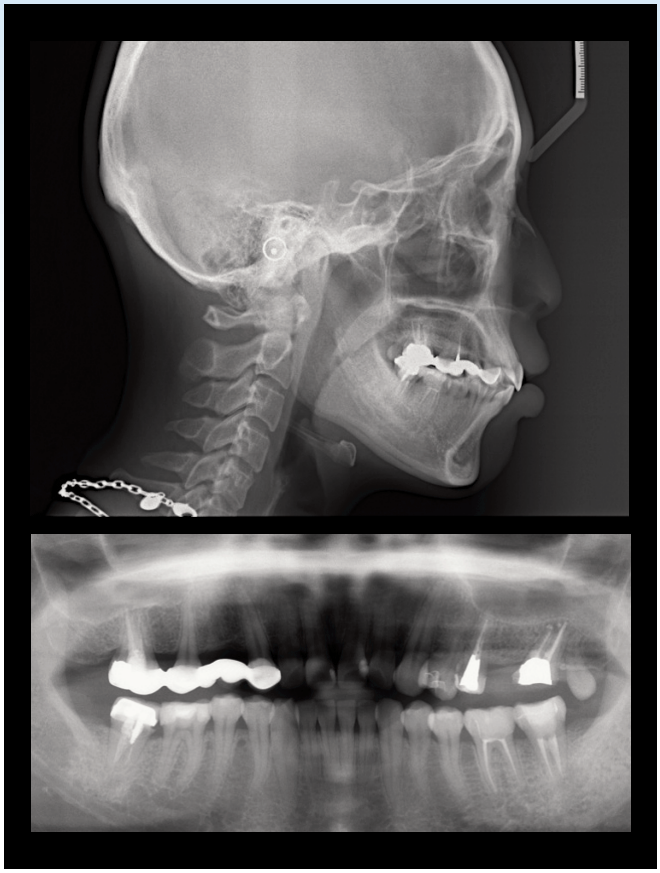


Fig. 7:

Pre-treatment pano and ceph radiographs. The pano film showed that the #3, #5, #14 were missing. The lateral ceph radiograph indicated that there was about 7 mm of upper incisor exposure at rest (from incisor edge of upper central incisor to lower border of upper lip).

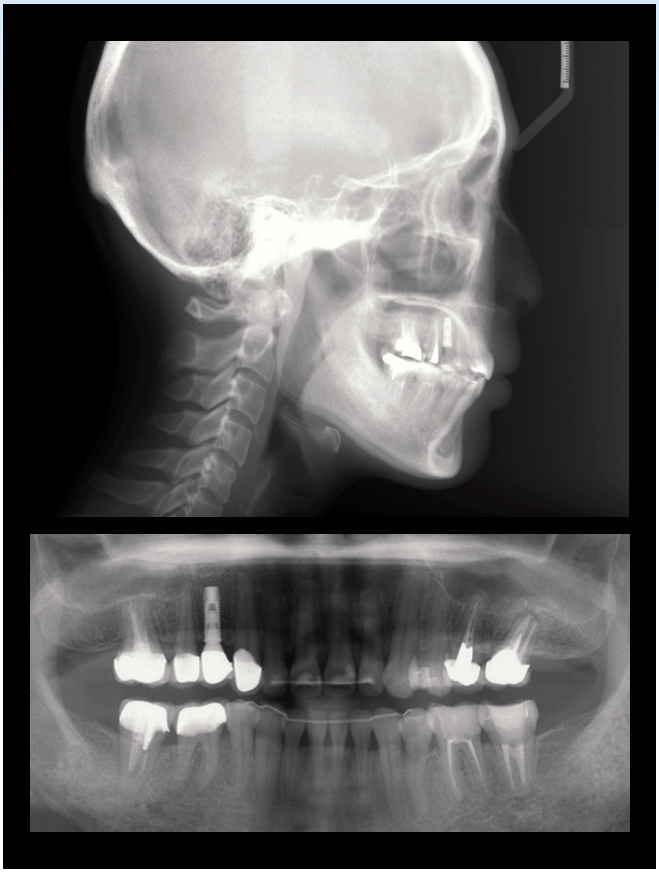


Fig. 8:

Post-treatment pano and ceph radiographs. The pano film showed that the missing maxillary first molar spaces were closed and an implant replaced the missing maxillary right first premolar.

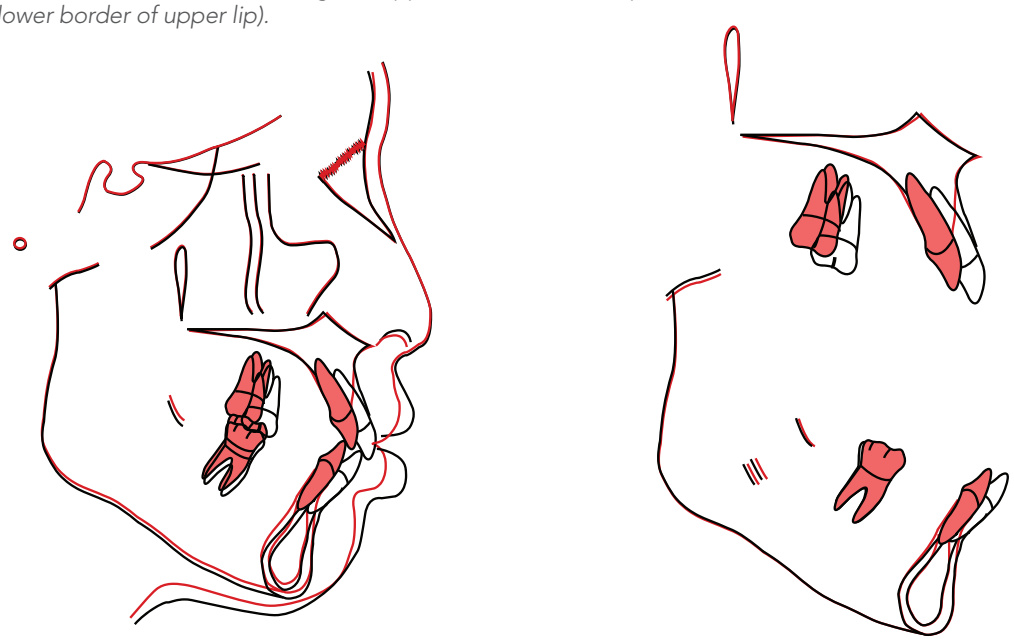


Fig. 9:

Superimposed tracings indicated that the maxillary incisors and molars had been intruded, upper molars had been distalized by miniscrews, both upper and lower central incisors had been retracted, and the profile had been improved.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	82°	81°	1°
SNB°	78°	78°	0°
ANB°	4°	3°	1°
SN-MP°	42°	40°	2°
FMA°	36°	35°	1°
DENTAL ANALYSIS			
U1 TO NA mm	7 mm	2 mm	5 mm
U1 TO SN°	111°	109°	2°
L1 TO NB mm	10 mm	3 mm	7 mm
L1 TO MP°	102°	85°	17°
FACIAL ANALYSIS			
E-LINE UL	2 mm	-1 mm	3 mm
E-LINE LL	5 mm	1 mm	4 mm

Table. 1: Cephalometric summary

Specific Objectives of Treatment

Maxilla (*all three planes*):

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

Mandible (*all three planes*):

- A - P: Maintain
- Vertical: Decrease the vertical dimension of occlusion (*VDO*)
- Transverse: Maintain

Maxillary Dentition

- A - P: Retract the maxillary anterior segment and close molar spaces
- Vertical: Intrude the entire maxillary dentition
- Inter-molar Width: Maintain

Mandibular Dentition

- A - P: Retract the mandibular incisors
- Vertical: Maintain
- Inter-molar / Inter-canine Width: Maintain

Facial Esthetics: Retract protrusive lips

Treatment Plan

Extract the bilateral mandibular second premolars, remove both maxillary FPDs, and fabricate temporary crowns for the abutment teeth. Retain a space of about 7.5 mm between the maxillary right canine and second premolar for an implant supported crown; close all other spaces. Retract and intrude the maxillary anterior segment by utilizing miniscrews in the right and left infrazygomatic crests for anchorage. Lever arms from the miniscrews were used to apply intrusive force to the anterior maxillary dentition to help correct the gummy smile. At the completion of active treatment, remove the fixed appliances, bond fixed retainers on the anterior segments of both arches, and fabricate a clear overlay retainer for the upper arch.

Appliances and Treatment Progress

Before bracket bonding, the mandibular second premolars were extracted. The maxillary FPDs were removed and temporary crowns were constructed for the abutments (*Fig. 10*). Subsequently, .022" Damon D3MX brackets (*Ormco Corporation, Glendora, CA*) were selected. The wire sequence in both arches was: .014 NiTi, .016 NiTi, .014x.025 NiTi, .017x.025 TMA, .019x.025 SS. After the .019x.025 SS archwires were inserted in both arches, closed coil springs were applied to close all space except for the maxillary right first premolar implant site.

Nineteen months into active treatment, a 2x12 mm OrthoBoneScrew (*Newton's A, Inc., Taiwan*) was placed in each infrazygomatic crest for posterior maxillary anchorage. Bilateral intrusion lever arms, fabricated from sections of .017x.025 TMA wire, were inserted into the auxiliary slots of the miniscrews for anchorage, and the active arm was hooked on the main archwire between the maxillary canine and lateral incisor (*Fig. 11*). Two anterior bite turbos were bonded on the palatal surface of the maxillary central incisors and Class II elastics (*3.5oz*) were used (*Figs. 11-12*). Fifteen months after the intrusion lever arms were applied, there was no significant intrusive effect on the maxillary anterior teeth, probably because of the extrusive component of the Class II elastics was negating the intrusive force of the lever arms. To enhance the intrusive force on the incisors, two additional miniscrews 1.5x8 mm OrthoBoneScrews were placed apically between the maxillary central and lateral incisor's roots. Intrusive elastic chains were tied from the miniscrews to the main archwire, which generated 60 gm per side (*Fig. 13*). This latter mechanism provided a direct line of intrusive force to the incisors to supplement the intrusive force on the maxillary anterior segment due to the posterior lever arms (*Fig. 14*).

In the 49th month of treatment, a computed tomography (*CT*) image was taken in preparation for implant placement in the maxillary right first premolar area, and a 4x11.5 mm (*wide diameter*) fixture was chosen. Full thickness flaps were reflected on the labial and lingual surfaces. The buccal flap was sutured to the cheek and the palatal flap was retracted with sutures to obtain a clear

Fig. 10:

Temporary crowns were fabricated for maxillary right canine, second premolar, second molar and maxillary left second premolar and molar.

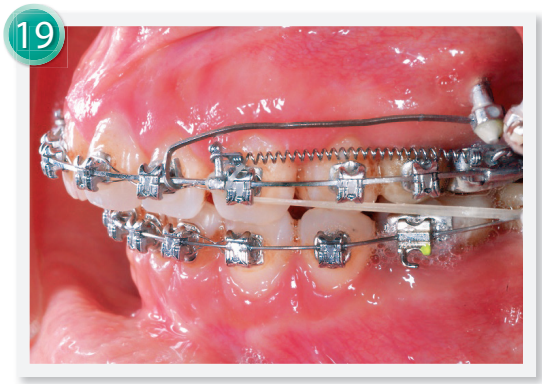


Fig. 11:

Intrusion lever arms made with .017x.025 TMA were inserted into the miniscrew head holes.

Fig. 12:

The anterior bite turbos were bonded on the palatal side of maxillary central incisors. Class II elastics were used (3.5 oz).

Fig. 13:

Two miniscews were placed between maxillary central and lateral incisors as anchorage to intrude anterior teeth.

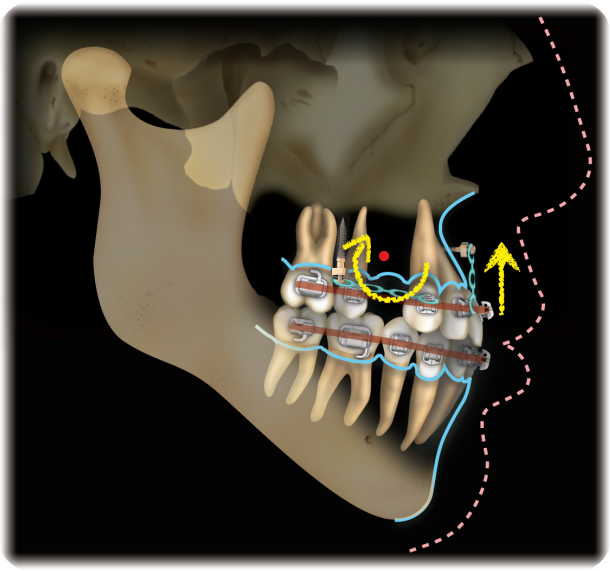


Fig. 14:

Retracting the whole maxillary dentition with bony anchorage in the infrazygomatic crests would extrude the maxillary incisors and tip the molars back. Intruding the maxillary incisors with bony anchorage between the central and lateral incisors will counteract the extruding force. In this way, the whole maxillary dentition can be retracted and intruded by these anterior and posterior miniscrews.

surgical view. A surgical stent was used to achieve optimal positioning of the fixture. After the implant was placed and the cover screw was secured, GEM 21S (*Growth-factor Enhanced Matrix, Osteohealth*) was placed into the defect on the mesial side of the first premolar area, and a surgical membrane was used to cover it (*Fig. 15*). The flap was sutured with direct loop interrupted 5-0 nylon.

Two months after the implant surgery, all orthodontic appliances were removed and retainers were delivered. Seven months after the fixture had been placed, an incision was made to expose the cover screw and a healing abutment was secured to the fixture. One week later, the abutment (*EZ Post, EZ Plus™, Megagen, UK*) was used to replace the healing abutment (*Fig. 16*). A snap impression, with a coping and post level analog, were used to transfer the level of the abutment. In the laboratory, occlusal reduction of the analog for the crown fabrication was performed. A mock-up was made for an index of the abutment. After trimming the abutment, the metal coping was tried-in and the tightness of the contact area and marginal integrity were checked. The permanent crown was luted with temporary cement (*Fig. 17*).

Retention

Fixed retainers were bonded from 2-2 in the maxillary arch and 3-3 in the mandibular arch. An upper clear overlay retainer was delivered. The patient was instructed to wear it full time for the first 6 months and nights only thereafter. Instructions

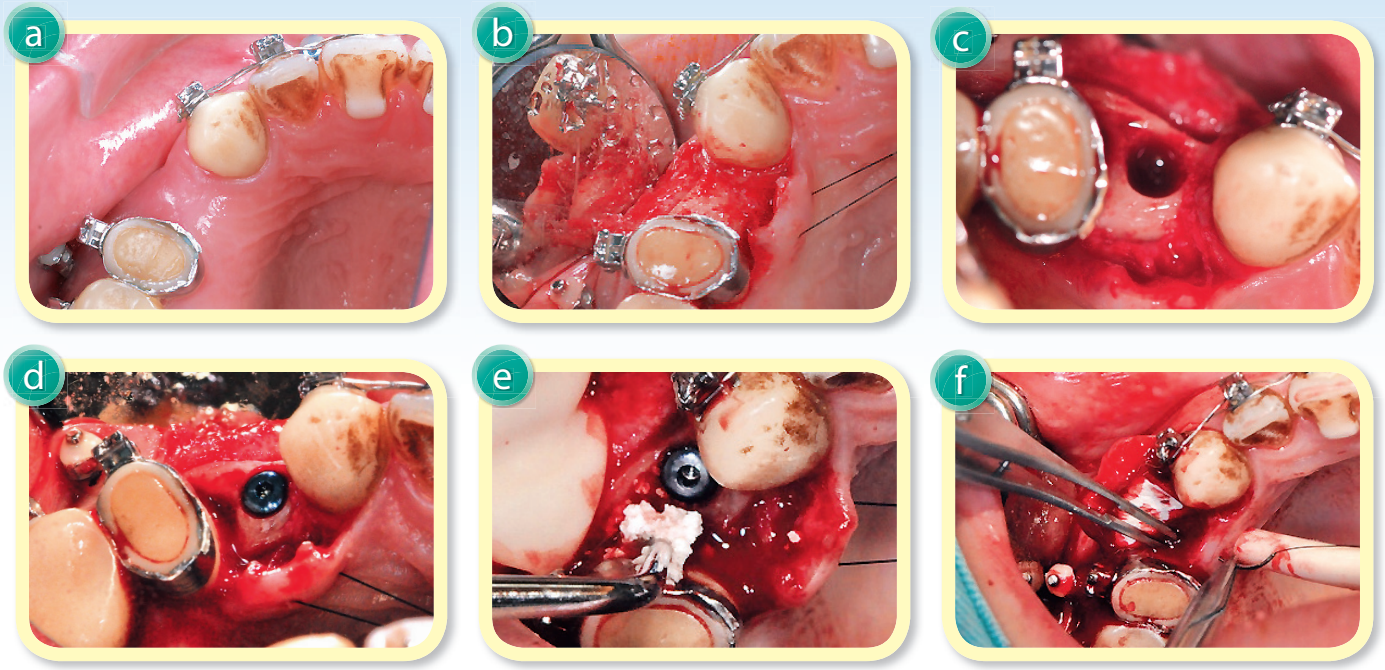


Fig. 15:

Surgical procedure. a,b,Open the flap. c,d, Drill the bone and place the fixture. e,f, Fill the mesial bony defect with GEM 21S and suture with a membrane.

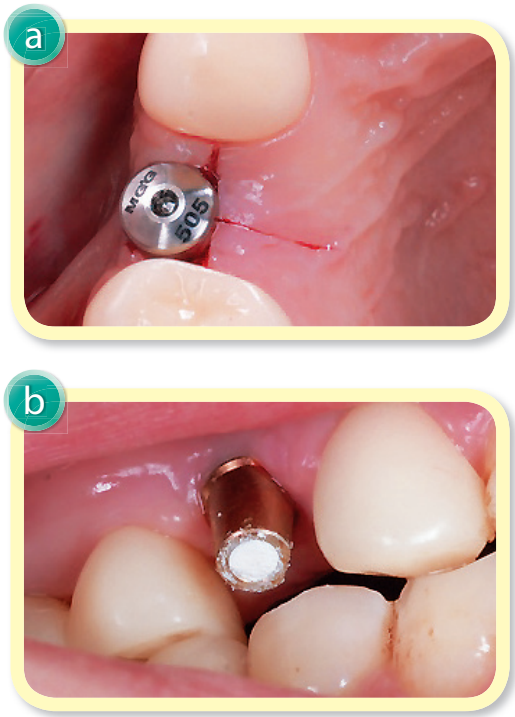


Fig. 16:

a, A healing abutment was screwed into the fixture two months after the surgery.

b, One week later, the abutment replaced the healing abutment.

were provided for home care and maintenance of the retainers.

Final Evaluation of Treatment

First, the ABO Cast-Radiograph Evaluation score was 15 points, which reflected the optimal occlusion of the asymmetric buccal segments. The major discrepancies were overjet and occlusal relationship. Because both maxillary first molars were missing, the optimal treatment plan was deemed to be extraction of the mandibular second premolars. This extraction pattern minimized the prosthetic needs but it resulted in an atypical, although stable, occlusal relationship (*Fig. 18*). The use of the ABO Cast-Radiograph Evaluation is challenging under these circumstances. The occlusal relationships of the canines and the adjacent premolars were scored, but the relative positions of the maxillary second premolars and second molars were considered

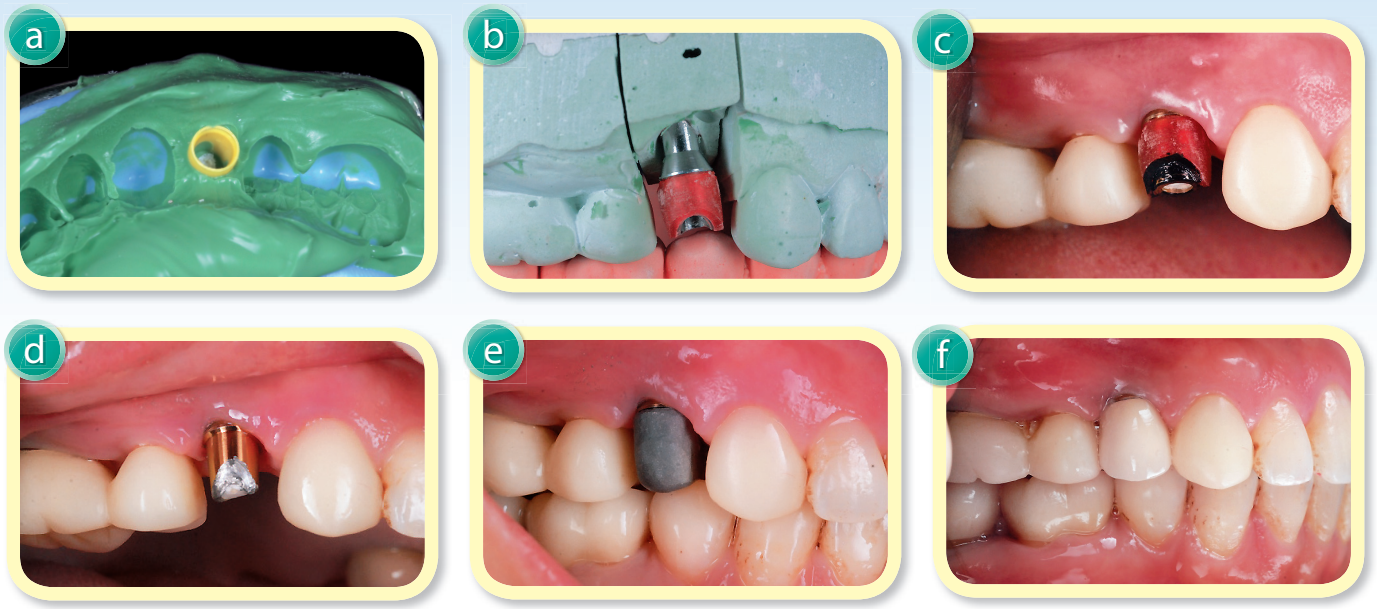


Fig. 17:
Prosthesis fabrication. a, The snap impression coping. b, Occlusal reduction of the post level analog and a mock up. c, d, Use the mock up as an index to trim the analog. e, Metal coping try-in. f, The permanent crown was luted with temporary cement.

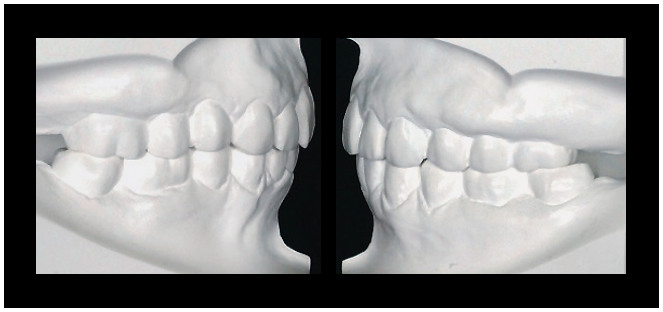


Fig. 18:
The occlusal relationship of both sides were not optimal because of asymmetric extraction.

optimal so they were not scored.

Second, the IBOI Pink & White Esthetic score was 2 points. The interdental papilla between maxillary central incisors did not fully occupy the embrasure. Moreover, the level of gingival margin between the right side and the left side was uneven.

Third, the IBOI Implant-Abutment Transition & Position Analysis score was 7 points. The fixture was placed mesially and buccally about 2 mm below the future crown margin. This resulted in insufficient gingival contour and height of the abutment was insufficient.

Overall, the maxillary dentition was intruded and the anterior teeth were retracted (*Fig. 9*). The gummy smile and the protrusive lips were significantly improved (*Fig. 4*) and the edentulous area was restored with an implant. The patient was quite satisfied with the result.

Discussion

Excessive gingival display when smiling, is commonly refereed to as "*gummy smile, high lip line, or high smile line,*" and it is usually an esthetic deficit.[1] The prevalence of excessive gingival display affects ~10% of population between the age of 20 and 30, but it is more prevalent in women than in men.[2] When gingival exposure while smiling reaches more than 4 mm, most dentists and lay people consider

the smile to be unesthetic.[3] However, orthodontists tend to be most critical; gingival exposure more than 2 mm during a full smile is considered to be unharmonious.

Many etiological factors, alone or in combination, may be involved in a gummy smile: gingival hypertrophy (*overgrowth*), anterior dentoalveolar protrusion, vertical maxillary excess (*inferiorly positioned maxilla*), and hyperactivity of upper lip elevator muscles.[4] To diminish the gingival display when smiling, there are many treatment options depending on the differential diagnosis of the problem. Thus, a thorough examination and careful diagnosis is essential before treatment. Several studies[4-6] have evaluated the etiology of excessive gingival display:

1. Gingival overgrowth: Enlarged gingival tissues may be due to infection or medication (*e.g. phenytoin, cyclosporine, calcium channel blockers*). The treatment for this condition should focus on oral hygiene, but a gingivectomy may be necessary in some cases. Another condition of gingival overgrowth is altered passive eruption, where the gingival margins fail to recede apically to the level of cementoenamel junction (*CEJ*). Before treatment, probing the thickness of the soft tissue to the bone level will determine the amount of excess soft tissue and whether bone resection is needed.

2. Anterior dentoalveolar extrusion: This condition may be associated with anterior tooth wear or a deep bite. The latter is usually associated with an occlusal disharmony between anterior and posterior segments. The treatment of this condition may include orthodontic intrusion of the anterior teeth and/or periodontal surgery, with or without restorative therapy.

3. Vertical maxillary excess: These patients typically have increased lower facial height, and the occlusal plane between the anterior and posterior segments is harmonious, but it is inferiorly positioned. The problem is of skeletal origin rather than an over-eruption of the maxillary anterior teeth. Due to the inferiorly positioned occlusal plane, the lower lip covers the incisal edges of the maxillary canines and premolars. According to Garber and Salama,[1] the treatment of vertical maxillary excess, with an unesthetic soft tissue display, is classified into three degrees with corresponding treatment modalities. Their approach is summarized in Table 2.

4. Hyperactivity of the upper lip elevator muscles: A normal (*non-hyperactive*) upper lip moves approximately 6-8 mm from a resting position to a broad smile position. Hyperactive upper lips move a distance that is 1.5 to 2 times greater. A lip repositioning procedure[7] or an injection of botulinum toxin-A to the lip elevator muscles[8] is advocated. Another etiology related to excessive gingival exposure is a short upper lip (*decreased length*). However, upper lip length for most gummy smile patients is normal even if the lip looks short, clinically. Thus, the underlying etiology is usually hyperactivity of the upper lip elevator muscles.

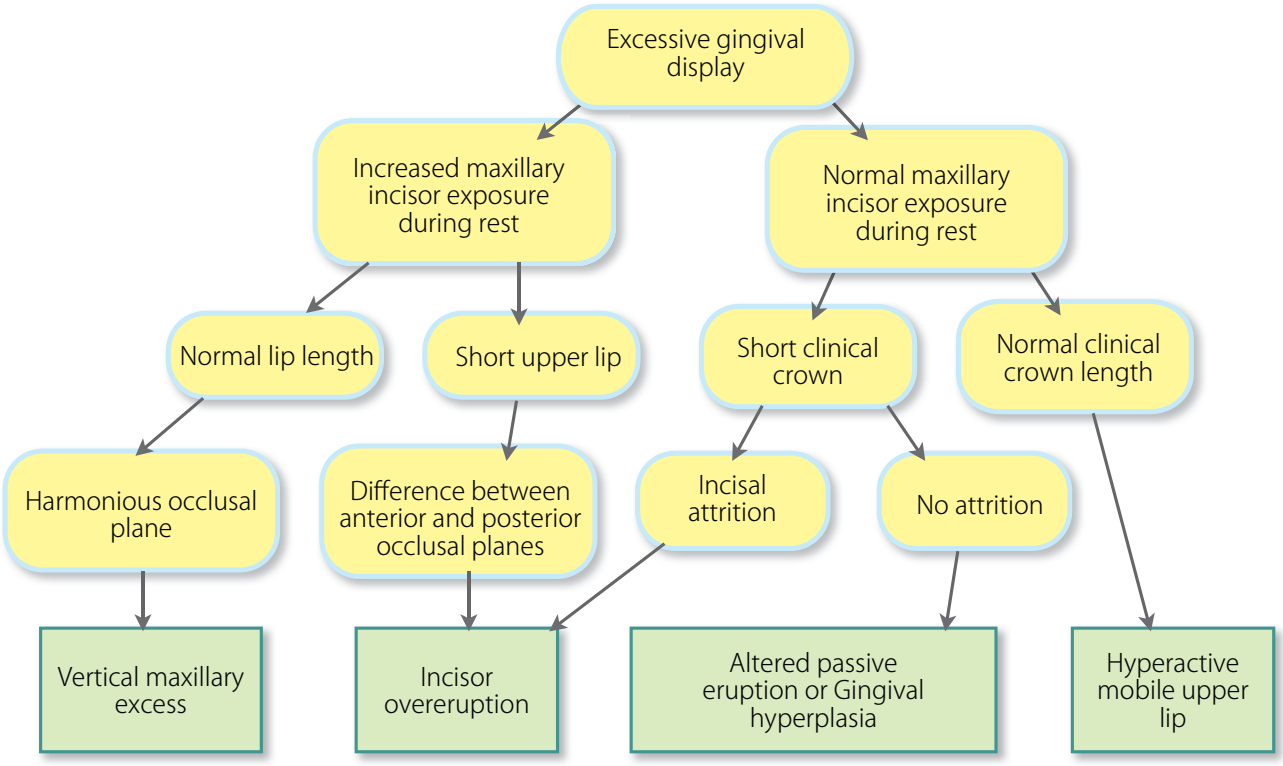
The gummy smile phenotype may have a multifactorial etiology, so it may be difficult to diagnose and treat. A flow chart is helpful for determining the etiology and selecting the appropriate treatment plan (*Fig. 19*).[4-5]

At rest the present patient had a 6 mm maxillary

Degree	Gingival and mucosal display(mm)	Treatment modalities
I	2~4	Orthodontic intrusion Orthodontics and periodontics Periodontal and restorative therapy osteotomy)
II	4~8	Periodontal and restorative therapy Orthognathic surgery(Le Fort I osteotomy)
III	>8	Orthognathic surgery with or without adjunctive periodontal and restorative therapy

* The degree of severity is predicated after treating the altered passive eruption.

■ Table 2. The degree of gingival and mucosal display and the relative treatment modalities.[1]



- Normal maxillary incisor exposure during rest: 3~4 mm in young women, 2 mm in young men
- Normal lip length: 20~24 mm
- Normal crown length of maxillary central incisor : 10.5 mm

■ Fig. 19: A flow chart can help to determine the etiology of excessive gingival display.[4-5]

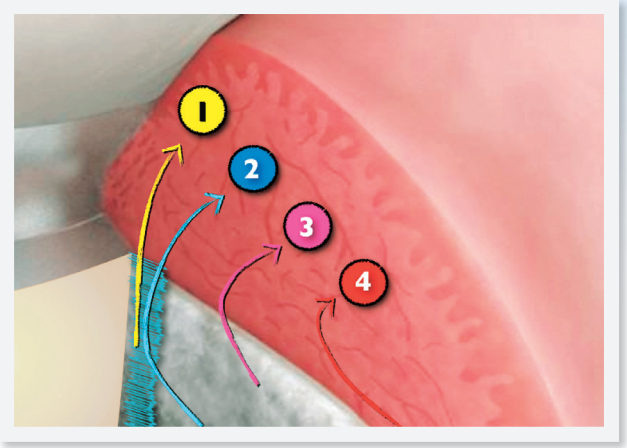


Fig. 20:

Because there is no periodontal ligament over implants, the blood supply routes of the marginal gingiva are only via cortical bone (3) and apical mucosa (4).[12] *Grunder*[11] *found that 2mm of buccal bone thickness could prevent gingiva recession.*

central incisor exposure, i. e. the distance from the incisal edge to the inferior border of the upper lip (*Fig. 7*). Lip length, occlusal plane and overbite were within normal limits (*WNL*). The clinical crowns of the maxillary incisors were short, but no attrition was evident. According to the flow chart (*Fig. 19*), the present morphological pattern fit the vertical maxillary excess group because altered passive eruption was also noted. The treatment plan was orthodontic intrusion of the maxillary anterior teeth followed by gingivectomy to resolve the gummy smile. As previously described, 15 months of intrusive force, delivered by lever arms anchored with posterior miniscrews, failed to achieve adequate intrusion of the anterior segment. Then two additional miniscrews were placed between the maxillary central and lateral incisors to provide supplemental force for incisor intrusion.[9]

Light forces, 60 gm per side (*20 gm per tooth*),[10] were applied. Thus, the primary anchorage units for incisor intrusion were the anterior miniscrews, while the infrazygomatic bone screws were used to retract the anterior segment and intrude the molars.

When multiple teeth are missing, orthodontic alignment and space closure is usually necessary to achieve optimal results. As shown in Fig. 15a, the right maxillary first premolar space was prepared for implant placement. During implant placement, the osteotomy bur was inadvertently shifted to the buccal, resulting in a buccal plate of bone that was only 1 mm thick. Thus, the straight post on the abutment required occlusal reduction before crown fabrication (*Fig.17d*). Another apparent ramification of the thin buccal plate of bone was gingival recession (*Fig. 17f*). This undesirable clinical result is consistent with a report by Grunder, Gracis and Capelli[11] who demonstrated that gingival recession occurs if the buccal bone thickness is less than 2 mm. When there is an insufficient buccal plate after implant placement, bone augmentation is required to produce an adequate bone mass to provide vascular support for the overlying gingiva (*Fig. 20*).[12] For the present patient, the implant position should have been placed more lingual, and positioned 3 mm apical to the future gingival margin of the prosthesis, to provide for an adequate biologic width (*Fig. 21*). Building on these concepts of periodontal biology, Chang[12] proposed the 2B-3D rule as a guide to achieve more consistent esthetics and stability.

GEM 21S (*Growth-factor Enhanced Matrix, Osteohealth, Shirley, NY*) is a synthetic bone graft material, composed of recombinant human platelet-derived growth factor-BB (*rhPDGF-BB*) and beta-tricalcium (*ß-TCP*).[13] PDGF is a natural growth factor that has been synthesized for bone grafting

purposes in periodontics. PDGF promotes the regeneration of bone, ligament, and cementum in animals and humans.[14] ß-TCP is a purified, porous osteoconductive scaffold that provides a framework for bone ingrowth. A multi-center, randomized and blinded clinical trial in humans demonstrated the effectiveness of rhPDGF-BB in combination with a porous ß-TCP for the treatment of periodontal osseous defects.[15] With respect to present case report, GEM 21S was used to successfully fill a mesial bony defect near the maxillary right second premolar (*Fig. 22*).

Conclusion

The smile plays an important role in facial esthetics, particularly for the first impression. Gummy smile was the major esthetic concern for the present patient

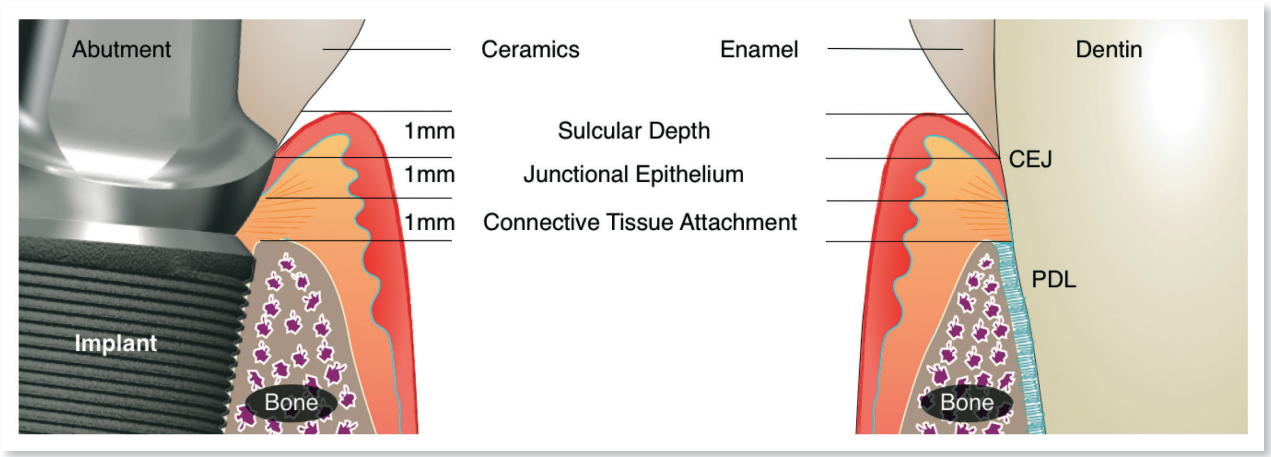


Fig. 21:

A comparison of biologic width between an implant and a nature tooth. Based on the rule, the fixture should be placed 3 mm apical to the gingival margin of the future prosthesis to gain the ideal emergence profile, esthetics, and biologic width.[12]

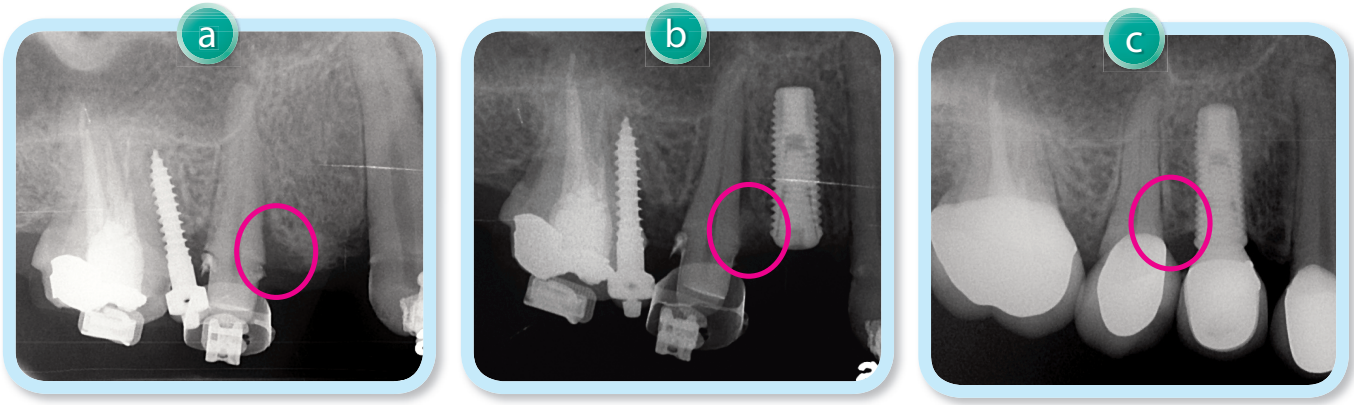


Fig. 22:

a, There was a mesial bony defect over the maxillary right second premolar. b, The GEM 21S completely filling the defect during the surgery. c, Two years after the surgery, a significant increase in bone fill was noted.

Fig. 23: Pre- and post-treatment images of the patient's smile. The gummy smile has been improved remarkably.

to seek dental treatment. Careful examination and an appropriate diagnosis are essential for achieving an optimal result. Miniscrews are useful anchorage devices for intruding maxillary anterior teeth to resolve the problem of excessive gingival exposure when smiling (*Fig. 23*). A malocclusion with multiple missing teeth required orthodontics for optimal alignment before restoration of a missing maxillary premolar with an implant-supported crown. Combined orthodontic and implant therapy is an excellent, cost effective option for comprehensive care of acquired malocclusions.

References

1. Garber DA, Salama MA. The aesthetic smile: diagnosis and treatment. Periodontol 2000;1996:18-28.
2. Tjan AH, Miller GD, The JG. Some esthetic factors in a smile. J Prosthet Dent 1984;51:24-28.
3. Kokich VO Jr, Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. J Esthet Dent. 1999;11(6):311-24.
4. Silberberg N, Goldstein M, Smidt A. Excessive gingival display-etiology, diagnosis, and treatment modalities. Quintessence Int 2009;40:809-18.
5. Seixas MR, Costa-Pinto RA, Araujo TM. Checklist of esthetic features to consider in diagnosing and treating excessive gingival display (gummy smile). Dental Press J Orthod 2011May-Apr;16(2): 131-57.
6. Miron H, Calderon S, Allon D. Upper lip changes and gingival exposure on smiling: Vertical dimension analysis. Am J Orthod Dentofacial Orthop 2012;141:87-93.
7. Rosenblatt A, Simon Z. Lip repositioning for reduction of excessive gingival display: a clinical report. Int J Periodontics Restorative Dent 2006;26:433-7.
8. Polo M. Botulinum toxin type A (Botox) for the neuromuscular correction of excessive gingival display on smiling (gummy smile). Am J Orthod Dentofacial Orthop 2008;133:195-203.
9. Ohnishi H, Yagi T, Yasuda Y, Takada K. A mini-implant for orthodontic anchorage in a deep overbite case. Angle Orthod 2005;75:444-452.
10. Burstone CR. Deep overbite correction by intrusion. Am J Orthod 1977;72:1-22.
11. Grunder U, Gracis S, Capelli M. Influence of the 3-D Bone-to-Implant Relationship on Esthetics. Int J Periodontics Restorative Dent 2005;25:113-119.
12. Chang CH. The 2B-3D rule for implant planning, placement and restoration. Int J Ortho Implantol 2012;27:96-101.
13. Lynch SE, Lynch LW, Nevins M, Nevins ML. A new era in periodontal and peri-implant regeneration: use of growth-factor enhanced matrices incorporating rhPDGF. Parkell Online Learning Center 2011 Nov-Dec. Available from: http://parkell.cdeworld.com/
14. Nevins M, Camelo M, Nevins ML, et al. Periodontal regeneration in humans using recombinant human platelet-derived growth factor-BB (rhPDGF-BB) and allogenic bone. J Periodontol 2003;74:1282-1292.
15. Nevins M, Giannobile WV, McGuire MK, et al. Platelet-derived growth factor stimulates bone fill and rate of attachment level gain: results of a large multicenter randomized controlled trial. J Periodontol 2005;76:2205-2215.
16. Su B, Chang CH, Roberts WE. Implant-orthodontic Combined Treatment: Over-erupted Molar and Scissors-bite Correction. Int J Ortho Implantol 2012;26:36-53.
17. Chang CH. Advanced Damon Course No. 4,5 : DI & CRE Workshop (1)(2)., Podcast Encyclopedia in Orthodontics 2011, Newton's A Ltd, Taiwan.
18. Chang CH, Roberts WE. Orthodontics [E-reader version]. Hsinchu: Newton's A; 2012.

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 = 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 side 2 pts.
Full Class II or III = 4 pts. per side ____ pts.
Beyond Class II or III = 1 pt. per mm. additional ____ pts.

Total = 2

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

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

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

SN-MP
≥ 38° = 2 pts.
Each degree > 38° 4 x 2 pts. = 8

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

1 to MP ≥ 99° = 1 pt.
Each degree > 99° 3 x 1 pt. = 3

Total = 14

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

Identify: 6 mm of excessive gingival display

Total = 7

IMPLANT SITE

Lip line : Low (0 pt), Medium (1 pt), High (2 pts) = _____
Gingival biotype : Low-scalloped, thick (0 pt), Medium-scalloped, medium-thick (1 pt), High-scalloped, thin (2 pts) = 1
Shape of tooth crowns : Rectangular (0 pt), Triangular (2 pts) = _____
Bone level at adjacent teeth : ≤ 5 mm to contact point (0 pt), 5.5 to 6.5 mm to contact point (1 pt), ≥ 7mm to contact point (2 pts) = _____
Bone anatomy of alveolar crest : H&V sufficient (0 pt), Deficient H, allow simultaneous augment (1 pt), Deficient H, require prior grafting (2 pts), Deficient V or Both H&V (3 pts) = 1
Soft tissue anatomy : Intact (0 pt), Defective (2 pts) = _____
Infection at implant site : None (0 pt), Chronic (1 pt), Acute(2 pts) = _____

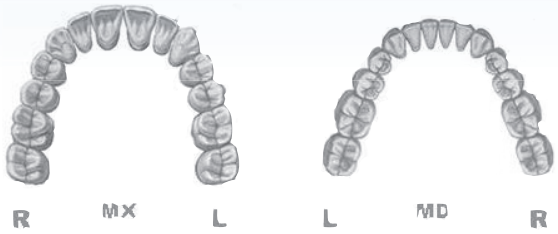
Total = 2

Cast-Radiograph Evaluation

Total Score: 15

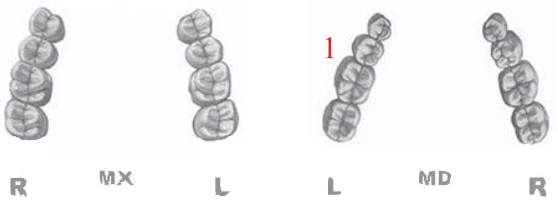
Alignment/Rotations

0



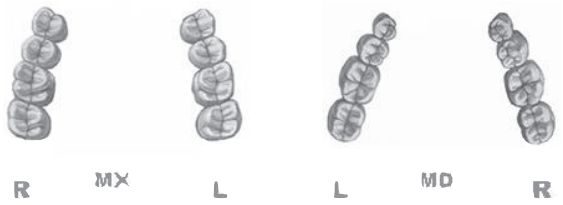
Marginal Ridges

1



Buccolingual Inclination

0

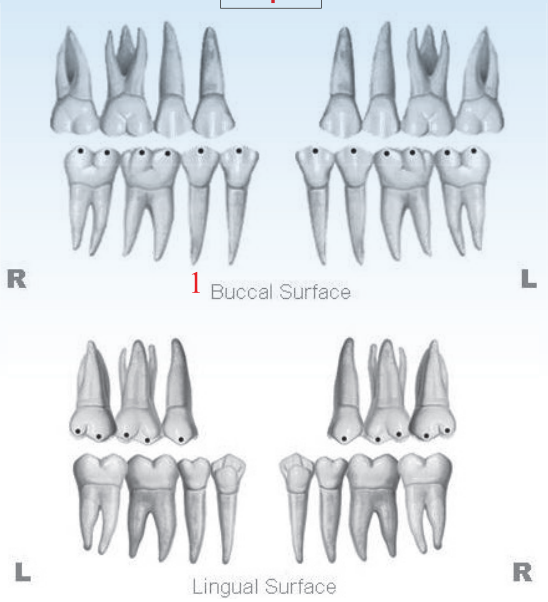


Overjet

6

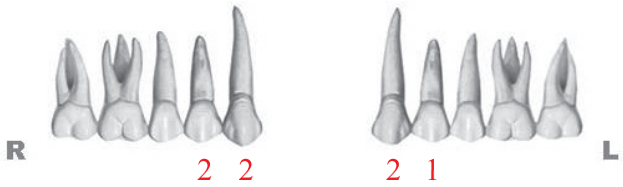
Occlusal Contacts

1



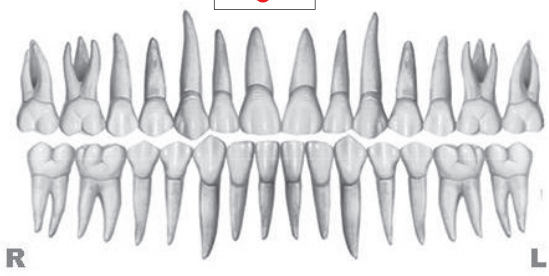
Occlusal Relationships

7



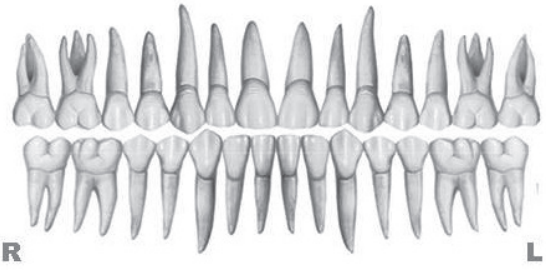
Interproximal Contacts

0



Root Angulation

0



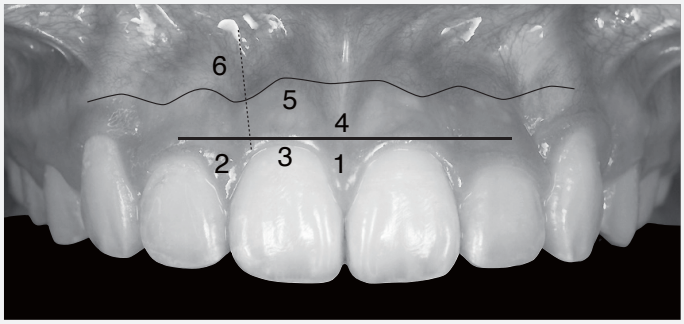
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

Total Score: = 2

1. Pink Esthetic Score

Total = 2

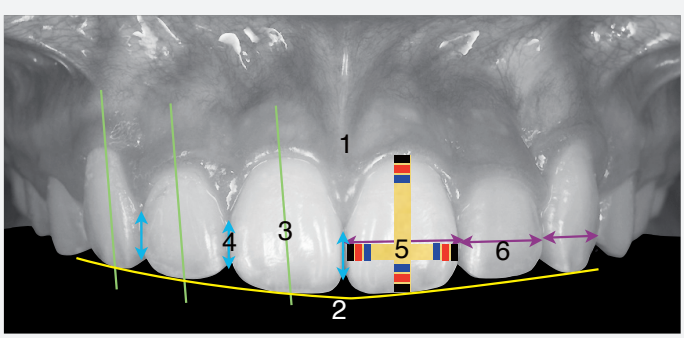


1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2

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 = 0



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

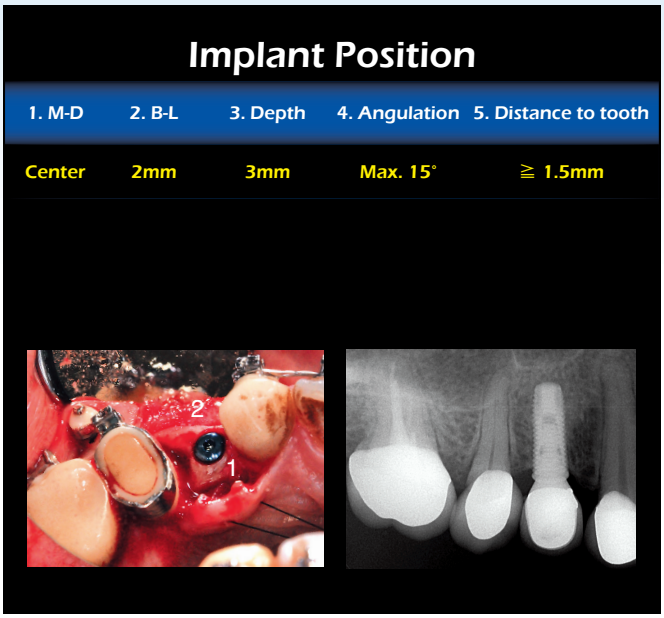
1. Midline	**0**	1	2
2. Incisor Curve	**0**	1	2
3. Axial Inclination (5° , 8° , 10°)	**0**	1	2
4. Contact Area (50%, 40%, 30%)	**0**	1	2
5. Tooth Proportion	**0**	1	2
6. Tooth to Tooth Proportion	**0**	1	2

IBOI Implant-Abutment Transition & Position Analysis

Total Score: = 7

1. Implant Position

Total = 3

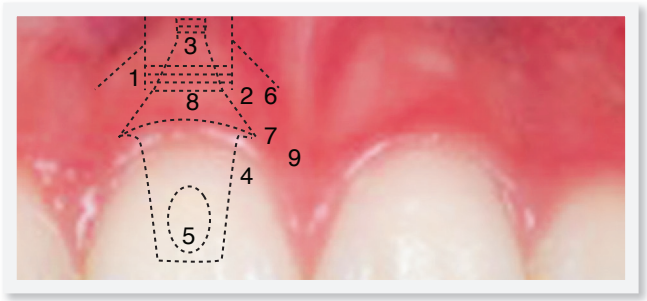


1. M & D (Center)	0	1	2
2. B & L (Buccal 2 mm)	0	1	2
3. Depth (3 mm)	0	1	2
4. Angulation (Max. 15°)	0	1	2
5. Distance to Adjacent Anatomy	0	1	2

1. M & D (Center)	0	(1)	2
2. B & L (Buccal 2 mm)	0	(1)	2
3. Depth (3 mm)	0	(1)	2
4. Angulation (Max. 15°)	(0)	1	2
5. Distance to Adjacent Anatomy	(0)	1	2

2. Abutment transition Contour

Total = 4



E : external connection,
I : internal connection,
S : screw type,
C : cement type,
P : palatal/central,
B : buccal

1. Fixture Cervical Design	N	Y
2. Platform Switch	N	Y
3. I-A Connection Type	E	I
4. Abutment Selection	S	C
5. Screw Hole Position	P	B
6. Marginal Bone Loss	N Y	0 1 2
7. Modified Gingival Contour	N Y	0 1 2
8. Gingival Height	N Y	0 1 2
9. Crown margin fitness	N Y	0 1 2

1. Fixture Cervical Design	(N)	Y
2. Platform Switch	N	(Y)
3. I-A Connection Type	E	(I)
4. Abutment Selection	S	(C)
5. Screw Hole Position	P	(B)
6. Marginal Bone Loss	N Y	0 (1) 2
7. Modified Gingival Contour	N Y	0 (1) 2
8. Gingival Height	N Y	0 1 (2)
9. Crown margin fitness	N Y	(0) 1 2