

Oligodontia and Class II Malocclusion Treated with Orthodontics, Bone Augmentation, and an Implant-Supported Prosthesis

Summary

A 29 year female presented with a partially edentulous, compensated Class II malocclusion. There were twelve missing permanent teeth including two third molars; nine were congenitally missing. Cephalometrics revealed an underlying Class II skeletal pattern: facial convexity 15°, ANB angle 4° and lower incisor to mandibular plane angle of 106°. The lack of molar antagonists on the right side resulted in an unstable occlusion that was associated with a large mandibular edentulous space (area teeth #29-31) as well as extruded upper and lower molars (teeth #3 and 32). Diagnostically, this acquired malocclusion had an ABO Discrepancy Index (DI) of 18, with 3 additional points added for an unfavorable implant site, resulting in an overall interdisciplinary DI of 21 points. The patient preferred no extractions, orthodontics only in the upper arch, and decided against replacing an unesthetic maxillary anterior fixed prosthesis. Interdisciplinary care involved space closure in the left quadrant and arch alignment. The maxillary right 1st molar was intruded with buccal and lingual temporary anchorage devices, augmented with a temporary implant-supported prosthesis. The lower right atrophic edentulous ridge was split and spread to receive two implants to restore teeth #29 and 30 with an implant-supported prosthesis. Despite the limitations on treatment options, an optimal occlusion was achieved, as evidenced by a Cast-Radiograph Evaluation (CRE) = 26. The atrophic lower right implant site was successfully restored as evidenced by a 5 point score on the Implant-Abutment Transition and Position Analysis. The Pink & White dental esthetics were not scored because there were no changes in the esthetic zone. (*Int J Ortho Implantol* 2014;36:52-69)

Key words:

oligodontia, self-ligating bracket, bone splitting and spreading, implant-supported prostheses

History and Etiology

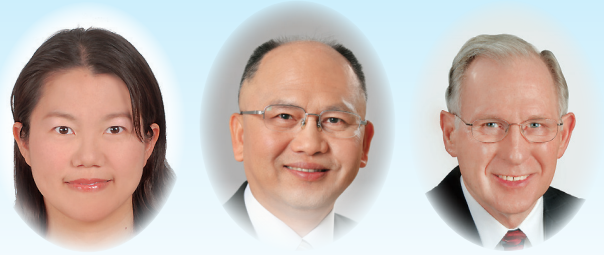
A 29-year old woman presented with a chief complaint of chewing problems due to multiple missing teeth (Figs. 1-3). Despite malocclusion complexity, Discrepancy Index (DI) =18 and significant limitations imposed on the scope of treatment, the final result was good (Figs. 4-8), as evidenced by a CRE of 26 points. Cephalometric documentation of the treatment is presented in Fig. 9.

There were a number of important diagnostic considerations for the successful management of this severe problem. Pre-treatment photographs (Figs. 1-2) revealed a symmetrical face, relatively convex profile, and a nasolabial angle that was within normal limits (WNL). An unesthetic fixed prosthesis restored the missing right lateral incisor. The medical history was noncontributory. Dental history and radiographic evaluation (Fig. 7) was consistent with a congenital oligodontia because nine permanent teeth (excluding third molars) were

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■ Fig. 1: Pre-treatment facial photographs



■ Fig. 4: Post-treatment facial photographs



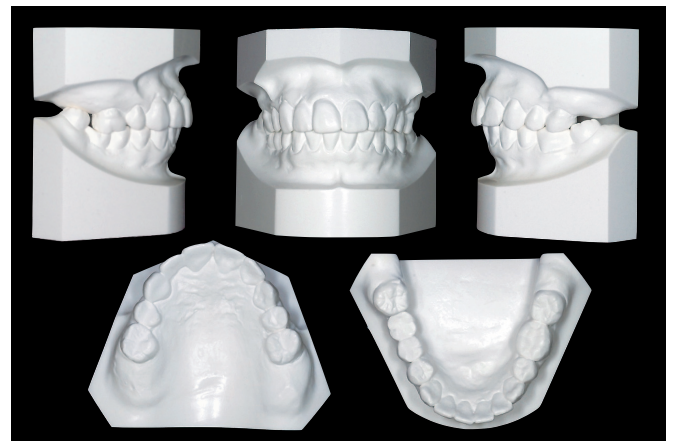
■ Fig. 2:
Pre-treatment intraoral photographs reveal extrusion of the upper right first (#3) and lower right (#31) third molars, and edentulous spaces in upper left and lower right quadrants.



■ Fig. 5:
Post-treatment intraoral photographs document the final alignment and stabilization of the occlusion with an implant-supported prostheses in the lower right posterior quadrant.



■ Fig. 3: Pre-treatment study models (casts)



■ Fig. 6: Post-treatment study models (Casts)

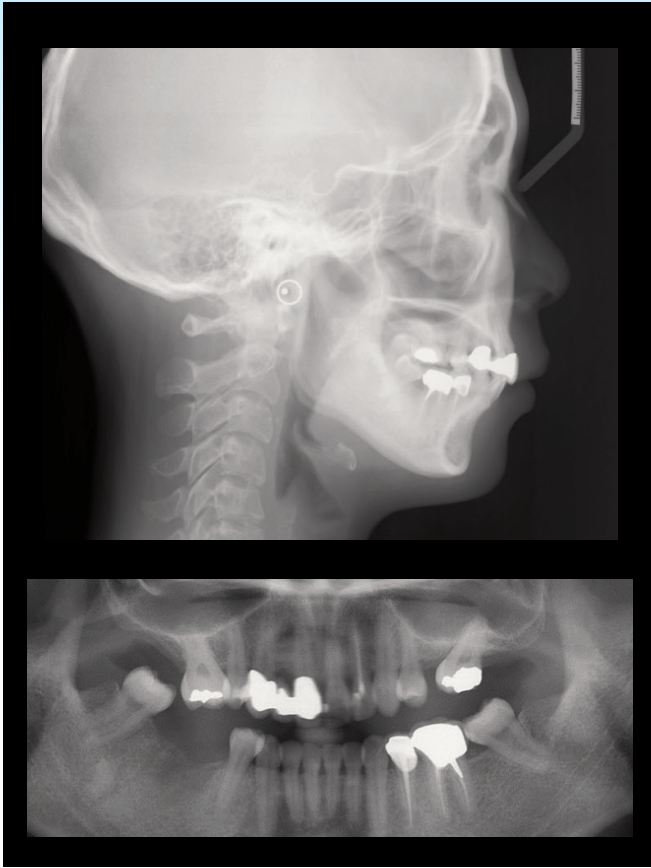


Fig. 7: Pre-treatment panoramic and cephalometric radiographs document the unstable occlusion, due to edentulous spaces and extrusion of unopposed molars.

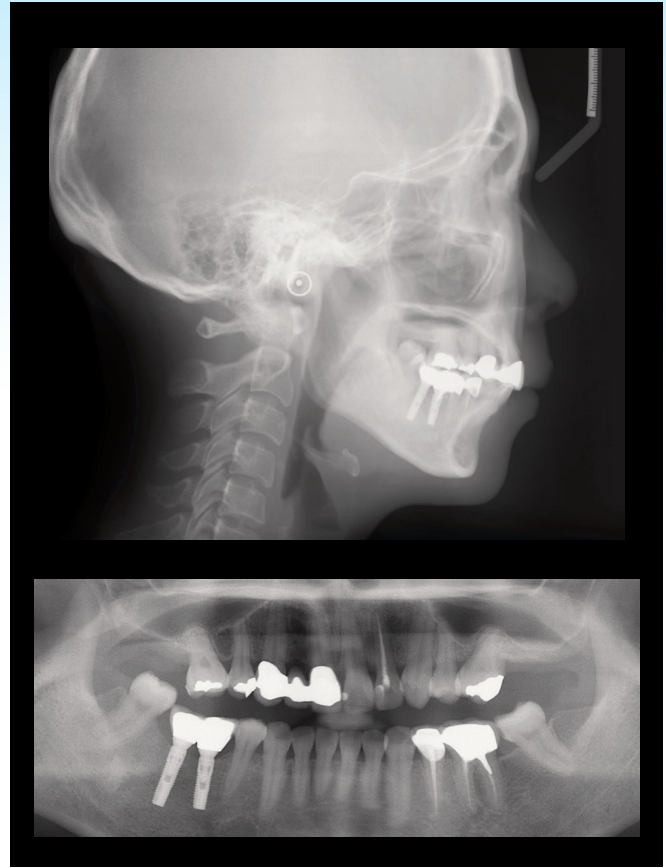


Fig. 8: Post-treatment panoramic and cephalometric radiographs document the final alignment and stabilization of the occlusion with an implant-supported prostheses. The patient chose to retain the unopposed lower right third molar contrary to professional advice. There is concern that it may cause soft tissue irritation and interfere with protrusive excursions.



Fig. 9: Pre-treatment (black) and post-treatment (red) cephalometric tracings are superimposed on stable skeletal structures of the anterior cranial base (left), maxilla (upper right) and mandible (lower right). Note that the upper left first molar was protracted during space closure because of the anchorage provided by the overbite.

CEPHALOMETRIC			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA°	87°	87°	0°
SNB°	83°	83°	0°
ANB°	4°	4°	0°
SN-MP°	29°	29°	0°
FMA°	22°	22°	0°
DENTAL ANALYSIS			
U1 TO NA mm	4 mm	4 mm	6 mm
U1 TO SN°	110°	109°	1°
L1 TO NB mm	8 mm	8 mm	0 mm
L1 TO MP°	106°	106°	0°
FACIAL ANALYSIS			
E-LINE UL	2 mm	2 mm	0 mm
E-LINE LL	2 mm	2 mm	0 mm

Table 1: Cephalometric summary

missing, including the maxillary left lateral incisor and all four second premolars. The initial panoramic radiograph (Fig. 9) was consistent with at least one molar extraction in the lower right segment. Overall, there was a total of 12 missing teeth, two of which were third molars. The loss of the lower right mandibular molar resulted in an unstable, asymmetric occlusion (Figs. 3 and 7). The latter was associated with a large mandibular edentulous space (*area teeth #29-31*) and extruded upper and lower molars (*teeth #3 and 32*).

Diagnosis

Skeletal:

- Skeletal Class II (SNA 87°, SNB 83°, ANB 4°)
- Low mandibular plane angle (SN-MP 29°, FMA 22°)
- Condylar heads are relatively symmetric (Fig. 10)

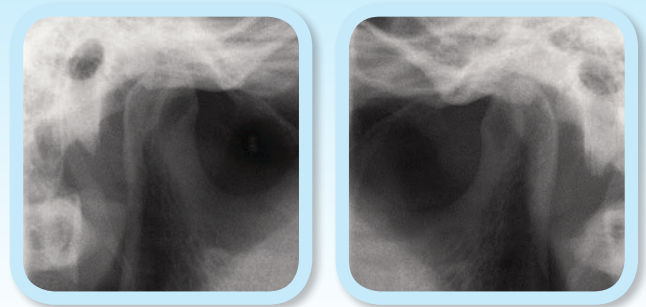


Fig. 10: Radiographic images of the mandibular condyles document symmetrical temporomandibular relationships.



Fig. 11: The unesthetic anterior prostheses was not a priority for the patient. There was no orthodontic or restorative treatment in the maxillary anterior esthetic zone.



Fig. 12: The apparent large overjet of the incisors is partially masked by the increased axial inclination of the lower incisors and the moderately deep overbite of 3.5mm.

Dental:

- Unesthetic maxillary anterior segment (Fig. 11) and large overjet (Fig. 12)
- Canine relationship: Class II right and Class I left (Fig. 3)
- Midlines: facial, maxillary and mandibular midlines are coincident (Figs. 1-3)

- Upper right first ([#]3) and lower right third molars ([#]31) are extruded
- Missing Teeth: [#]1, 2, 4, 7, 13, 15, 16, 18, 20, 29, 30, and 31
- Spaces: *multiple edentulous spaces in both arches*
- Caries in upper right first premolar

Facial:

- Convex profile (*Figs. 1, 7 and 9*)
- Slightly protrusive upper and lower lips
- Facial symmetry; unesthetic maxillary dental smile-line due to maxillary anterior prostheses (*Fig. 11*)

The ABO Discrepancy Index (DI) was 18; the major discrepancies were missing teeth and flared lower incisors. A further 3 points were deducted for the compromised implant site: thin gingival biotype, different horizontal bone level relative to adjacent teeth and knife-edge osseous ridge. The overall DI was 21, as shown in the subsequent worksheet.^{1,2}

Treatment Objectives

The clinical objectives were to optimally restore occlusal function and esthetics with interdisciplinary treatment, involving full fixed orthodontics treatment and implant-supported prostheses as follows:

- Gain space between bilateral upper first premolars and first molars for implant-supported crowns.
- Create sufficient interarch space and bone width for implant placement in the mandibular right second premolar and molar region.

- Replace unesthetic maxillary anterior fixed prosthesis, and restore temporary restoration in the upper right first premolar with a gold inlay.
- Extract the lower right third molar to avoid extrusion and protrusive interference.

Treatment Alternatives

The patient **only** agreed to portions of the proposed treatment plan. Orthodontics treatment was restricted to the maxillary arch for space closure and alignment to prepare for an implant-supported prostheses to restore the lower right first molar and second premolar. Extraction of lower right third molar was deleted and the patient did not want to replace the unesthetic maxillary anterior prosthesis. A compromised treatment plan was devised that involved orthodontics to close space in the upper arch and level the occlusal plane to create sufficient interarch space for a lower right implant-supported prosthesis. The patient was informed that this treatment plan revision would probably result in compromised dental axial inclinations, no improvement in maxillary esthetics, and leave an unopposed lower third molar, that would likely contribute to future soft tissue and occlusion problems. The patient accepted these limitations and decided to proceed with treatment.

Treatment Plan and Sequence

1. Fixed orthodontic appliance in the upper arch
2. Compressed NiTi open coil spring mesial to [#]14 for uprighting, followed by space closure to move it mesially using the overbite as anchorage (*Figs. 7 and 13*).

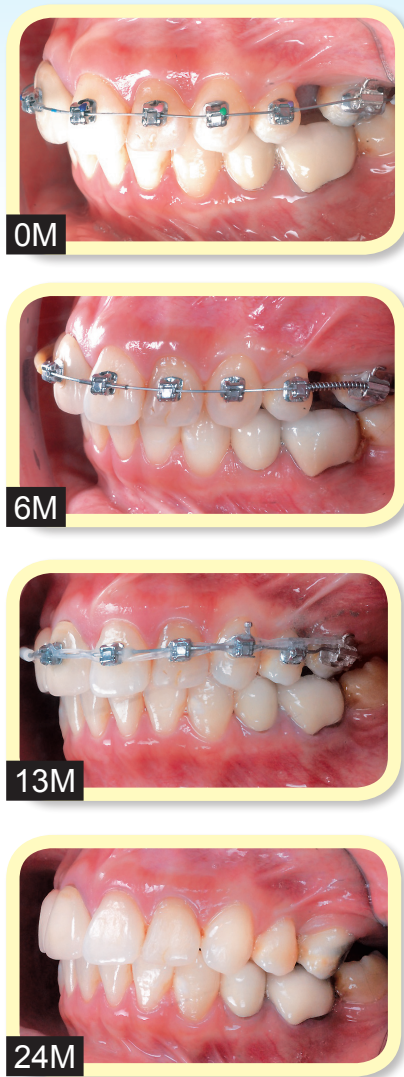


Fig. 13: Orthodontics alignment and space closure in the maxillary arch is documented at the start (0M), 6 months (6M), 12 months (12M) and at the end of 24 months (24M) of active treatment.

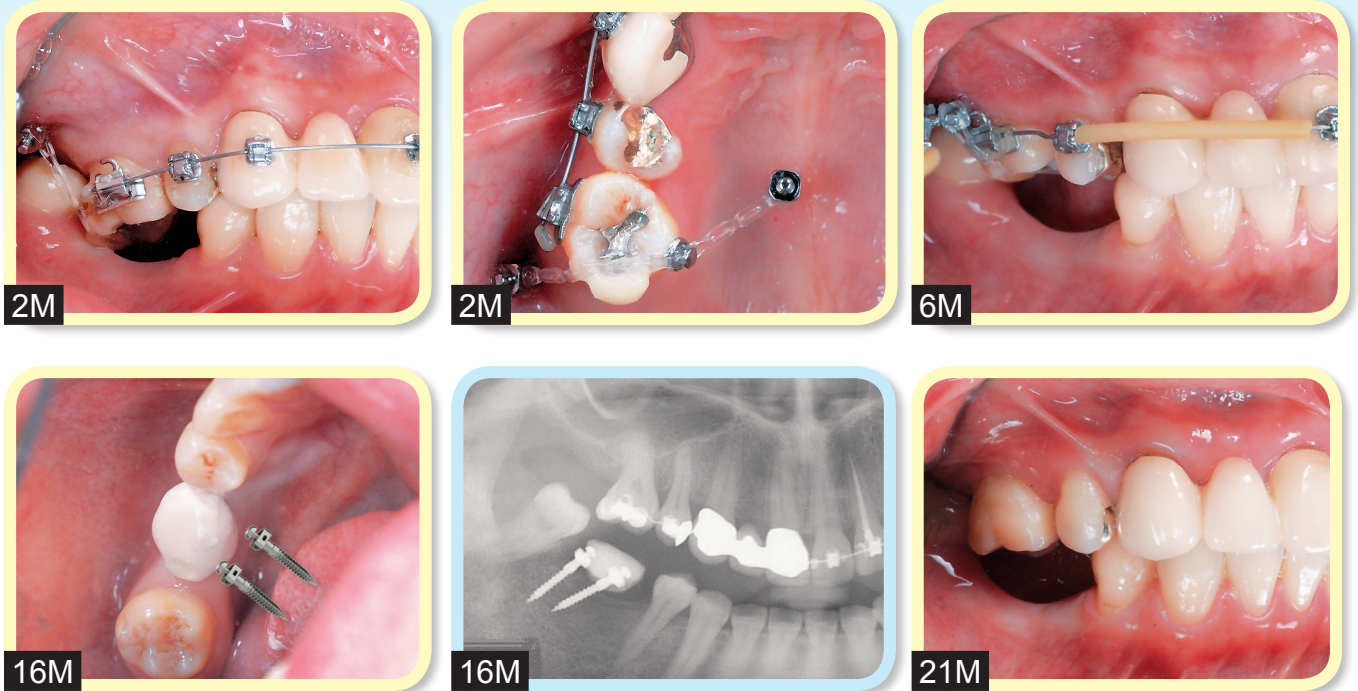
3. Intrude upper right first molar by leveling the arch and intruding by placing a temporary prosthesis in the lower right edentulous space.
4. Fabricated in gold inlay for the upper right first premolar.

5. Place implants in the lower right second premolar and first molar regions by using bone splitting and spreading.
6. Once the implants integrate, restore with a fixed crowns.
7. Retention of the corrected malocclusion using a clear retainer for both the maxillary and mandibular arches.

Appliances and Treatment Progress

Damon Q® .022" brackets with standard torque (Ormco, Glendora CA) were bonded on the maxillary teeth. The initial wire was .014" CuNiTi. In the 2nd month, the arch wire was changed to .018" CuNiTi. In the 3rd month, two 2x12mm OrthoBoneScrews (OBS) (Newton's A, Ltd, Taiwan) were inserted in the palate and right infrazygomatic crest. Power chains were attached from tooth #3 to the OBSs on both the buccal and palatal surfaces to intrude the extruded molar (Fig. 14). In the 4th month, a compressed NiTi open coil spring was placed on the mesial of the upper left first molar (#14) to correct its axial inclination and the archwire was changed to a .014x.025" CuNiTi. Subsequently, the upper left space was closed with a power chain and the arch wire was changed to .017x.025" TMA in the 7th month. These mechanics were designed to protract #14 using the overbite as anchorage (Fig. 13).

In the 16th month, a temporary fixed prosthesis was constructed to apply occlusal pressure on #3 to assist with its intrusion. The temporary prostheses was made by inserting two OBSs in the lower right edentulous area. Fuji II Glass Ionomer Cement Type II



■ Fig. 14:

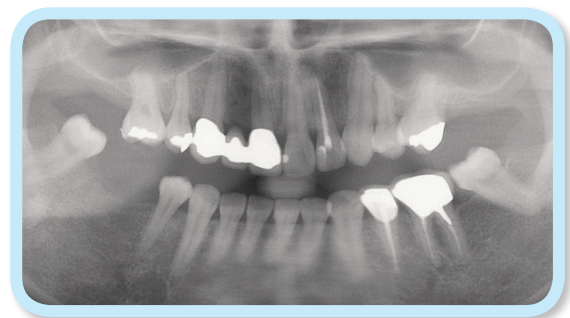
Progress photographs for 2-21 months of orthodontics treatment show the intrusion of the upper right first molar. At 2 months (2M) power chains were anchored by OBSs to deliver intrusive force on the buccal and the lingual. At 16 months (16M) a temporary prosthesis was constructed to oppose the extruded tooth #3. Note at 21 months (21M) there is adequate interocclusal space created for an implant-supported prosthesis.

(GC America, Alsip IL) was used to connect the screws and create an occlusal surface (Fig. 14).

In the 19th month, the bracket position was changed to a more mesial inclination on the upper left second molar via progressive archwires: .018"CuNiTi, .014x.025"CuNiTi and .017x.025" TMA. A panoramic radiograph was exposed to evaluate root alignment (Fig. 15). In the 23rd month, all brackets were removed, and a clear overlay retainer was delivered for the upper arch.

The patient was then scheduled for the final restorative procedures. The temporary restoration in the upper right first premolar was replaced with

a gold inlay, and two implants were placed to permanently restore teeth #29 and 30.



■ Fig. 15:

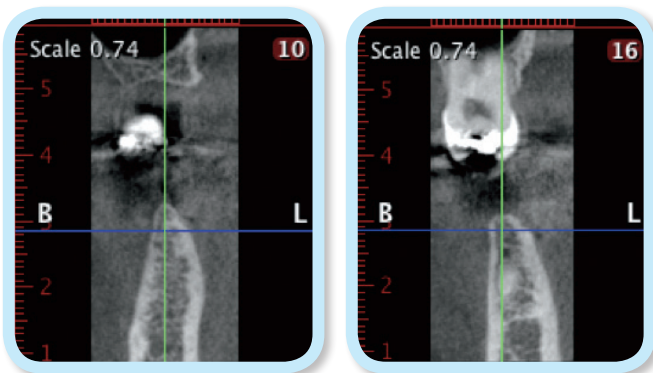
Following orthodontics a panoramic radiograph documents the pre-prosthetic preparation of the maxillary arch. There was no orthodontics treatment in the lower arch.

Implant Placement

A preoperative CBCT scan was used to evaluate the alveolar bone volume (Fig. 16). Tooth #29 area was 12 mm in height x 3.8 mm in width and the tooth #30 area was 14 mm in height x 3.8 mm in width. Since there was insufficient bone volume in both areas, simultaneous bone splitting and spreading was indicated prior to implant placement. A surgical stent facilitated precise implant placement in three dimensions (Fig. 17). The implant fixture was

positioned 3 mm below the future crown margin and no closer than 1.5 mm to the adjacent teeth.³

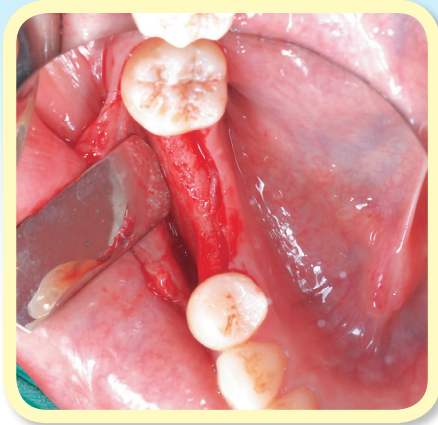
In the #29-30 area, a crestal incision was performed along the lingual line angle with a No.15c scalpel. Sulcular incisions were made on the buccal and lingual sides of the adjacent teeth to achieve adequate flap reflection (Fig. 18). After exposing the bone with full-thickness flaps, the knife-edged crestal bone was trimmed with a diamond bur until 4.5mm of bone width was achieved (Fig. 19). The bone was then split using a disc that was .025mm thick and 3.2mm deep (Fig. 20). The surgical stent was fitted to guide the lance and twist drills for the initial osteotomy (Figs. 21-23); the final depth of the osteotomy corresponded to the implant length. A surgical guide pin (Fig. 24) was placed in the osteotomy, and a periapical radiograph revealed the implant in the #29 area almost impinging on the root of #28 (Fig. 25). A Linderman side cutting drill was used to change the direction of the osteotomy to parallel the adjacent tooth (Fig. 26).



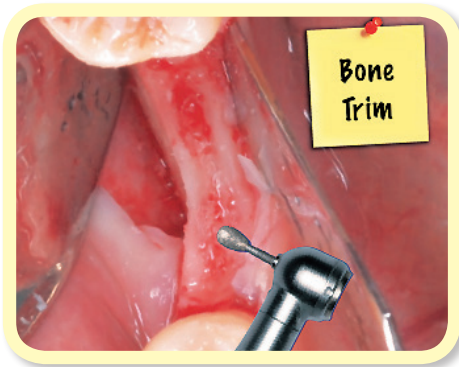
■ Fig. 16: A preoperative CBCT scan shows the narrow width of the lower right edentulous arch.



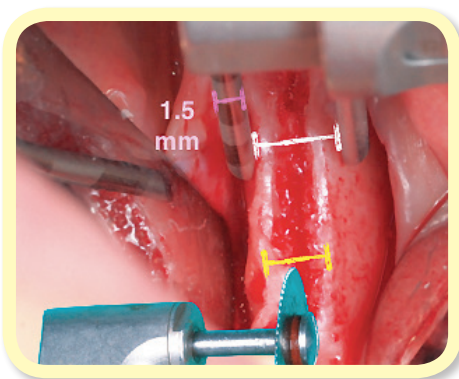
■ Fig. 17: A resin surgical stent was used as a drill guide.



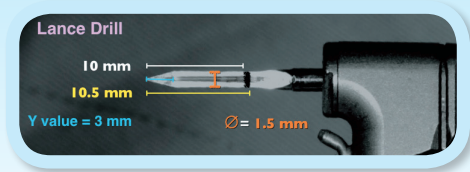
■ **Fig. 18:**
A crestal incision was performed at the lingual line angle of the edentulous ridge.



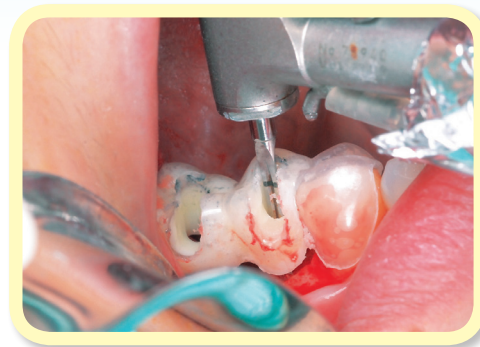
■ **Fig. 19:**
The narrow crestal ridge of bone was reduced with a diamond bur until the ridge was $\geq 4.5\text{mm}$ in width.



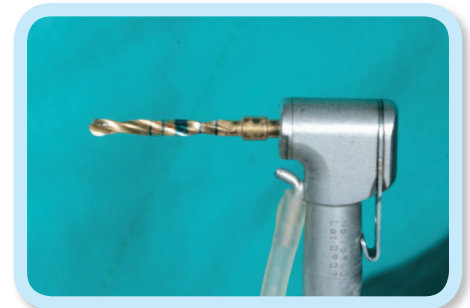
■ **Fig. 20:**
A disc was used to split the bone through the marrow space.



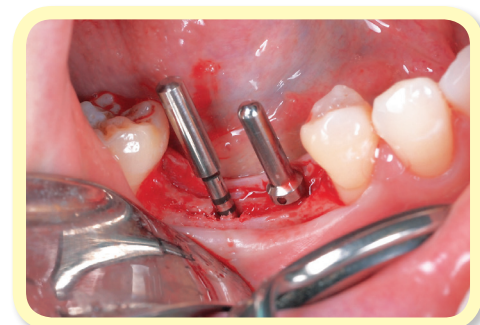
■ **Fig. 21:**
The initial osteotomy was performed with a lance drill as shown.



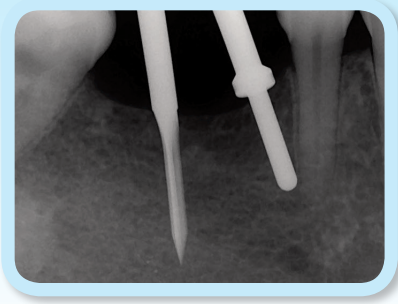
■ **Fig. 22:**
The surgical stent was fitted to the adjacent teeth to guide the lance and twist drills for the initial osteotomy.



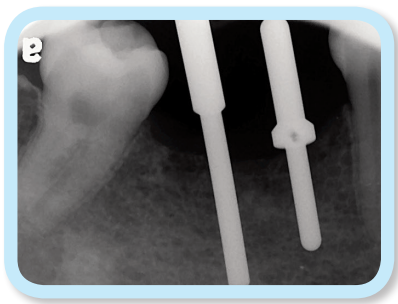
■ **Fig. 23:**
The twist drill enlarged the osteotomy formed by the lance drill.



■ **Fig. 24:**
Surgical guide pins were inserted in each osteotomy to check the orientation.

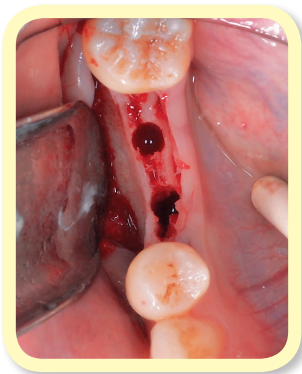


■ **Fig. 25:**
The mesial osteotomy is almost in contact with the root of tooth #28.

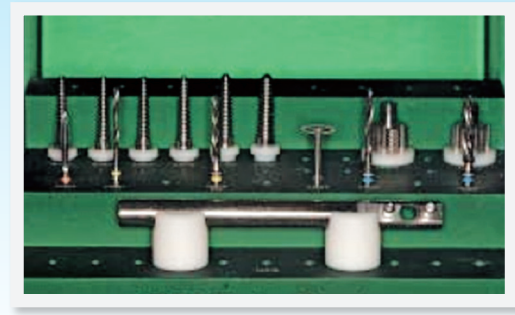


■ **Fig. 26:**
A Linderman side-cutting drill was used to correct the direction of the osteotomy in the area of teeth #29.

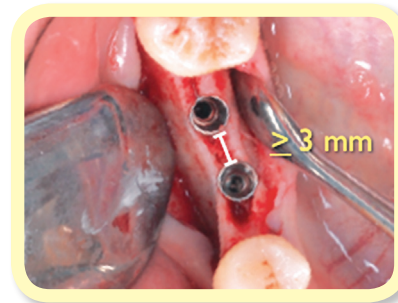
The distance between the buccal and lingual cortical plates (Fig. 27) was increased with a bone spreading kit by progressively inserting tapered rods of increasing diameter (Fig. 28). Two implant fixtures (Ø3.8 X 12mm, Ø3.8 X 14 mm, A+ System, MegaGen® Taiwan) were installed (Fig. 29). The implants achieved adequate primary stability, so healing abutments were placed (Fig. 30). The flap was repositioned and closed with 5-0 nylon sutures (Fig. 31).



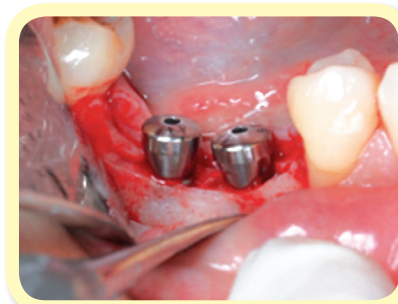
■ **Fig. 27:**
The osseous ridge was expanded with a bone spreading kit.



■ **Fig. 28:**
The bone spreading kit is a series of tapered root-form pins (socket formers) that progressively increase the diameter of the osteotomies.



■ **Fig. 29:**
Two implant fixtures were installed.

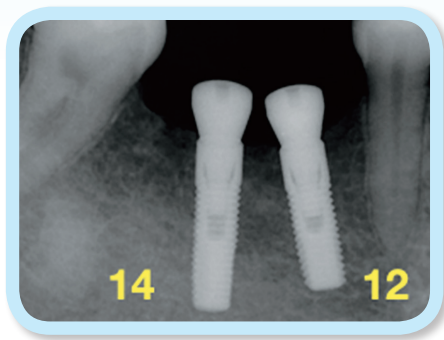


■ **Fig. 30:**
Healing abutments were placed on the implant fixtures.

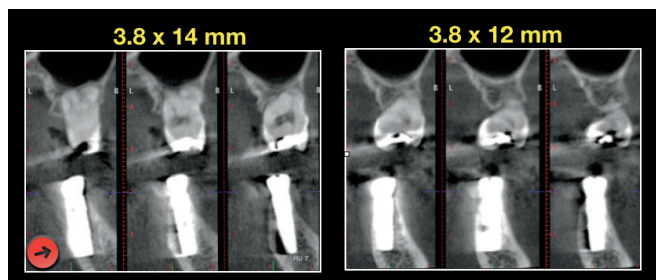


■ **Fig. 31:**
The soft-tissue flap was sutured around the healing abutments with 5-0 nylon.

Post-operative periapical radiographs were taken to assess the position and angulation of the implants (Fig. 32). Although the two implants were not parallel, their position was adequate because modified abutments could facilitate the prosthesis fabrication.



■ **Fig. 32:**
A post-operative radiograph shows that two implants 12mm and 14mm in length were not parallel.



■ **Fig. 33:**
Left: A post-operative CBCT scan reveals that the apical third of the 14mm implant is nearly penetrating the lingual plate of bone (red arrow).
Right: The 12mm implant is well within the lingual plate of bone.

A post-operative CBCT scan revealed the apical third of the implants were near the lingual plate. (Fig. 33)

Implant Prostheses Fabrication

The multi-post abutments ($\varnothing 5.00$ mm and 2.00 mm cuff height) were fitted and the abutments were modified with a diamond bur for occlusal clearance while maintaining a desirable soft tissue contour



■ **Fig. 34:**
Abutments are adjusted with a diamond bur to provide adequate occlusal clearance.



■ **Fig. 35:**
Trying in the adjusted posts demonstrates that there is 2mm of occlusal clearance, which is adequate for the fabrication of the porcelain fused to metal crown.

(Fig. 34). The abutment's post height was reduced to provide the 2mm of occlusal clearance necessary for fabrication of a porcelain fused to metal crown (Fig. 35).

Before taking an impression to fabricate the prostheses, the abutment screws were torqued to 30-N-cm with a screw driver and a torque ratchet. Gingival retraction cords were positioned in the peri-implant sulcus with a packing-placement instrument (Fig. 36). A direct impression was obtained with polyvinyl siloxane and it was poured with type IV dental stone (Fig. 37). The casts were subsequently articulated using check-bite records. A metal coping

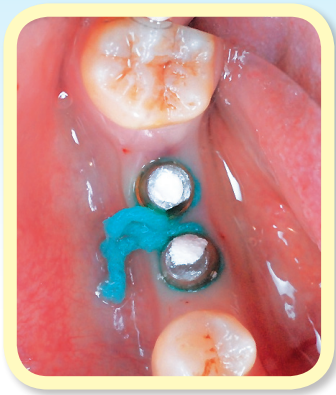


Fig. 36:
Gingival retraction cord is packed into the peri-implant sulcus.



Fig. 37 :
Following removal of the retraction cord, a direct impression with polyvinyl siloxane captures the margins of the abutments.



Fig. 38:
The upper photographs show the metal coping for the prosthesis, and the lower photographs illustrate the completed final prostheses.

was fabricated by the laboratory, and the marginal integrity was verified clinically with a dental explorer (Fig. 38). After completion of the final prostheses, an appropriate fit of the contact area was confirmed with dental floss. After clinical adjustment and verification of the fit and occlusion, the permanent crowns were luted into place with permanent cement (Hybond® Shofu Dental Corp., Kyoto, Japan). The holes on the occlusal surface of the crowns were filled with composite resin.

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: *All space closed, mesial translation of the left molar*
- Vertical: *Upper right first molar intruded*
- Inter-molar / Inter-canine Width: *Maintained*

Mandibular Dentition

- A - P: *Maintained*
- Vertical: *Maintained*
- Inter-molar / Inter-canine Width: *Maintained*

Facial Esthetics: *Maintained*

Final Evaluation of Treatment

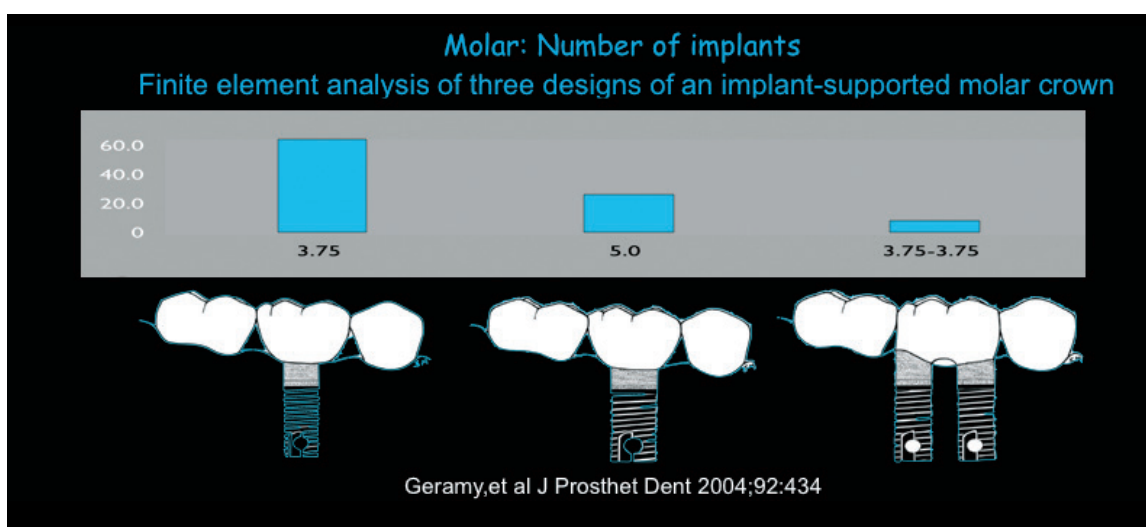
The ABO Cast-Radiograph Evaluation (CRE) score was 26 points.^{1,2} The major discrepancy was excessive overjet of multiple teeth (6 points). Occlusal function (contacts) was improved by closing the space between the left maxillary first premolar and first molar. The functional occlusion was stabilized by restoring the missing mandibular right second premolar and first molar with an implant-supported prostheses with a double implant design (Fig. 39). Overall, the patient was quite satisfied with the improvement in her occlusal function.

Discussion

Reconstruction with orthodontics treatment and implants stabilized the temporomandibular relationship and improved the chewing efficiency of the patient. There are several methods to optimize space for implants, but orthodontics treatment is the most conservative, because it preserves the

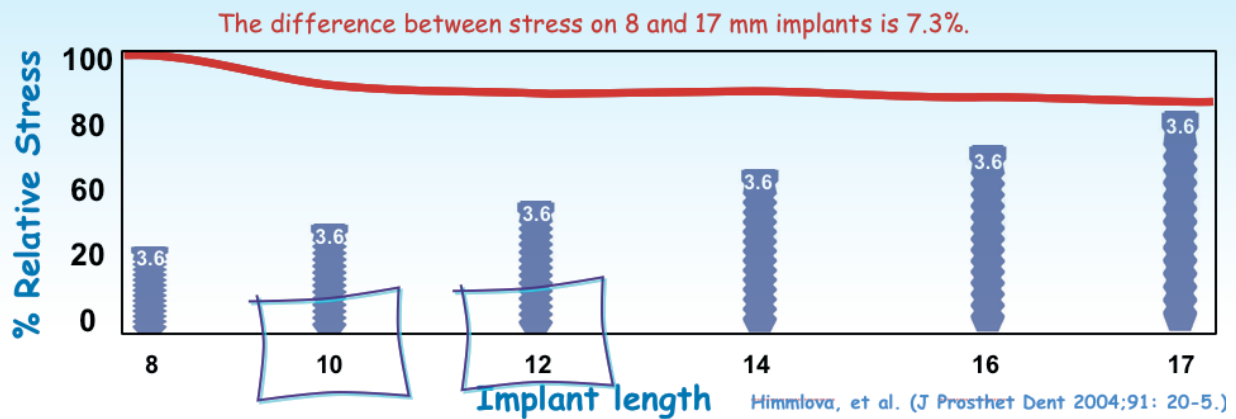
integrity of the teeth and minimizes the need for prosthetic restorations. Anchorage with OBSs is very effective mechanics for tooth intrusion.^{4,5,6} The most ideal sites for the OBSs are the infrazygomatic crest, maxillary palate (2mm on either side of the midline), and the buccal shelf of the mandible.

Himmlova et al.⁷ reported that the ideal length for implants is in the range between 10-12mm, and the ideal width is between 4.2-5.0mm (Figs. 40 and 41). When the crown of a tooth is loaded eccentric to its axial inclination, damaging moments (stress) can be generated that tend to displace and flex the implant relative to its supporting bone (Figs. 40 and 41). The double-implant design substantially decreases stress in the sagittal plane (Fig. 39).⁸ The same principle applies when two implants are used to replace two adjacent teeth. The implants selected to restore the lower right quadrant were Ø3.8X 12mm long and Ø3.8X 14 mm long.

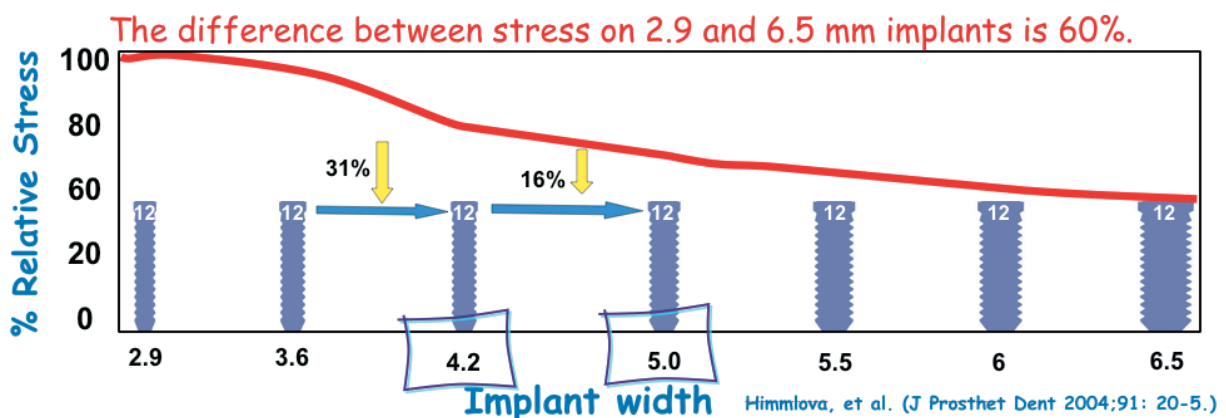


■ Fig. 39:

When the pontic is loaded off-center, the double-implant design (right) produces substantially less moment on the implant head, resulting in damped displacement, compared with either of the single-implant designs (left and center). Figure adapted from Geramy A, Morgano SM. J Prosthet Dent 2004;92:434-40.⁵



■ Fig. 40: The stress on implants is inversely related to length. The optimal implant length is ~10-12mm. Figure adapted from Himmlova L, Dostalova T, Kacovsky A, Konvickova S. J Prosthet Dent 2004;91:20-5.⁴



■ Fig. 41: With respect to moderating stress, the optimal implant width is ~4.2-5.0mm. Figure adapted from Himmlova L, Dostalova T, Kacovsky A, Konvickova S. J Prosthet Dent 2004;91:20-5.⁴

There are four common methods for classification of soft and hard tissue defects.^{9,10,11,12} Wang¹³ modified Seibert's¹² scheme to create the HVC (*horizontal, vertical, combination*) ridge deficiency classification for assessing vertical and horizontal discrepancies. The latter is a practical method that is widely used for conveying the difficulty in restoring the ridge. The three broad categories are still present: Class I, II, and III defects are classified as horizontal (H), vertical (V), and combination (C) defects. Each category is further subdivided into small (*s*, ≤ 3mm), medium

(*m*, 4 to 6 mm), and large (*l*, ≥ 7mm) subcategories. Both soft and hard tissue defects are considered in this classification scheme. Treatment options are suggested based on the HVC classification. The lower right edentulous ridge was classified as a small horizontal defect, so an appropriate treatment approach is an onlay bone graft. The present patient was treated with an attractive alternative procedure: bone splitting, spreading and immediate implant placement. The latter approach (Figs. 27-31) saves treatment time and is often more predictable,

because there is no need for a bone grafting procedure and healing phase before placing the implants.

Conclusion

Oligodontia with additional missing teeth resulted in a severe acquired malocclusion. Malocclusions associated with a mutilated dentition may require orthodontics, bone augmentation, implants, and prostheses to achieve an optimal functional outcome. Orthobonescrews (OBSs) are versatile temporary anchorage and prosthetic devices for correcting unstable occlusions. The bone splitting procedure is effective for managing an atrophic edentulous ridge to receive implant-supported prostheses.

References

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 21

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

Total = 0

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

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 $> 38^\circ$ x 2 pts. =

$\leq 26^\circ$ = 1 pt.

Each degree $< 26^\circ$ x 1 pt. =

1 to MP $\geq 99^\circ$ = 1 pt.

Each degree $> 99^\circ$ 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 (≥ 3 mm) @ 2 pts. =
- Missing teeth (except 3rd molars) 10 x 1 pts. = 10
- Missing teeth, congenital x 2 pts. =
- Spacing (4 or more, per arch) x 2 pts. =
- Spacing (Mx cent. diastema ≥ 2 mm) @ 2 pts. =
- Tooth transposition x 2 pts. =
- Skeletal asymmetry (nonsurgical tx) @ 3 pts. =
- Addl. treatment complexities x 2 pts. =

Identify:

Total = 10

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), ≥ 7 mm to contact point (2 pts) = 1
- 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 = 3

Cast-Radiograph Evaluation

Total CRE Score 26

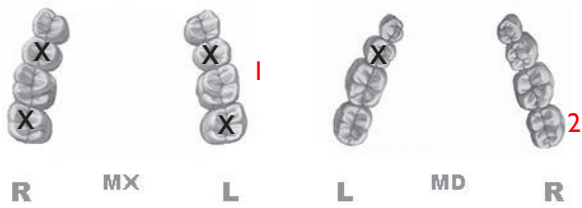
Alignment/Rotations

3



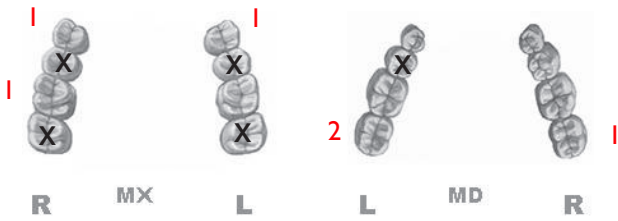
Marginal Ridges

3



Buccolingual Inclination

6



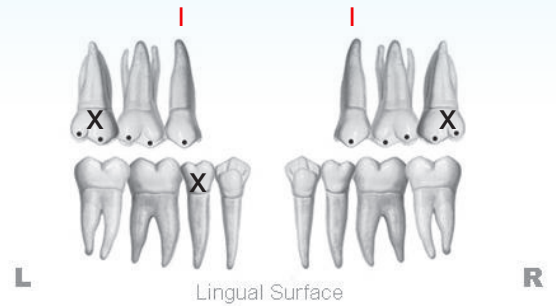
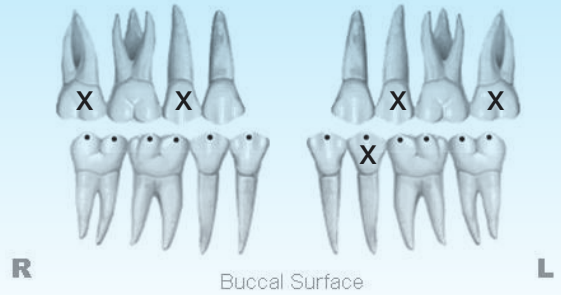
Overjet

6



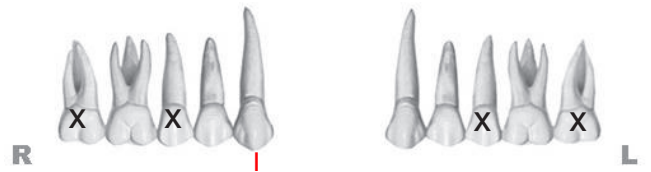
Occlusal Contacts

2



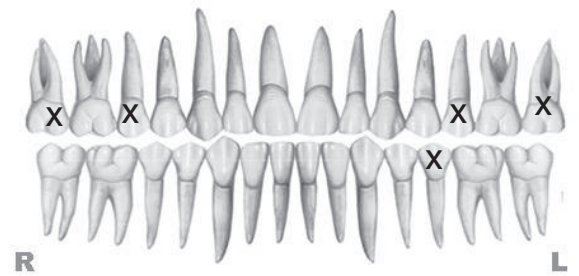
Occlusal Relationships

1



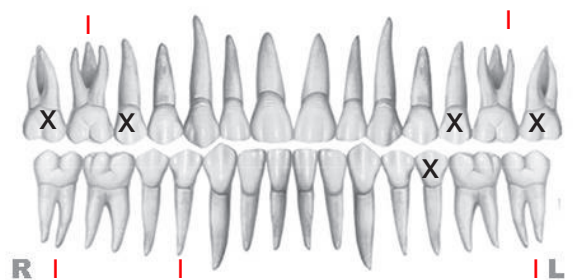
Interproximal Contacts

0



Root Angulation

5



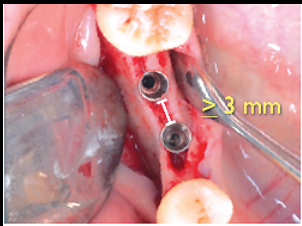
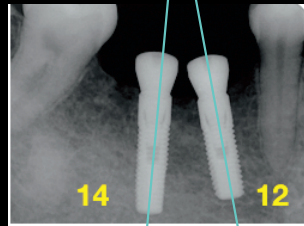
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

Implant-Abutment Transition & Position Analysis Total Score: = 5

1. Implant Position

Implant Position

1. M-D	2. B-L	3. Depth	4. Angulation	5. Distance to tooth
Center	2mm	3mm	Max. 15°	≧ 1.5mm

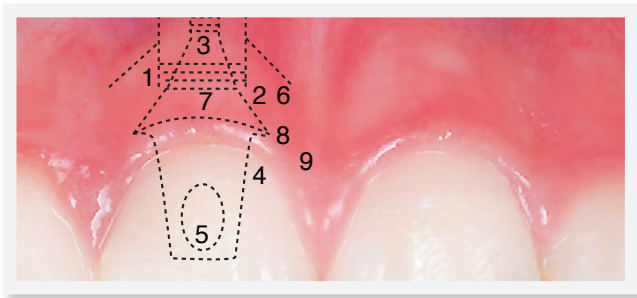
I 45 Total = 1

- 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

I 46 Total = 0

- 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

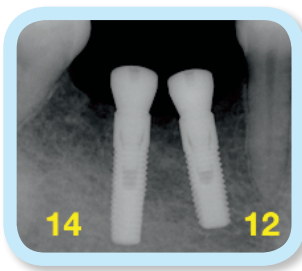
2. Abutment transition Contour



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

I 45 Total = 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



I 46 Total = 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