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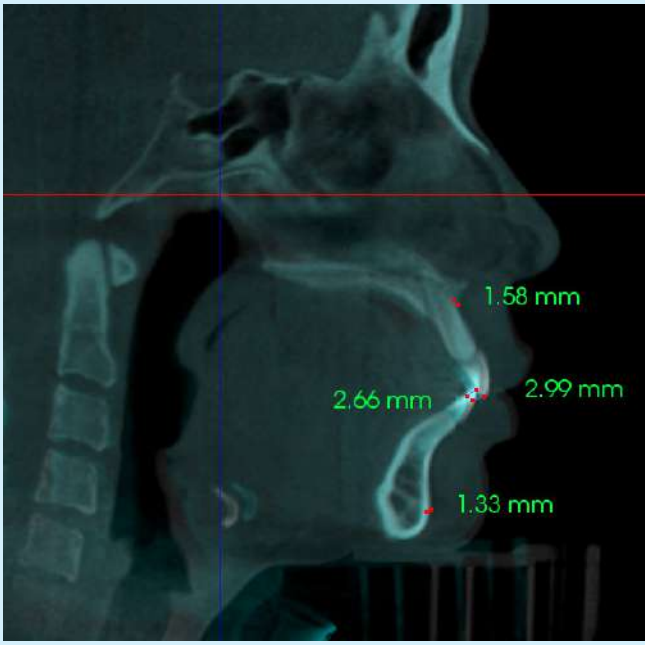
JCDD

Journal of Clinical & Digital Dentistry



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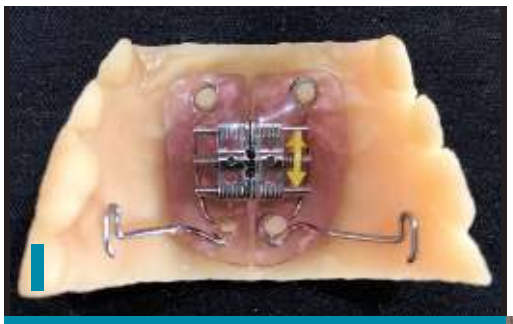

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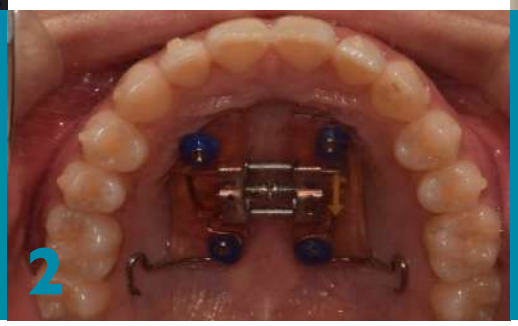

JCDD
Journal of Clinical & Digital Dentistry

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About the Journal

The Journal of Clinical and Digital Dentistry are published four times (March, June, September, and December) annually since May 2019. The abbreviated title is "J Clin Digit Dent". In the journal, articles concerning any kind of clinical dentistry such as prosthodontics, orthodontics, periodontics, implant dentistry and digital dentistry are discussed and presented.

Aims and scope

This journal aims to convey scientific and clinical progress in the field of any kind of clinical and digital dentistry.

This journal publishes

Original research data and high scientific merit in the field of clinical and digital dentistry.
Review articles.
Case reports in implant dentistry including GBR, digital dentistry, 3D printing, and prosthodontics.
Short communications if they provide or document new technique and clinical tips.

About the Journal

Editorial Board

Editorial

Everybody wants to live a healthy life.

No matter how much knowledge you have, you can't share it without your health.
No matter how much money you have, you can't spend it without your health.
No matter how much honor and power you have, you can't exercise them without your health.

So everyone makes the effort: exercise regularly, eat healthy, get check ups - all in order to prevent problems before they happen.

Recently, the world is in fear amidst the spread of the newly identified coronavirus. The biggest reason we fear is because there is no cure yet.
When someone gets sick, you can't treat it without knowing the cause. And even if you know the cause, you can't treat it without a cure.

The same is true for dental care. Proper treatment should help patients stay healthy for a long time. To do this, you need to know the cause and the appropriate care. If properly treated according to the cause, the patient can live a healthy life for a long time.

This issue of JCDD talks about the appropriate treatment method according to the cause in each field. First, the 2019 Dentis World Symposium (Seoul) answers the questions of the audience to the speakers, explaining the long-term stable implant treatment results. Secondly, the maxillary expansion and Clear aligner not only improve the patient's dentition, but also provide an environment that allows the nasal cavity to be enlarged for nasal breathing. Finally, the long-term prognosis of the application of subepithelial CT grafts is described, which explains the most periodontal concerns.

I hope this issue will encourage each of us to approach our treatments with the long-term health and satisfaction of our patients.

Wongun Chang, DDS MS PhD

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After Service
신속한 A/S 및
체계적인 사후관리

덴티스 전속모델
방송인 오상진

Temporary

Surgical Guide

Model

Protocol for transverse control of the narrow maxilla in clear aligner treatment

Choonbong Lee, DDS, MSD, PhD

Introduction

Crowding is the main reason for orthodontic treatment. Expansion of narrow arch as a solution to crowding can increase arch width, thus provide more space for tooth alignment, which can also reduce interproximal reduction or modify the arch form. [1,2] Clear aligner proves to be a good pushing appliance that provides dental expansion (arch development), molar distalization and space opening for the dental implant site. Distalization of an upper molar(within 1.5 mm) is the most effective and has a predictable outcome in approximately 87% of cases. [3] In addition, expanding the narrow arch can improve the esthetics of the smile by reducing the buccal corridor. [4,5] Thus, when the maxillary arch is narrow, an increase in arch width is planned during Invisalign treatment. Recent reports of Invisalign expansion suggest that when dentoalveolar expansion is planned with Invisalign, the mean accuracy for the maxilla is 72.8%:82.9% at the cusp tips and 62.7% at the gingival margins. Invisalign becomes less accurate going from the anterior to the posterior region. [6] In the cone-beam computed tomography (CBCT) analysis, the increase in the arch width is indicated by the inclination of the posterior tooth, and the average expansion efficiency of the maxillary first molar is 36.35%. Aligners could increase the arch width, but expansion was achieved by tipping movement. The evaluation of initial position and preset of sufficient root-buccal torque of posterior teeth were necessary due to the lower efficiency of bodily buccal expansion by the Invisalign system. [7]

For the palatal inclination of the posterior dentoalveolar segment in a maxilla with a narrow arch, arch expansion is well performed by buccal uprighting of the crowns through the push movement of the Invisalign system. However, when the maxillary skeletal transverse width is narrow, the maxillary posterior dentoalveolar has a buccal inclination. [8] In this case, the crown buccal tipping in the posterior part becomes more severe during expansion with the Invisalign system, causing functional problems in periodontal and occlusal aspects. [9] Therefore, it is recommended to skeletally expand the maxillary bone in advance when the maxillary skeletal transverse is narrow. [10]

Various maxillary skeletal expansion devices [11,12] are generally designed in order to provide skeletal support along with tooth support. In addition to the skeletal expansion, tooth movements such as the buccal inclination of the maxillary molars as well as space formation and changes in the axis of the maxillary anterior teeth can be achieved. [13] When Invisalign is applied after maxillary skeletal bone expansion, the number of teeth that require root movement increases, requires fixed appliance bonding or increases in the number of additional aligners. Also, adjusting it properly with Invisalign is not an easy move.

This case report shows the successfully simultaneous maxillary skeletal expansion and the arch expansion through Invisalign in patients whose maxillary transverse is normal or skeletally deficient. A new nasal cavity skeletal expander (NCSE) design and the expansion protocol for the removal of transverse skeletal discrepancy are presented.

Determining maxillary/mandibular skeletal transverse discrepancy. [14] Images were taken using CBCT which shows the entire frontal side of the head, and measurements were taken using the Yonsei Transverse Index (YTI) suggested in the Korean Journal of Orthodontics (KJO) in 2017. YTI is the maxillary first molar center of resistance (CR) width minus the mandibular first molar CR width, and the values from -1 to 0 fall within the categorization of normal. If YTI is less than -1, it is considered a maxillary transverse deficiency. In maxillary transverse deficiencies, the maxillary posterior expansion is identically reflected in the ClinCheck with the right YTI value of 1/2.

Choonbong Lee

Dr. Choonbong Lee graduated from the Jeonbuk National University of School of Dentistry in 1996. He got Master's degree and Ph.D. from the Jeonbuk National University of School of Dentistry in 2008. He completed residency training at the Department of Orthodontics, Chonbuk National University Dental Hospital. He is currently a board-certified orthodontist, member of the Korean Association of Orthodontists, member of Korean Society of Orthodontics, Adjunct Professor at the Dept. of Orthodontics, Ajou University. He is running a private practice in Bucheon, Republic of Korea.

NCSE(Nasal Cavity Skeletal Expander)

1. Miniscrews are Fixed as deep as possible in the bony areas in the palate or maxilla (diameter 1.8 or 2.0 mm, length 9, 12, or 13 mm) (Fig 1-a)
2. Palatal posterior miniscrew must be bicortical (nasal plate, palatal plate)
3. Intraoral scan (Fig 1-b)
4. 3D printer (Fig 1-c)
5. Orthodontic lab (Fig 1-d)
6. Intraoral fixation
7. Slow expansion (1 week, 2 turns) (1-3 months)
8. Nasal inspiratory flow meter for nasal expansion check
9. Turn 2 to 3 times every 1 or 2 months during visits after nasal expansion
10. Additional expansion is determined by superimposition of CBCT before additional aligner

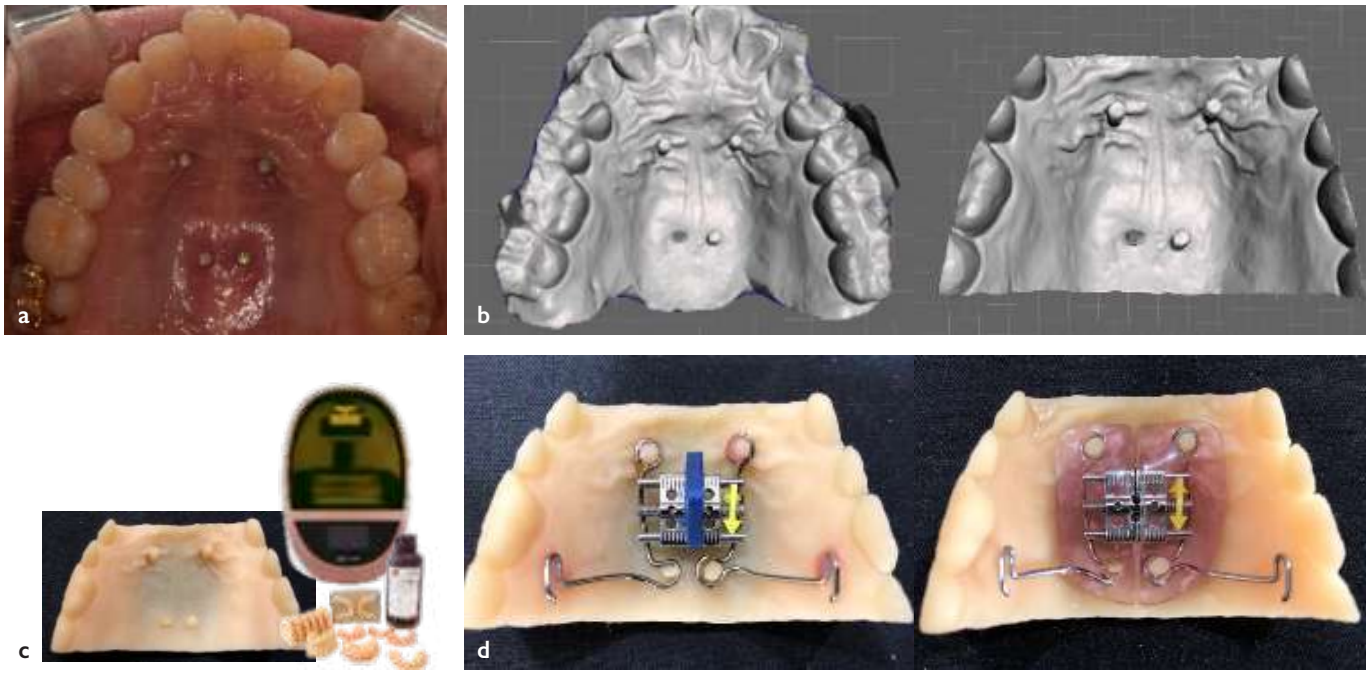


Fig. 1a-d. NCSE (a)Fixed as deep as possible in the bony areas in the palate or maxilla (b)Intraoral scan (c)3D printer (d)Preparation of prosthesis

Case Presentation

Case 1

The first case was a 14-year-old female with the chief complaints of crowding. The buccal corridor appeared large when she smiled. Intraoral views showed palatal and lingual inclination in upper and lower posterior teeth, Class II canine relationship, and a minor crowding of the anterior teeth of the lower arch. In the radiographic analysis, a slightly low angle in Class I skeletal relationship was diagnosed, and U1 to FH plane was normal. There was a slight nasal septum curve towards the right, but the morphology of the nasal cavity was good, and the maxillary transverse deficiency was normal (YTI : 0). Upper and lower first molars showed palatal and lingual inclination.

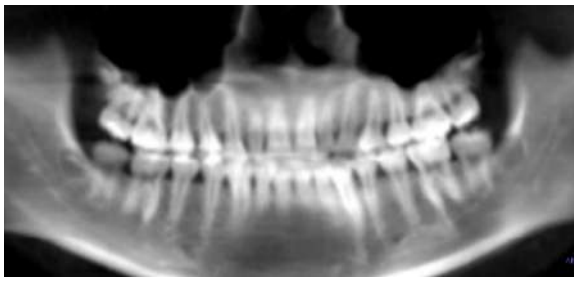
Treatment objectives were to establish a Class I molar and canine relationship in the sagittal view, to establish transverse uprighting of the upper and lower molars, to establish proper vertical exposure of the upper anterior teeth, to ensure lip sealing, and to improve the aesthetics of the smile by reducing the buccal corridor. During the Invisalign treatment, the sequential distalization of the upper posterior teeth and Class II elastics were worn, with a plan to increase the width by 3 mm at the inter-arch width of upper first molars. The total treatment took 20months.

A great improvements were made in the smile by reducing the buccal corridor(Fig.11b). The arches were well aligned, with the Class I molar and canine relationship(Fig.12), with transverse uprighting of the posterior teeth(Fig.8b).

Table 1. Key cephalometric values of Case 1

Measurement	Pre-Tx	Post-Tx	Norms
ANB	2.1	1.7	2.4 ± 1.8
FMA	20.6	18.1	24.2 ± 4.6
U1-FH	116.2	114.2	116.0 ± 5.7
L1-Mn Pl	101.8	103.3	95.9 ± 6.3
Y-index	1.01	0.48	-1 ~ 0

Pre-treatment



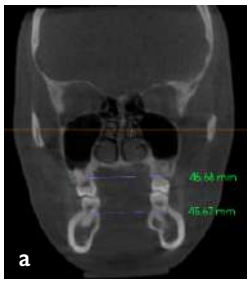


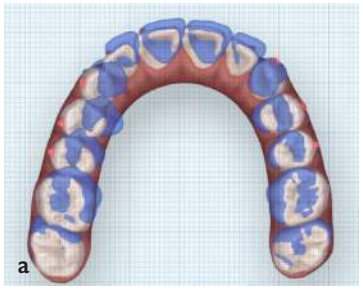
Fig. 2. Pre-treatment panorama

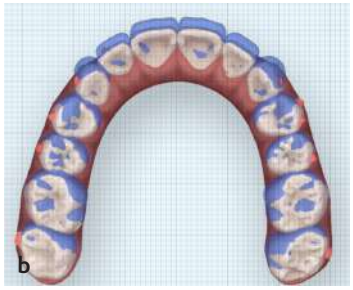
Fig. 4. Pre-treatment facial views

Fig 3a-b. Pre-treatment cephalometric radiograph

Fig. 5a-b. Pre-treatment intraoral views

Expansion of Upper arch in the Clincheck & CBCT

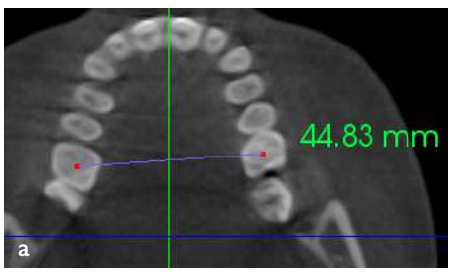


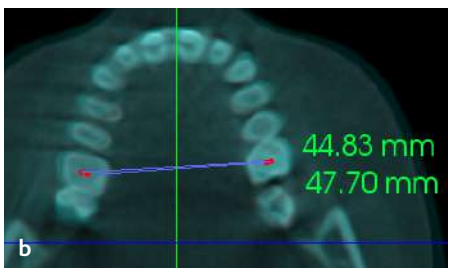


Teeth	Initial position	Final align position	
1.3 - 2.3	33.5	36.3	+2.8
1.4 - 2.4	34.2	40.0	+5.8
1.5 - 2.5	41.1	44.2	+3.1
1.6 - 2.6	44.8	47.1	+2.3

Teeth	Initial position	Final align position	
1.3 - 2.3	36.4	36.2	-0.2
1.4 - 2.4	38.6	40.0	+1.4
1.5 - 2.5	43.6	44.5	+0.9
1.6 - 2.6	46.7	47.5	+0.8

Fig. 6a-b. ClinCheck of the inter-arch width (a)1st Aligner (b)Additional 1st Aligner (The inter-arch width is measured from the point on the occlusal surface of each tooth where the long axis of said tooth intersects with the occlusal surface.)





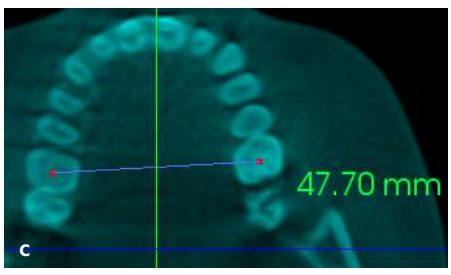


Fig. 7a-c. (a)The initial inter-arch width of CBCT (b)The inter-arch widths of CBCT superimposition (c)The final inter-arch width of CBCT

Superimposition of CBCT

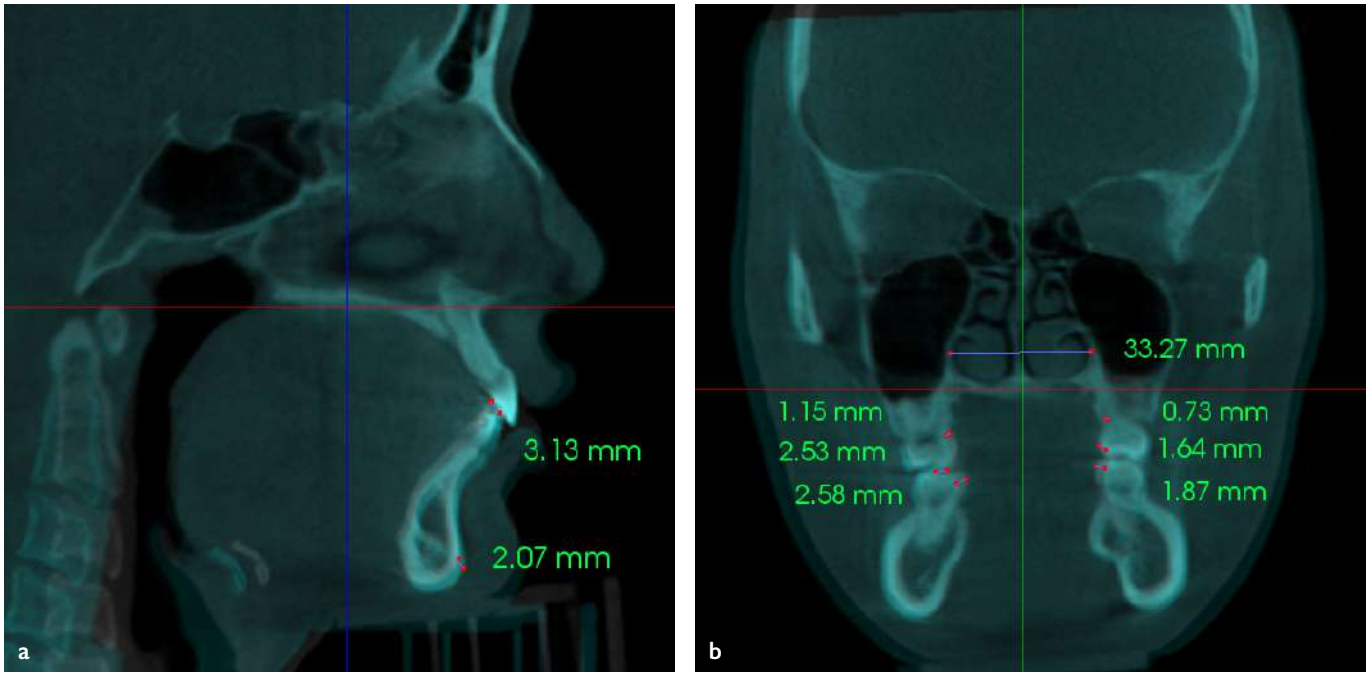
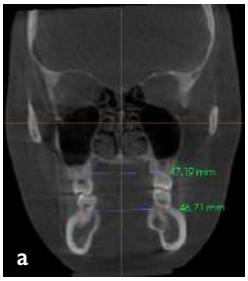


Fig. 8a-b. (a)Sagittal change (b)Nasal cavitry & UL 6 change

Post-treatment

Fig. 9. Post-treatment Panorama



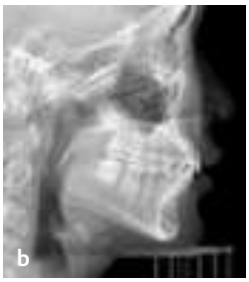


Fig. 10a-b. Post-treatment cephalometric radiograph

Fig. 11a-c. Post-treatment facial views

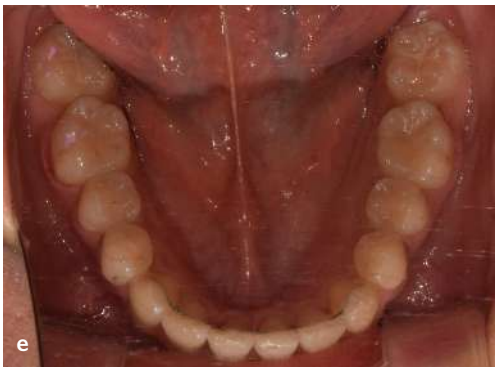


Fig. 12a-e. Post-treatment intraoral views

Case 2

The second case was a 19-years-old female with the chief complaints of lip protrusion. In the frontal facial view, the chin was slightly deviated to the left. Intraoral views showed Class II canine relationship and lingual inclination of the lower posterior teeth. The radiographic analysis, revealed a Class II skeletal relationship in the sagittal view, and a slightly low angle vertically; transverse nasal morphology was good, but the maxilla was narrower than the mandible by -2.75 mm (YTI), and the upper first molar showed slight buccal inclination.
Treatment objectives were to establish a Class I molar and canine relationship, to establish transverse uprighting of the upper and lower molars, to establish proper vertical exposure of the upper anterior teeth, to ensure lip sealing, and to improve the aesthetics of reducing lip protrusion. To do this, the plan was to make by 1.5mm transverse bodily movement of the upper molars through NCSE in the fixation of miniscrews (2.0 mm, 12 mm) on the lateral palatal slope under the apex of premolars(Fig.20c) during Invisalign treatment. Wore the elastics for anchorage reinforcement during the sequential distalization of the upper and lower arch. The hook was used in the posterior of the NCSE in the upper arch(Fig.17d). Miniscrew was used in the buccal side of lower posterior molars. The total treatment took 27months.

Post treatment panoramic radiograph showed root paralleling in the lower molars(Fig.21). Transverse uprighting of upper and lower molars was improved(Fig.20d). Nasal width increased by 2.91mm at the U6 level, and CR width of U6 increased by 3.14mm(Fig.20b). The exposure of the maxillary anterior teeth increased due to the posterior and inferior movement of the upper and lower anterior teeth by 2.66 mm and 2.99 mm(Fig.20a), respectively, which improved lip protrusion as a result(Fig.23).

Table 2. Key cephalometric values of Case 2

Measurement	Pre-Tx	Post-Tx	Norms
ANB	4.4	5.1	2.4 ± 1.8
FMA	22.5	22.6	24.2 ± 4.6
U1-FH	122.7	110.0	116.0 ± 5.7
L1-Mn Pl	108.4	102.5	95.9 ± 6.3
Y-index	-2.75	0.3	-1 ~ 0

Pre-treatment

Fig. 13. Pre-treatment panorama

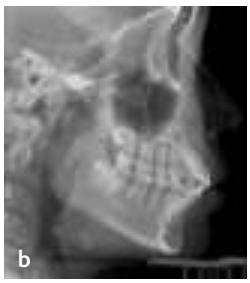


Fig. 14a-b. Pre-treatment cephalometric radiograph

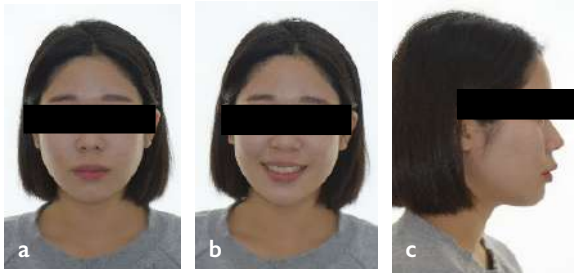
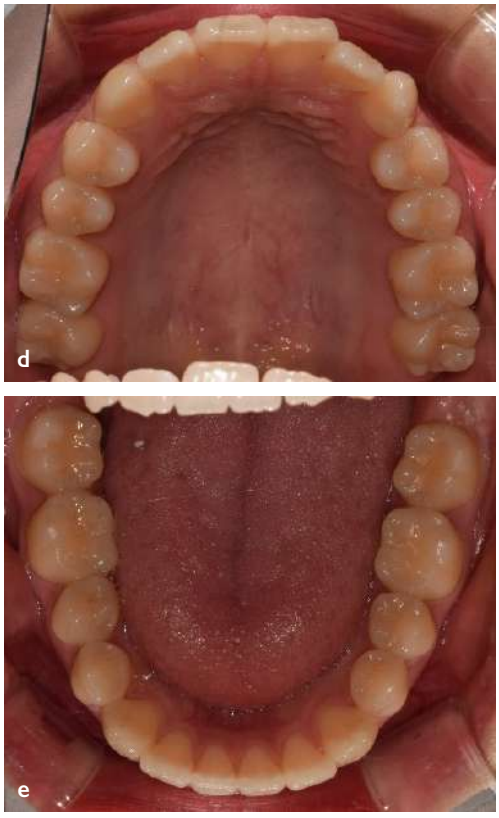


Fig. 15a-c. Pre-treatment facial views

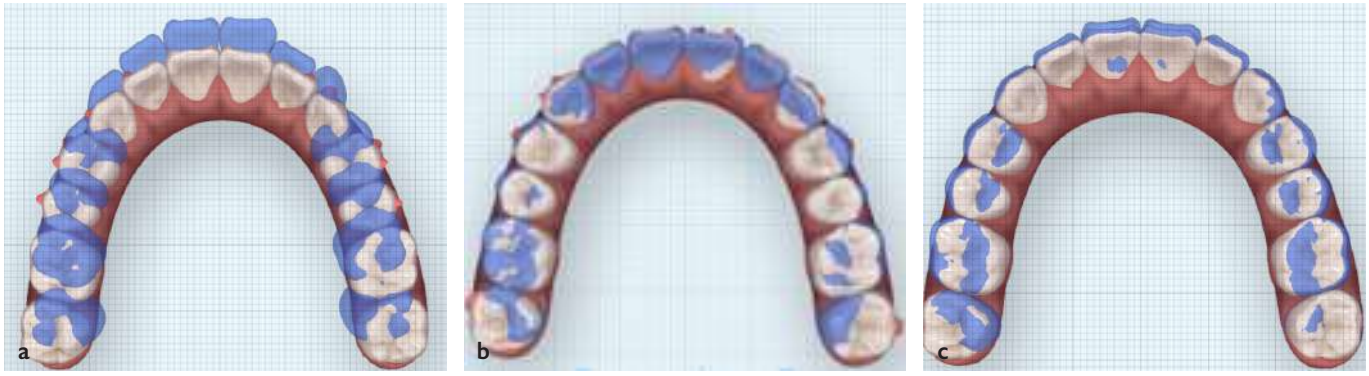
Fig. 16a-e. Pre-treatment intraoral views



NCSE & Aligner 30

Fig. 17a-e. Intraoral views

Expansion of Upper arch in the Clincheck & CBCT



Teeth	Initial position	Final align position	
1.3 - 2.3	36.9	38.4	+1.5
1.4 - 2.4	40.1	42.5	+2.4
1.5 - 2.5	44.5	47.5	+3.0
1.6 - 2.6	48.3	51.1	+2.8

Teeth	Initial position	Final align position	
1.3 - 2.3	38.5	39.2	+0.7
1.4 - 2.4	43.0	42.9	-0.1
1.5 - 2.5	47.9	47.5	-0.4
1.6 - 2.6	51.9	51.2	-0.7

Teeth	Initial position	Final align position	
1.3 - 2.3	38.6	37.6	-1.0
1.4 - 2.4	43.5	42.4	-1.1
1.5 - 2.5	48.4	47.3	-1.1
1.6 - 2.6	52.2	50.9	-1.3

Fig. 18a-c. ClinCheck of the inter-arch width (a)1st Aligner (b)Additional 1st Aligner (c)Additional 2nd Aligner

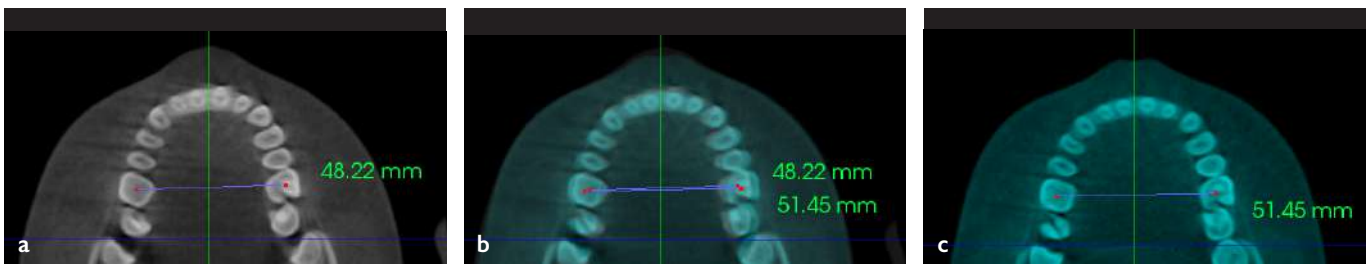


Fig. 19a-c. (a)The initial inter-arch width of CBCT (b)The inter-arch widths of CBCT superimposition (c)The final inter-arch width of CBCT

Superimposition of CBCT

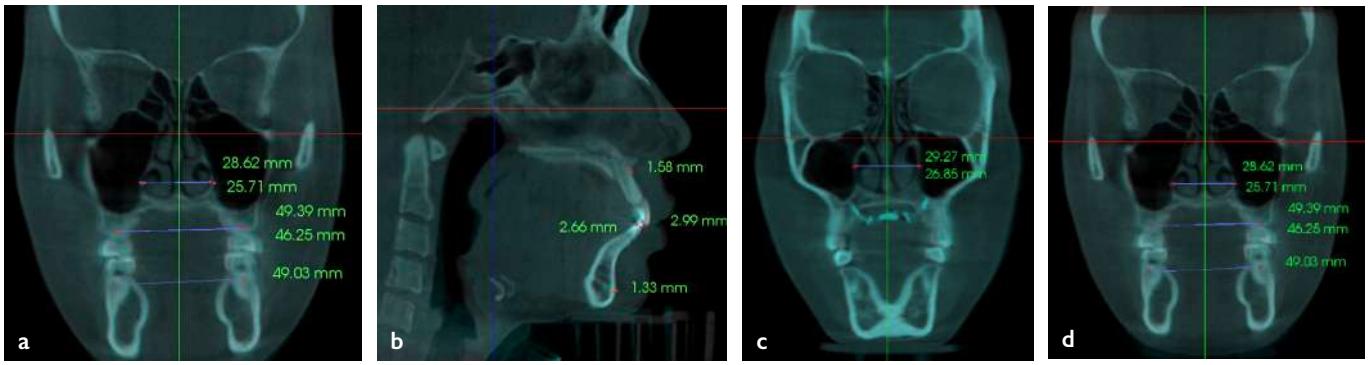


Fig. 20a-b. (a)Sagittal change (b)Nasal cavitry & YTI change (c)Nasal cavity expansion by NCSE (d) U6 crown expansion pattern

Post-treatment

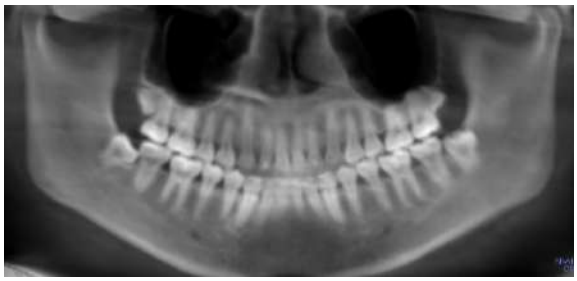


Fig. 21. Post-treatment panorama

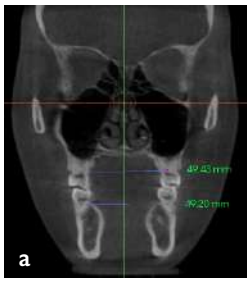


Fig. 22a-b. Post-treatment cephalometric radiograph

Fig. 23a-c. Post-treatment facial views

Fig. 24. Post-treatment intraoral views

Case 3

The third case was a 16-years-old female with the chief complaints of upper anterior protrusion. In the frontal facial view, the patient had a symmetrical face, tension on the lips when the mouth closed, and chin prominence. In the lateral facial view, the nasolabial angle was small, and lower lip was retrusive. Intraoral views showed Class II tendency canine and molar relationship, V-shaped upper arch form, protrusive central incisors, U–shaped lower arch form, lingual inclination in the lower posterior teeth, deep curve of spee and anterior crowding. The radiographic analysis, revealed a Class I skeletal relationship in the sagittal view, and a slightly high angle vertically; transverse nasal morphology was good, but the maxilla was narrower than the mandible by -6.3 mm (YTI), and the upper first molar showed buccal inclination.
Treatment objectives were to establish a Class I molar and canine relationship, to establish transverse uprighting in the upper and lower molars, and to improve deep bite through intrusion of the lower anterior teeth, to establish proper vertical exposure of the upper anterior teeth, to ensure lip sealing, and to retract upper anterior teeth through improve upper arch form. In order to achieve this objective during the Invisalign treatment, 2.5mm transverse bodily movement of the upper molars was executed through NCSE in the fixation of miniscrew(1.8 mm, 13 mm in the anterior, 1.8 mm 9 mm in posterior) in the median palatal area(Fig.29). Also, wore the elastics for anchorage reinforcement during the sequential distalization of the upper arch. The hook was used in the posterior of the NCSE in the upper arch(Fig.29). The total treatment took 23months.

Post treatment records showed well aligned arches with a correct incisor relationship, Angle Class I molar and canine relationship, improved overjet and overbite(Fig.37). There was improved transverse uprighting of upper and lower molars(Fig.33c,d). Nasal width increased by 4.06mm at the U6 level, and CR width of U6 increased by 6.66mm(Fig.33b). The exposure of the maxillary anterior teeth increased due to the posterior and inferior movement of the upper anterior teeth by 4.71 mm, the anterior and inferior movement of the lower anterior teeth by 4.97 mm(Fig.33a), respectively, which improved retrusive lower lip as a result(Fig.36c).

Table 3. Key cephalometric values of Case 3

Measurement	Pre-Tx	Post-Tx	Norms
ANB	1.5	2.0	2.4 ± 1.8
FMA	31.0	32.6	24.2 ± 4.6
U1-FH	134.3	112.2	116.0 ± 5.7
L1-Mn Pl	87.9	94.7	95.9 ± 6.3
Y-index	-6.3	0.3	-1 ~ 0

Pre-treatment

Fig. 25. Pre-treatment panorama

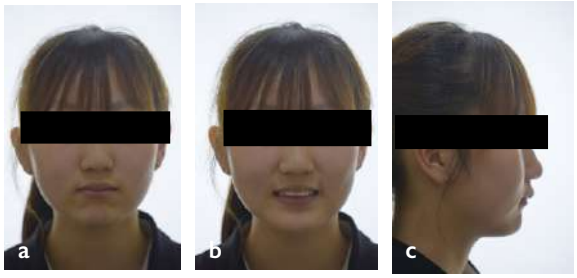


Fig 27. Pre-treatment facial views

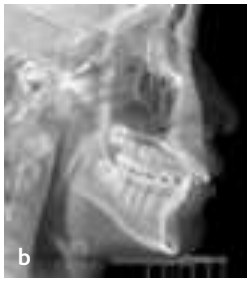


Fig. 26a-b. Pre-treatment cephalometric radiograph

Fig. 28. Pre-treatment intraoral views

NCSE by slow expansion

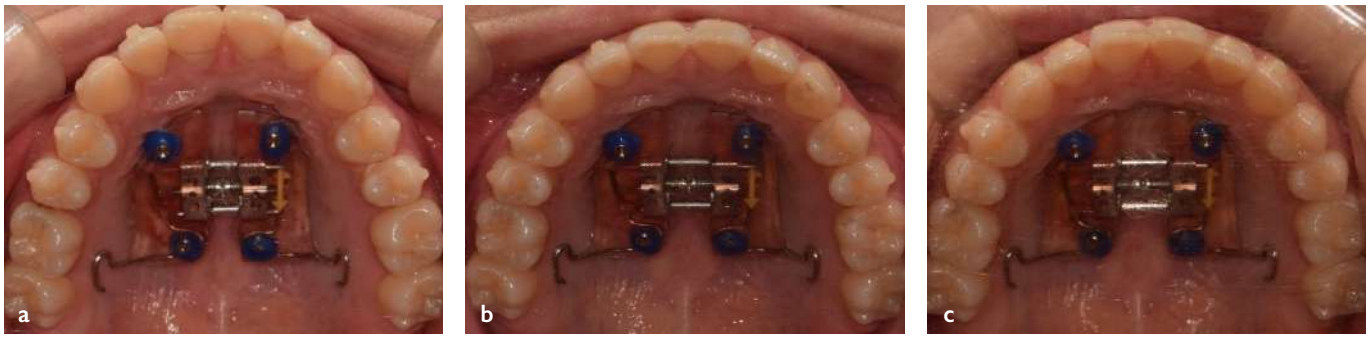


Fig. 29. (a)9months (b)14months (c)22months

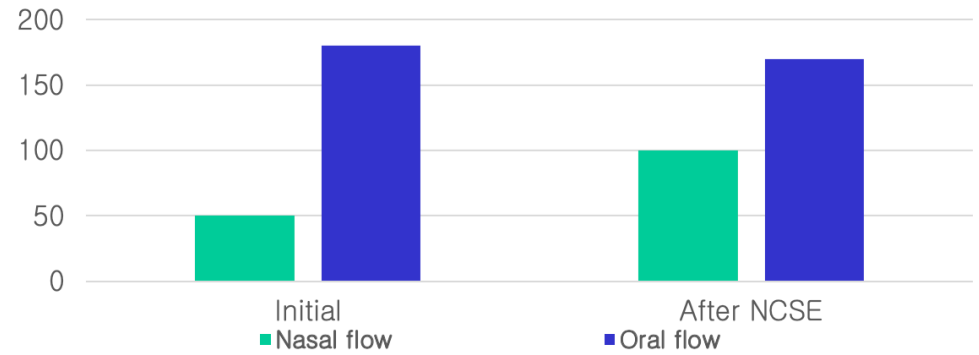
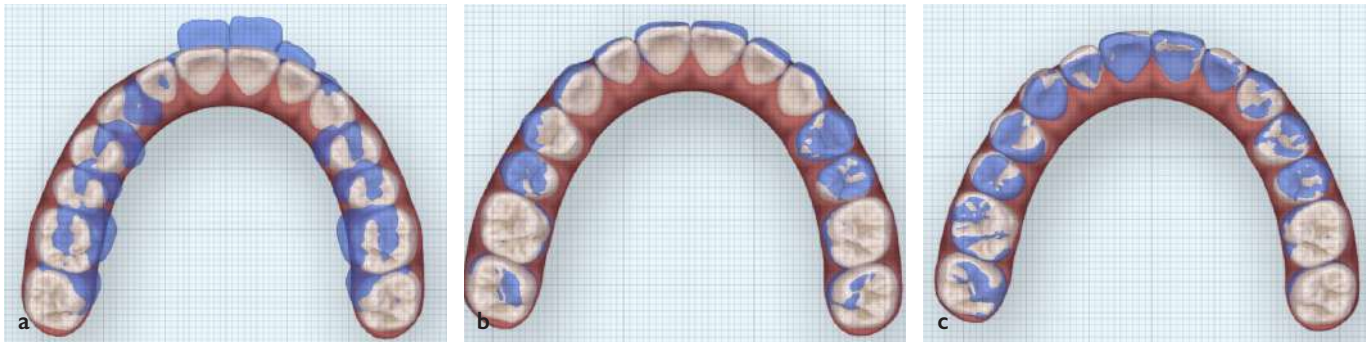


Fig. 30. Inspiratory flow changes after NCSE

Expansion of Upper arch in the Clincheck & CBCT



Teeth	Initial position	Final align position	
1.3 - 2.3	33.7	37.4	+3.7
1.4 - 2.4	36.4	42.3	+5.9
1.5 - 2.5	43.6	47.9	+4.3
1.6 - 2.6	47.7	52.0	+4.3

Teeth	Initial position	Final align position	
1.3 - 2.3	37.8	36.6	-1.2
1.4 - 2.4	42.1	42.1	0.0
1.5 - 2.5	48.6	48.5	-0.1
1.6 - 2.6	53.0	53.1	+0.1

Teeth	Initial position	Final align position	
1.3 - 2.3	37.0	36.8	-0.2
1.4 - 2.4	42.2	42.4	+0.2
1.5 - 2.5	48.9	48.8	-0.1
1.6 - 2.6	53.5	53.7	+0.2

Fig. 31a-c. ClinCheck of the inter-arch width (a)1st Aligner (b)Additional 1st Aligner (c)Additional 2nd Aligner

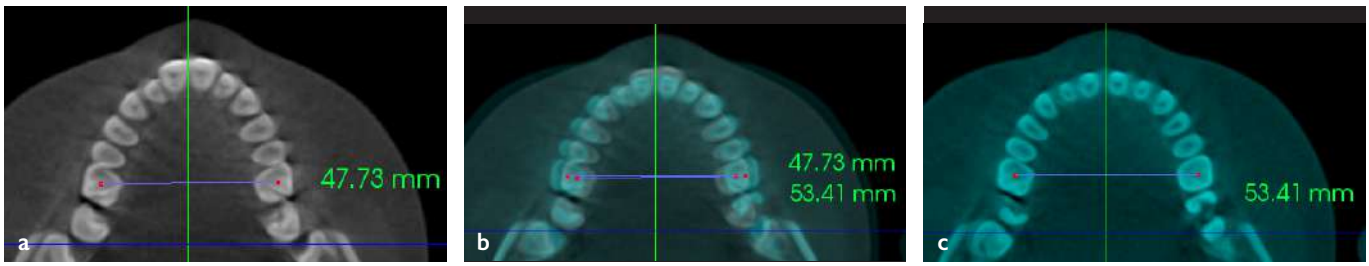


Fig. 32a-c. (a)The initial inter-arch width of CBCT (b)The inter-arch widths of CBCT superimposition (c)The final inter-arch width of CBCT

Superimposition of CBCT

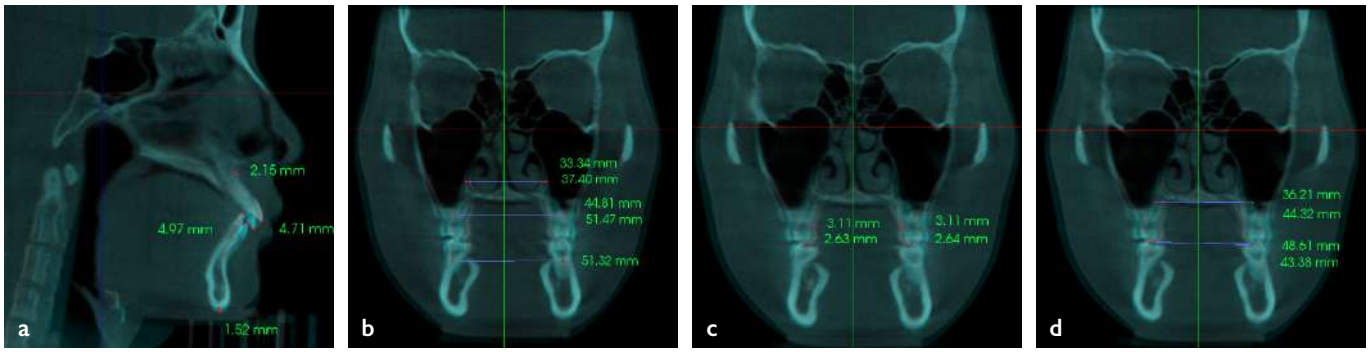


Fig. 33a-b. (a)Sagittal change (b)Nasal cavitry & YTI change (c)U6 crown expansion pattern (d)U6 root expansion pattern

Post-treatment

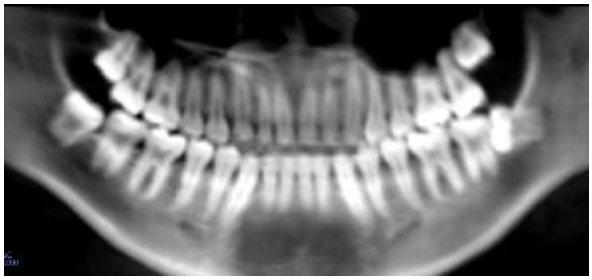


Fig. 34. Post-treatment panorama

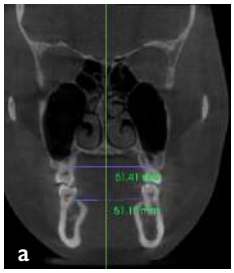


Fig. 35a-b. Post-treatment cephalometric radiograph

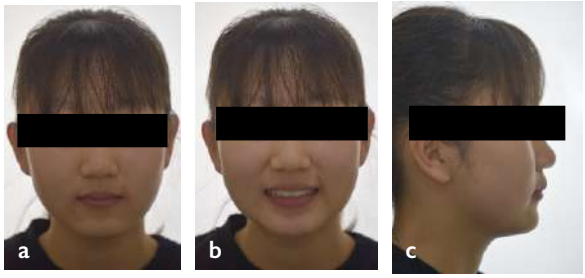
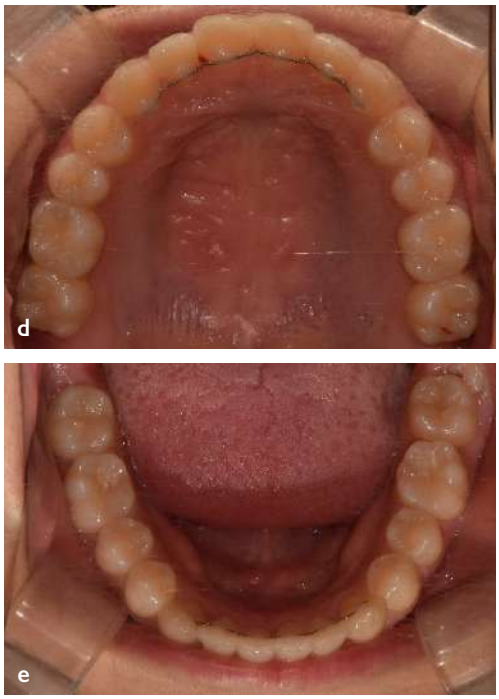


Fig. 36. Post-treatment facial views

Fig. 37. Post-treatment intraoral views



Discussion

Force and moment are necessary for the bodily movement of the tooth. In the edgewise system, tooth movement is possible because the moment is generated by the contact of the wire with the wall opposite to the bracket slot. [15] However, in the clear aligner device, most of the force is applied to the occlusal area and decreased rapidly toward the gingival area. Therefore, in cases where tipping and intrusion are required, clear aligners are recommended. When bodily movement and torque are needed, using a clear aligner might be a compromised solution. [16]

The labial/lingual root movement in the anterior can be controlled better with SmartTrack, Power ridge, and Attachments. [17, 18] However, in the posterior, the buccal root movement is almost impossible to control even with attachment. [16] Even if this movement is possible due to the improved material of the clear aligner, in the case where the maxillary skeleton is transversely narrow, it may cause periodontal problems such as resorption of buccal cortical bone, fenestration, and gingival retraction when the maxillary posterior dentoalveolar is inclined towards the buccal side. [8,9] Therefore, when the maxilla is laterally deficient, maxillary skeletal expansion is recommended. Thus, the maxilla needs to be expanded skeletally in case of maxillary transverse deficiency. In cases 2 and 3, the maxilla was expanded so that the roots of the maxillary molars were well-located in the alveolar bone. When the CBCT images from the initial treatment and end of treatment were superimposed, bodily movement in the maxillary first molar was confirmed and, in case 3, the apical root moved 1.5 mm more to the buccal side than the towards the crown (Fig.33d).

YTI [14] was determined by CBCT when diagnosing maxillary transverse deficiency. This is not necessarily confirmed only through CBCT but can be easily confirmed using the labial side slope of the dental crown in the posterior maxilla as mentioned above. However, it is necessary to diagnose using a CBCT that shows the entire cranial face in order to check the required expansion accurately, the pattern of change in the facial bone due to the expansion, and the locations where miniscrews are to be fixed.

For posterior maxillary expansion, YTI was entered identically for the left and right in the ClinCheck as 1/2. Although the amount of expansion may vary due to differences in left and right occlusal formation, the default expansion in the ClinCheck plan was to use the same value for the left and the right. As the patterns of maxillary skeletal changes by NCSE and other maxillary skeletal expansion devices vary from person to person in 3D, it is necessary to confirm the skeletal and dental changes and to re-evaluate these patterns.

The reason for fixing the miniscrew first for the expansion of the maxillary skeleton through NCSE is to select the most suitable site for obtaining the most bone support for the maxillary skeleton expansion due to the different bone distribution of individual maxillary or palatal bones.

Various maxillary skeletal expansion devices require a rapid turn of more than one turn per day in the form of hyrax, but NCSE recommends a slow turn with two turns per week for 1 to 2 months (Fig.1, 29), followed by 2 to 3 turns for subsequent visits during the next 1 to 2 months. If maxillary skeletal changes and the resulting movement of maxillary teeth occurs quickly during rapid turns, it is highly likely that manufacturing additional devices will be required due to the failure of the fitting of Invisalign. In addition, for skeletal changes, the amount of bone support provided at the fixture site in the device design is more important than the expansion rate. In case 2, the desired maxillary skeletal expansion could be obtained with only 2 miniscrews in the adult patient (Fig.20c).

The maxillary skeletal expander is named the Nasal Cavity Skeletal Expander for three reasons. First, maxillary skeletal expansion is accompanied by the skeletal expansion in the nasal cavity,[19] and the expansion in the nasal cavity is approximately twice that of the anteroinferior movement of the maxillary bone.[20] In case 2, A point in the maxilla showed an anteroinferior movement of 1.58 mm and nasal cavity expansion of 2.91 mm (Fig.20a), In case 3, A point in the maxilla showed an anteroinferior movement of 2.15 mm and nasal cavity expansion of 4.06 mm (Fig.33a). As such, further research with a greater number of cases is necessary. Second, maxillary skeletal expansion leads to the skeletal expansion in the nasal cavity, which improves nasal breathing by reducing the resistance of airflow and increasing nasal input.[21,22] In addition, the peak nasal inspiratory flow measurement device can be periodically measured to determine the extent of skeletal expansion.[21] In case 3, the nasal inspiratory flow measured was less than 50 L/min for the initial nasal input but it increased to 100 L/min after nasal cavity expansion, showing that the nasal input has doubled (Fig.30). Third, it is to emphasize that various maxillary skeletal expansion appliances can improve respiratory function as well as cause maxillary skeletal changes.[23] Clinical application of NSCE to resolve maxillary transverse deficiency with narrow nasal airway is recommended to enhance physiologic treatment outcomes.[21]

These cases have demonstrated posterior expansion movement and successful maxillary skeletal expansion using Invisalign in patients with a normal maxillary skeleton and those with maxillary transverse deficiency. In addition, the protocol for the design and expansion of a new NCSE (Nasal Cavity Skeletal Expander) for maxillary transverse deficiency is presented in Fig 1.

Conclusion

In the case of palatal inclination in maxillary posterior teeth, functional and aesthetic improvements can be made by establishing transverse uprighting of the maxillary and mandibular posterior teeth with Invisalign alone. Cases in which the maxillary molars show buccal inclination could be achieved functional and aesthetic improvements by establishing transverse uprighting in the maxillary and mandibular molars by applying Invisalign concurrently with a maxillary skeletal expansion device, such as an NCSE.

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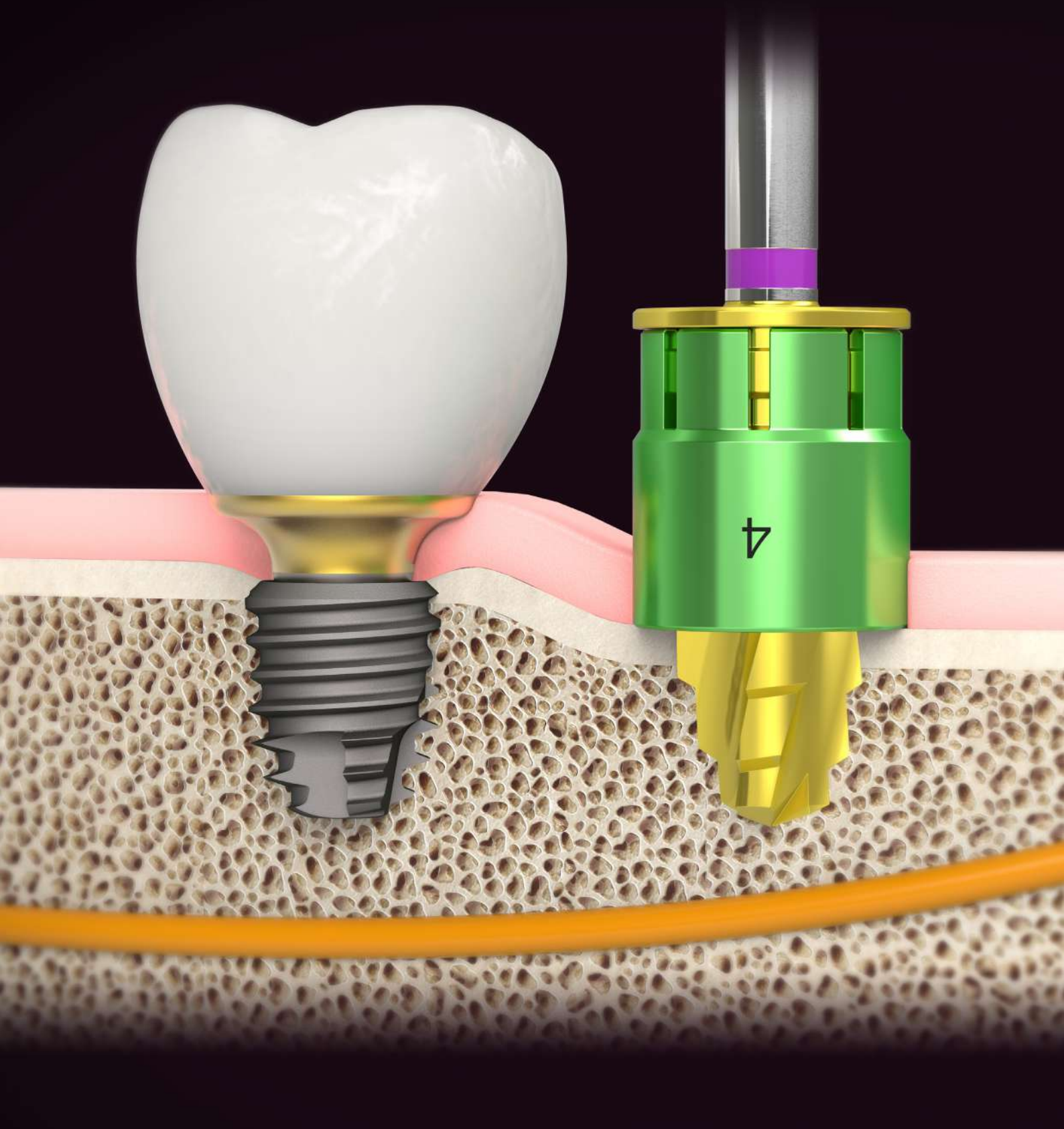
DENTIS SQ IMPLANT | SHORT

Safe and strong fixation



Long-term Observations for Subepithelial Connective Tissue Graft (SCTG) in Periodontal and Implant Surgery: Part 1

Kyoungman Min, DDS, MSD

Introduction

Mucogingival surgery is a plastic surgery procedure designed to correct defects in the morphology, position, or quantitative amount of the gingival morphology and location or quantitative defects around the teeth. Recently, with people's growing interest in the esthetic outcome of dental treatment the popularization of implant surgery, mucogingival surgery has garnered much attention from clinicians as a surgical procedure that enhances not only the prosthetic esthetics but also the long-term prognosis. In this light, the term "Periodontal Plastic Surgery" is becoming increasingly popular [1].

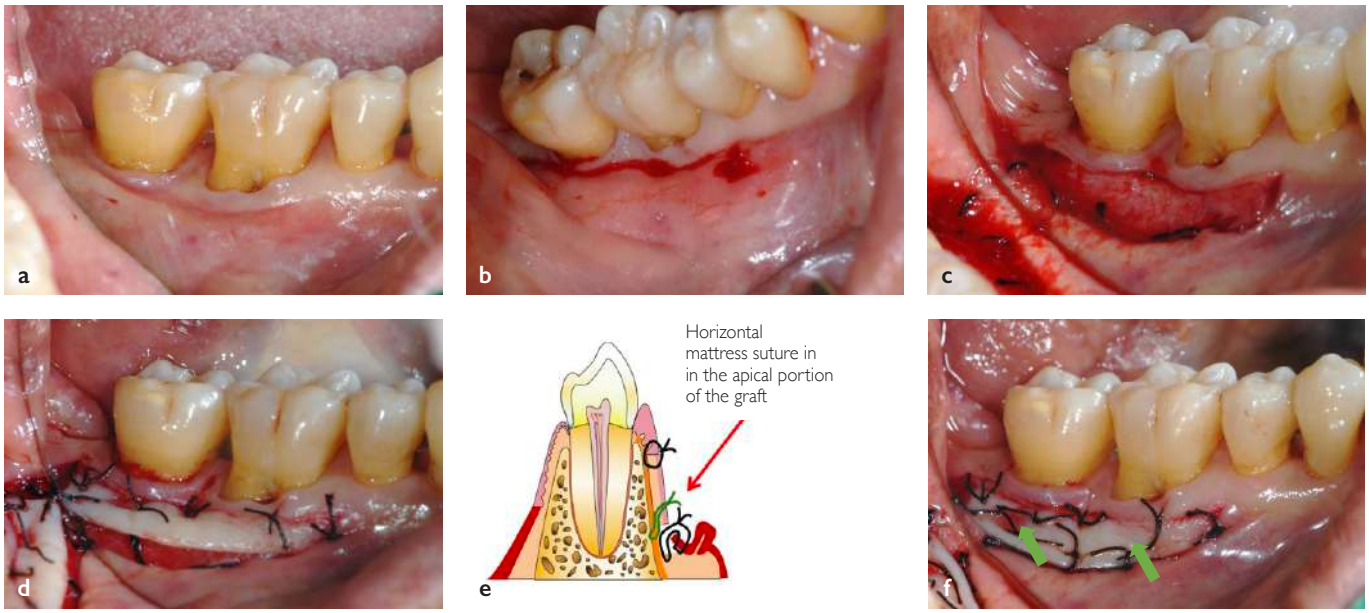


Fig. 1a-f. Since the importance of the attached gingiva (AG) became known, there have been attempts to increase the width of attached gingiva surrounding the natural tooth or implant to resolve many problems such as facilitating removal and control of plaque around the gingival margin, improving the esthetics, and reducing peri-implant gingivitis. Horizontal mattress suture in the apical portion of the graft was performed additionally to minimize graft shrinkage.

Kyoungman Min

D.D.S, MSD, Seoul National University
Residency, Department of Periodontology, Seoul National University Dental Hospital
Affiliated professor, Department of Periodontology, Seoul National University
Director, Seoul Mai Dental Office

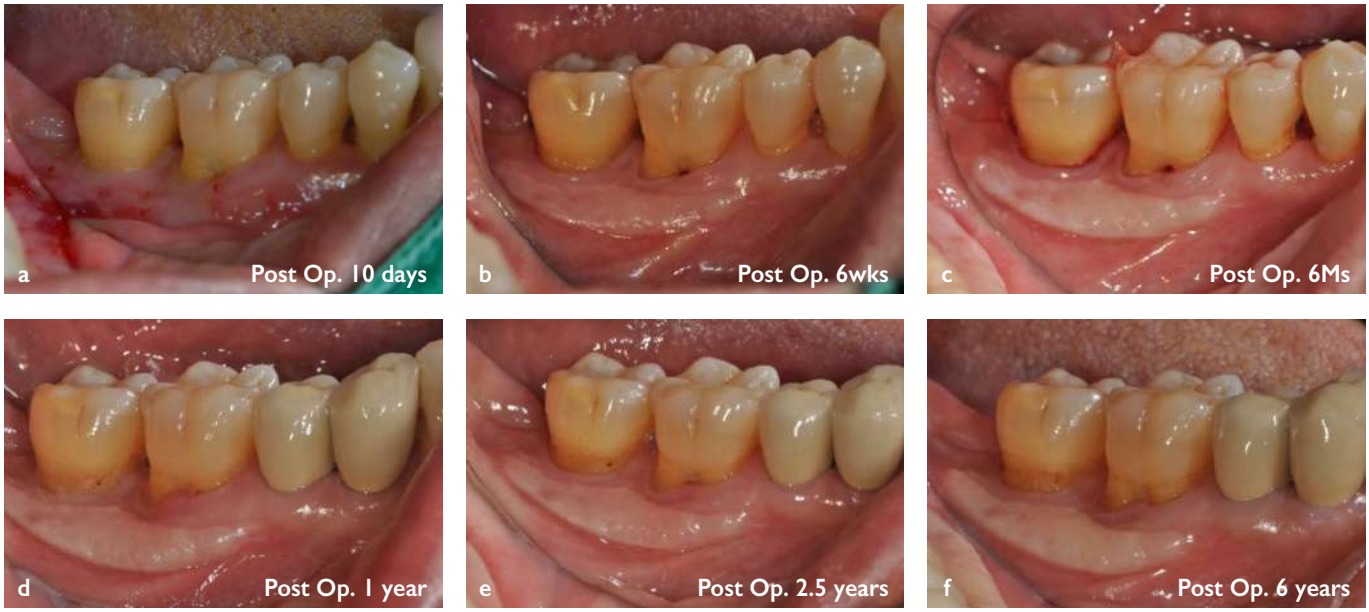


Fig. 2a-f. A 54-year-old male patient visited my clinic for discomfort in the area of right side mandibular molar region when brushing. I did free gingival graft procedure and the result is well maintaind for 6-years after surgery. In addition there has been no problem about the class I furcation involvement lesion of #36 tooth

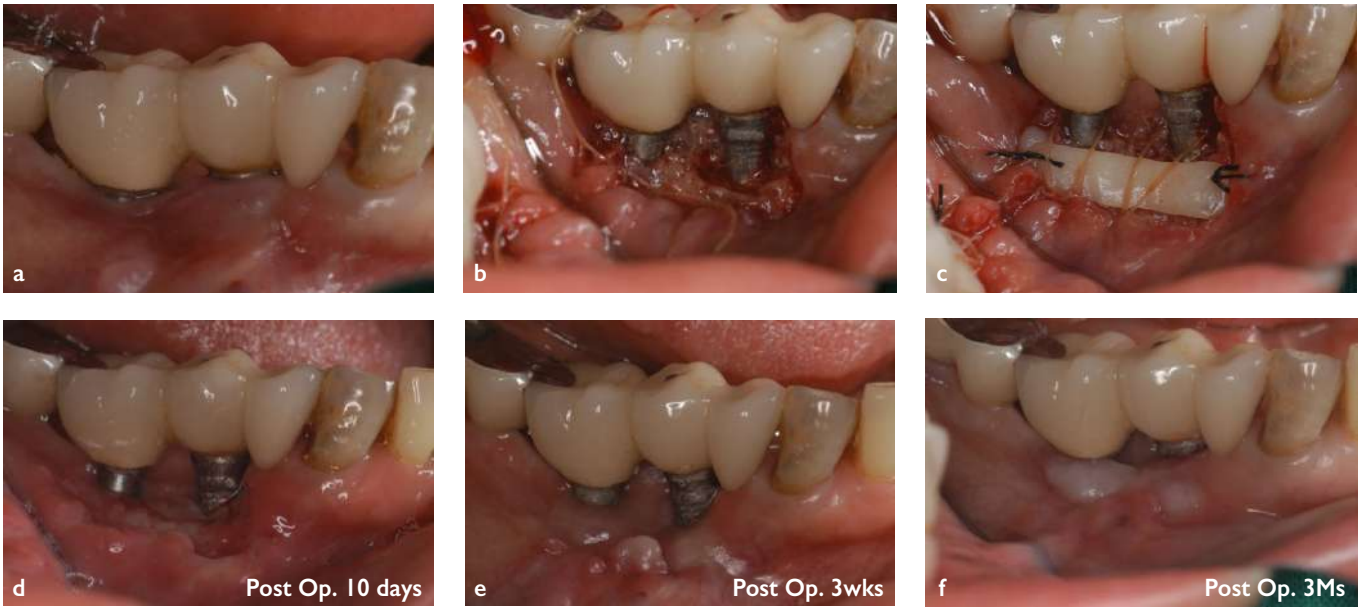


Fig. 3a-f. Peri-implant soft tissue is different from natural dentition's in that there is no Sharpy's fiber, and thus lack of AG can render the peri-implant mucosa prone to inflammation. After the mucosa on the buccal side of the implant had been moved toward the apex, a free gingival graft procedure was performed to establish a firm AG, removing the periodontal pocket and deepening the oral vestibule

Fig. 4a-f. A year after surgery, the firmly engrafted tissue was remodeled and developed into a rigid keratinized AG. Although a pseudo pocket was formed, it has been maintained for 13 years without any outstanding problems and forming a close contact with the implant surface

Regarding free soft-tissue autograft procedure, which has been reported in American literature since the 1960s, the practice of surgical augmentation of attached gingiva became commonplace after Sullivan and Atkins (1968) [2,3,4] published three classical papers on indications, surgical procedure, and wound healing. In 1972, Lang and Löe [5], reported that "when the attached gingiva was less than 1 mm (keratinized gingiva was less than 2 mm), inflammation persisted even with sufficient plaque control." Recently, however, with the development of various soft-tissue management procedures related to implant surgery, subepithelial connective tissue graft (SCTG) is primarily being performed. This is based on the fact that the esthetic defect at the recipient site is emphasized in the free gingival graft (FGG) and that the attached gingiva can be secured with the SCTG. This is supported by the experimental finding of Karring, [6] which is that the nature of gingiva is defined by the connective tissue below it. In fact, even before the development of graft procedures for root coverage, a free connective tissue graft (FCTG) had been performed in order to increase the width of the attached gingiva[7], And then application of this procedure has been expanded by clinicians from the treatment of denuded root to other areas including the treatment of furcation lesions, alveolar bone defects and soft tissue for implant surgery. [10,11]

Fig. 5a-f. To fabricate a surveyed crown for partial denture in the future, I increased width of attached gingiva via free gingival graft, apically positioned flap and free CT graft. The procedures had to be performed on the same day, and I asked the patient at 4 weeks of healing, whether there was any discomfort. The patient reported similar levels of discomfort on both sides of the mandibular premolar region, the recipient site, but less discomfort on the side where FCTG was performed in the palatal donor site. I believe this is coming from the difference between an open wound and a closed wound

In implant restoration, FCTG is commonly performed to secure a healthy biologic width around the implant, based on the different characteristics of the soft tissue around the dental implant and the natural tooth in shape and profile at the cervical margin.

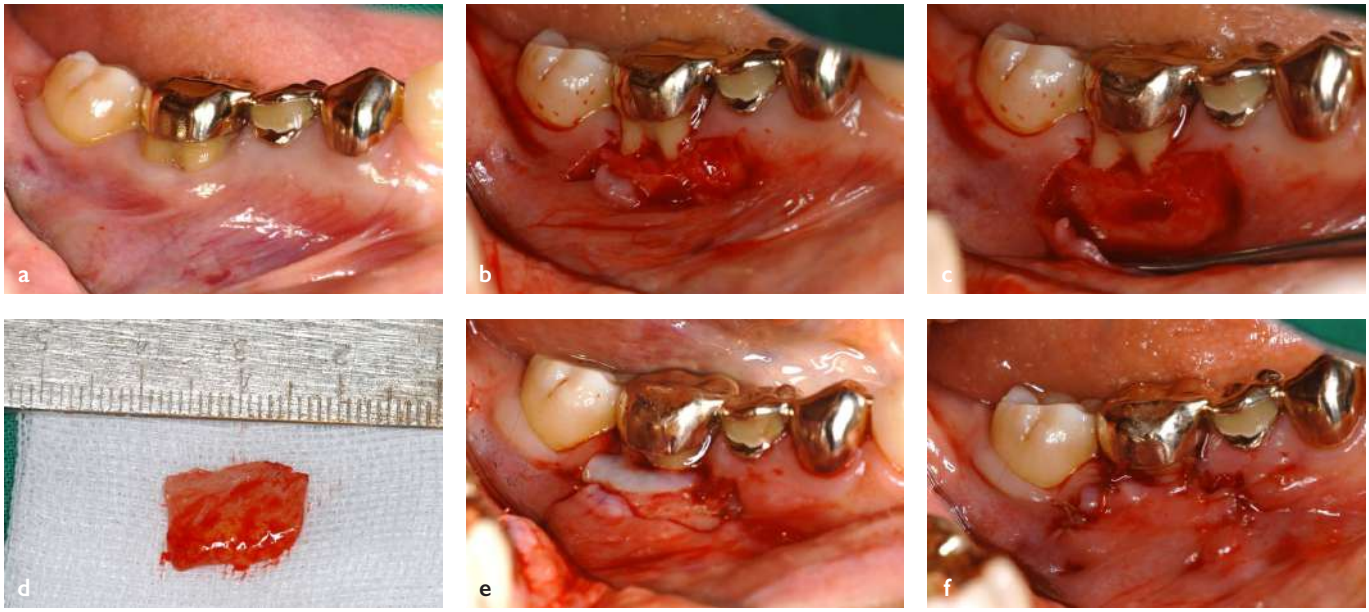


Fig. 6a-f. There are many ways to treat furcation lesions, but most are resective surgery, with some guided tissue regeneration therapy. Since soft-tissue attachment around the furcation areas is weak and thus prone to recurrence, SCTG may serve as an alternative in the case of grade I or early grade II furcation defect in patients with a thin bio-type. This patient had a grade II furcation defect and received SCTG after a partial-thickness flap formation

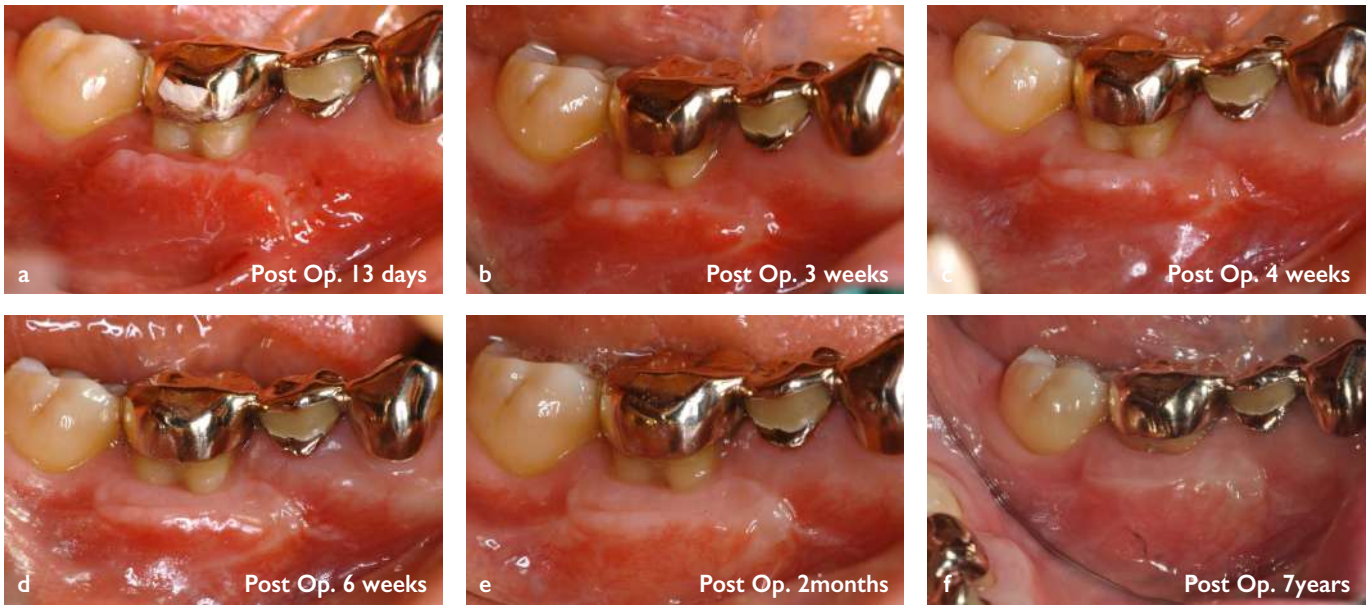


Fig. 7a-f. The preservation of graft tissue specificity reported by Karring T in 1975 explains the increase in keratinized gingiva during the two months of healing period after surgery, beginning from the minimum keratinization immediately following surgery. After 7 years of follow-up, creeping attachment[12,13] was observed based on good oral hygiene

To resolve peri-implantitis in the anterior maxilla, we can applicate guided bone regeneration therapy and FCTG at the same time, as shown in Figure 8,9,10. After a considerable period of soft tissue remodeling, the characteristic volume of healty gingiva is observed around the cervical region as in natural dentition (Figure 7)[14].

Fig. 8a-h. A 38-year-old male patient visited my clinic for an acute periodontal abscess due to a fracture of right side maxillary central incisor. Abscess drainage was performed and antibiotics and analgesics was prescribed. After emergency treatment, He had received implant surgery at another clinic but visited our clinic for treatment of a fistula around the implant. After flap reflection, I removed the inflamed tissue surrounding the lesion site completely. I did surface treatment of contaminated implant with airabrasive powder, Tetracyclin swab, conditioning and then performed bone graft with xenogenic bone

Fig. 9a-c. I performed SCTG to prevent exposure of the implant prosthesis margin and to restore the natural emergence profile after application of resorbable membrane. Care must be taken to ensure that the graft amount is appropriate for the defect size

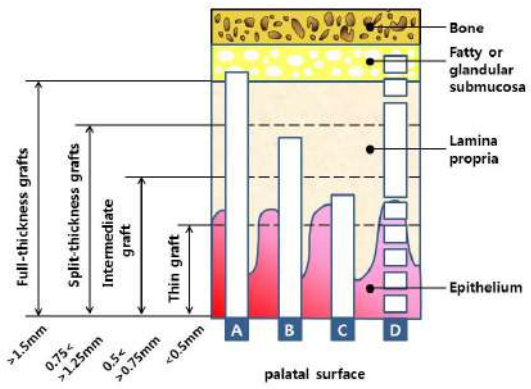
Fig. 10a-f. Soft tissue defect around the distal line angle area, fortunately, started to disappear at around 6 months. At 4 years post-surgery, the characteristic volume effect normally seen after CT graft around the cervical marginal area was observed

In summary, most of the surgical procedures for solving mucogingival problems fall into the category of FGG or SCTG and many techniques which is currently adopted and developed are based on the techniques of these two categories. The surgical procedure of these two categories commonly include the following four steps: **recipient site preparation** via partial-thickness flap formation (of course, full-thickness flap may be in some cases and, in fact, there have been reports of FGGs engrafted to the exposed bone.), **donor site preparation** for harvesting soft tissue from the palatal side according to the specific purpose, **graft immobilization** for securing the harvested graft to the recipient site, and lastly **donor site protection**[15]. In particular, since recipient site preparation and donor site preparation tend to be applied commonly in current implant treatment procedures, it is necessary to familiarize yourself with these procedures in various ways during usual periodontal treatment. In this paper, I would like to compare the characteristics of general periodontal surgery and those of implant-related surgery about the SCTG by presenting one case of each indications.

Although the current topic is not about root coverage, to increase the success rate of the surgery, we will first consider some of the basic knowledge related to healing of SCTG surgery. Unlike in FGG, in FCTG, parts of the recipient site inevitably include areas that are not helpful for blood supply, such as the root surface or implant, and thus we must take advantage of the double-layer technique.

In other words, we have to exert sufficient pressure on the graft and recipient site to create close contact during the earlier stages of healing to minimize the amount of exudate and increase the efficiency of plasmatic circulation[17]. Yotnuengnit et al. (2004) [18] experimented using the Raetzke method [19] and concluded that in relation to the area of originally exposed root or implant, the graft must be covered with a flap at about an 1 1:1 ratio, in order to compensate for the limited blood supply from below.

< Palatogingival tissue that can be used>



< Classification of grafts by thickness>

Fig. 11a-b. Diagram of donor site in free gingival graft or free CT graft

In this sense, I tend to choose a surgical technique by which the graft below can be covered up as much as possible based on the area of exposed root surface and the distribution and dimensions (height and width) of surrounding keratinized gingiva. For example, in the case of Miller Class I, the Envelope Technique is used regardless of the width [20] and coronally positioned flap using resin is performed additionally depending on the degree of graft immobilization (figure 10). in the case of Miller Class II, the Harris Technique is the first choice. [21] If the periodontal tissue is of the Thin-biotype, then the Flap design is slightly extended horizontally so that the connective tissue sufficiently covers the line angle area of the corresponding tooth (Figure 12, 13).

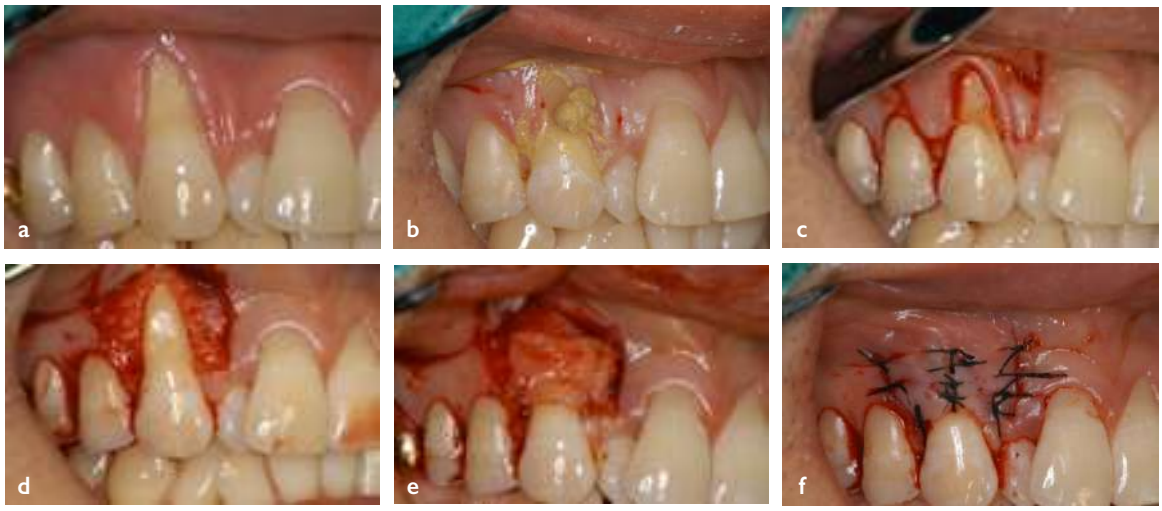


Fig. 12a-f. Herris' technique is the first choice in the case of Miller class II. During the recipient bed preparation, you must take care to perform an appropriate amount of releasing incision at the apical area considering the thickness and length of the graft so that the flap is seated passively on top of the graft

Fig. 13a-f. Root planing of the already exposed root surface was performed carefully, and then the root surface was treated with tetracyclin. Since the acidic Tetracycline may influence soft tissue surrounding the exposed root, it must be applied before flap formation. For the immobilization of the graft, suture must be done at both the coronal and apical area using 5-0 chromic-gut to open up the blood vessels within the graft and to create close contact between the graft and recipient site. In this way, early blood circulation is facilitated, even if it is slight, and initial graft shrinkage can be minimized

Fig. 14a-f. At 6 months post-surgery, the patient complained about the hypersensitivity on the maxillary right canine whilst brushing and the slight cervical abrasion that had remained was treated with composite resin. After 15 years, a functionally healthy and esthetically stable outcome was maintained. The patient mentioned that he would receive a gingival graft for root coverage on the opposite side, if the treated resin fell out

As for FGG, any keratinized gingiva on the palatal side can be used, but the rugae portion in the anterior must be avoided if possible and, especially in the molar region, care must be taken not to make too deep an incision. Thickness may vary depending on the purpose: for alveolar ridge restoration or root coverage, consider full-thickness or a thick split-thickness graft as in A. For augmenting the thickness of the attached gingiva, consider intermediate or thin split-thickness graft as in B or C. In clinical practice, the width of a #15 Blade can be used as a reference[22]. FCTG is harvested from the region slightly more anterior to the harvesting site of FGG, as this region is the thinnest due to the palatal side root of the maxillary first molar[23]. Typically, In general, the thickness of the graft tissue should be about 1.5-2.0mm. There are various ways to harvest the grafts from the palatal side depending on the number of horizontal incision lines formed and the presence of vertical incision lines in the mediodistal region. Personally, I harvest FCTG using a #15 blade only based on the "single-incision technique" proposed by Kumar et al. (2013) [24] (Figure 15).

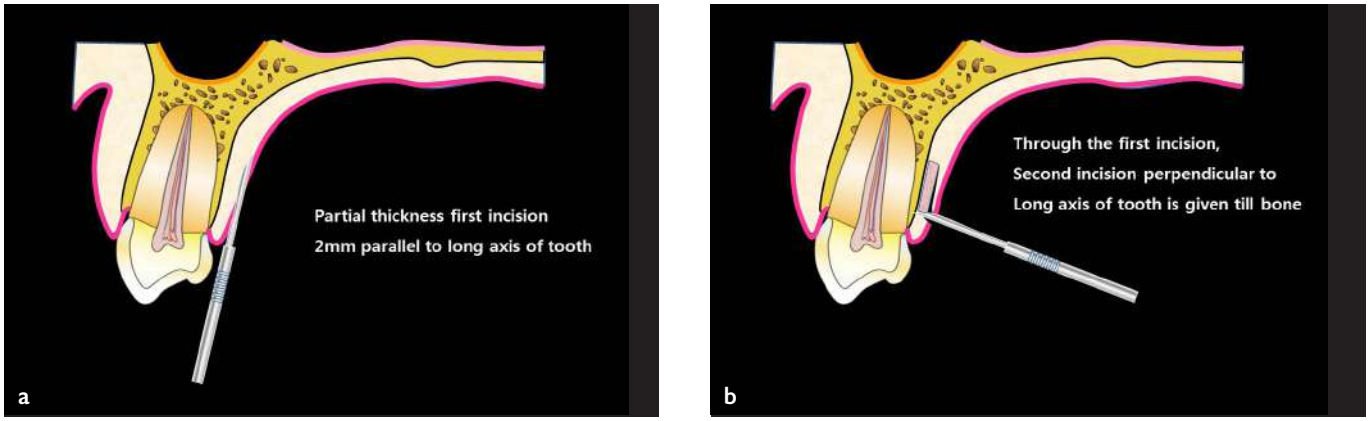


Fig. 15a-b. Line diagram of Kumar et al's. technique. a. Partial thickness first incision parallel to long axis of tooth; b: Through the first incision second incision perpendicular to long axis of tooth is given till bone.

In FGG or SCTG, which is the basis of periodontal plastic surgery, the most worrisome part is the hemorrhagic risk of the palatine artery when harvesting tissue in the donor site. Since textbooks primarily show pictures of the major blood vessel, it is easy to think that bleeding can be kept to minimal if we just avoid the vessel, but actually, it is the fine arteries that cause hemorrhage in a considerable number of clinical cases. (I try to achieve the desired graft size rather than avoid hemorrhage during surgery.) Of course, in the case of CTG, the donor site is mostly formed around the second premolar region (the harvesting site can include up to the mesial half of the first molar at most; harvesting beyond that is not recommended since the gingival thickness of the more posterior regions are thinner because of the palatal root of the first molar, and hemostasis is difficult.) to reduce the risk of hemorrhage Our staff jointly conduct the following hemostasis protocol in the case of hemorrhage: apply pressure with wet gauze, verify the hemorrhage location and inject local anesthetic containing 1:100,000 epinephrine, tie the proximal end of the blood vessel using 4-0 or 3-0 silk, and lastly, apply a hemostatics like agent such as surgicels[25]. However, if heavy bleeding is expected, then we use the surgical stent made using OmniVac to apply constant pressure after surgery.[26]

Dai A [27] reported in a meta-analysis of cases followed for more than 2 years that a coronally advanced flap (CAF) in conjunction with a CTG has greater long-term stability than CAF alone in terms of the mean root coverage and number of complete root coverage cases. As shown in Figure 12, 13, and 14, covering the exposed root with subepithelial CT and mucosa as much as possible seems to contribute to long-term stability. [28,29]

In this paper, I would like to share my experience about some of the following problems that can be solved using SCTG, with long-term clinical cases from the perspective of periodontal surgery and implant surgery.

1. A case of FCTG for esthetic improvement
2. Alveolar ridge augmentation or preservation without using a membrane
3. Alveolar ridge augmentation or preservation with a membrane
4. Promoting primary closure of the flap
5. Constructing the interdental papilla in the esthetic zone
6. Supplementary treatment of small alveolar bone defects
7. Facilitating the formation of biologic width around teeth or implants
8. Researches for for developing soft-tissue substitute

Case Presentation

Case 1
A case of SCTG for esthetic improvement

Since gingival recession in the maxillary anterior esthetic region can cause psychological problems in patients, it must be actively dealt with. For root coverage of more than two consecutive teeth, if there is a sufficient amount of healthy interdental papilla, most root coverage techniques using SCTG are possible and the Bruno Technique is especially useful, [30,31] which does not include a vertical incision in the recipient site However, if there is not enough interdental papilla as in this case, then the interdental papilla must be preserved as much as possible and advanced toward the coronal direction if needed. A method based on the Tunnel Subepithelial Connective Tissue Graft must be performed to reposition the flap including the interdental papilla toward the coronal direction[32](Figure 17,18).

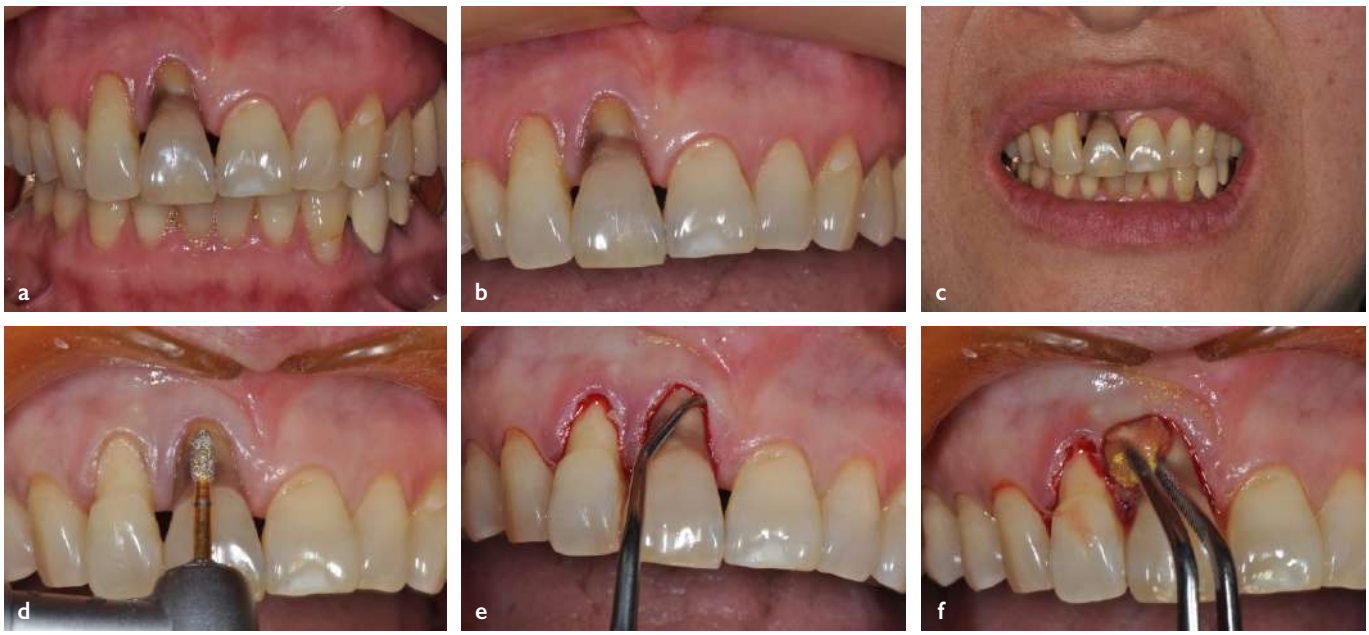


Fig. 16a-f. If gingival recession is observed in two consecutive teeth, typically Bruno's technique is recommended, which cuts the interdental papilla region without using a vertical incision or removing the graft epithelium, minimizing the amount of coronal displacement. In the present case, gingival recession was observed in the interdental papilla region so Tunnel Subepithelial Connective Tissue Graft surgery was performed without any vertical or horizontal incisions

Fig. 17a-f. A sufficient areas of recipient site shold be prepared using the P-24-G periosteal elevator, Fedi-1 chisel, Perio knife and #15 Blade so that the entire interdental papilla may be coronally repositioned for augmentation in the future. Care must be taken to avoid any perforations on the flap

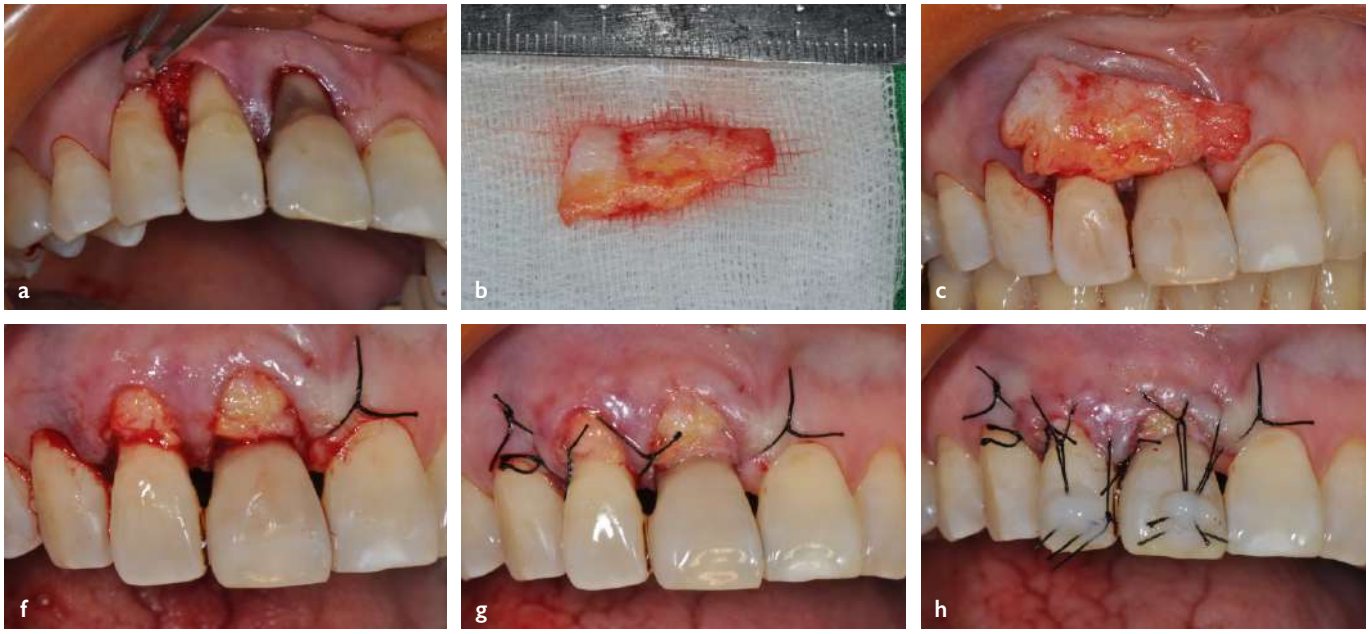


Fig. 18a-f. Since it is difficult to fit a thick graft into a narrow space, a mini vertical incision on distal line angle area was made to secure space for the graft, which was then carried by the suture to position it in the desired place; it was immobilized by simple interrupted suture in the middle papilla. The flap was coronally positioned using resin and suture method to cover up the graft as much as possible

Fig. 19a-i. After tooth preparation, any severely discolored spots were filled with tooth colored opaque resin and the good esthetic outcome was well maintained after 5 -year followup. In particular, the improved "Pink Esthetic" allowed for a natural smile

In general, I believe that the most critical factor to consider when selecting the surgical method for patients in need of root coverage is the health of the interdental papilla, which is implied in the Miller's classification[33]. In other words, the amount of interdental papillary tissue determines the prognosis, which I explain to the patient using the analogy that the height of the suspension bridge tower determines the height of the road so that he does not exaggerate the predicted results.It is known that after about 5 days of SCTG placement in the recipient site, vessels increase their continuity and form a vascular layer between the recipient site and graft and at 7 days, a horizontal anastomosis with the existing vasculature in the graft occurs, until complete revascularization of the graft occurs by week 2. Therefore, when you remove the stitches around 10 days post-surgery, you must assess the graft condition to verify the outcome and respond accordingly, such as inform the patient about re-surgery. Between about 4 weeks to 2 months post-surgery, the graft-recipient site boundary is lost [17] and thus it is considered safer to proceed with treatment including prosthetic procedure after 2 months. Nonetheless you must take the utmost care, if you proceed with impression-taking procedure such as inserting the cord. (Figure 19).
In the esthetic region, gingival recession that occurs after installing the implant prosthesis will cause a more severe esthetic problem. Since most gingival recession that occurs after implant surgery is caused when the labial prosthetic margin is formed inappropriately and fails to provide enough volume of soft tissue to this area, it is recommended to first re-fabricate the prosthesis from the abutment step to fabricate appropriate customized abutment. However, if the position or angle of fixture insertion is wrong in the first place, then it is difficult to secure appropriate thickness of labial soft tissue by re-making the prosthesis and thus a Biotype conversion must be attempted via SCTG (Figure 19, 20) [34,35]. The patient had been diagnosed as a thin-biotype at the first visit and had received implant surgery with Guided bone regeneration procedure after three failures with a splinted 4-unit bridge. Two years after surgery, the patient visited our clinic for gingival recession and leaking of pronunciation in the pontic region. We used the existing implant and there was no recurrence 4 years post surgery.
in the case of implant restorations in the esthetic region like the anterior maxilla in patients with a thin-biotype, gingival recession can be prevented first by surgically augmenting the tissue via SCTG, and then by prosthetically using a custom abutment to maximize the thickness of the peri-implant soft tissue. In the case of patients with a thin-biotype, high-scallop, and high lipline, it is recommended to fabricate the abutment and prosthesis using tooth-colored material in preparation for a possible gingival recession. [37]

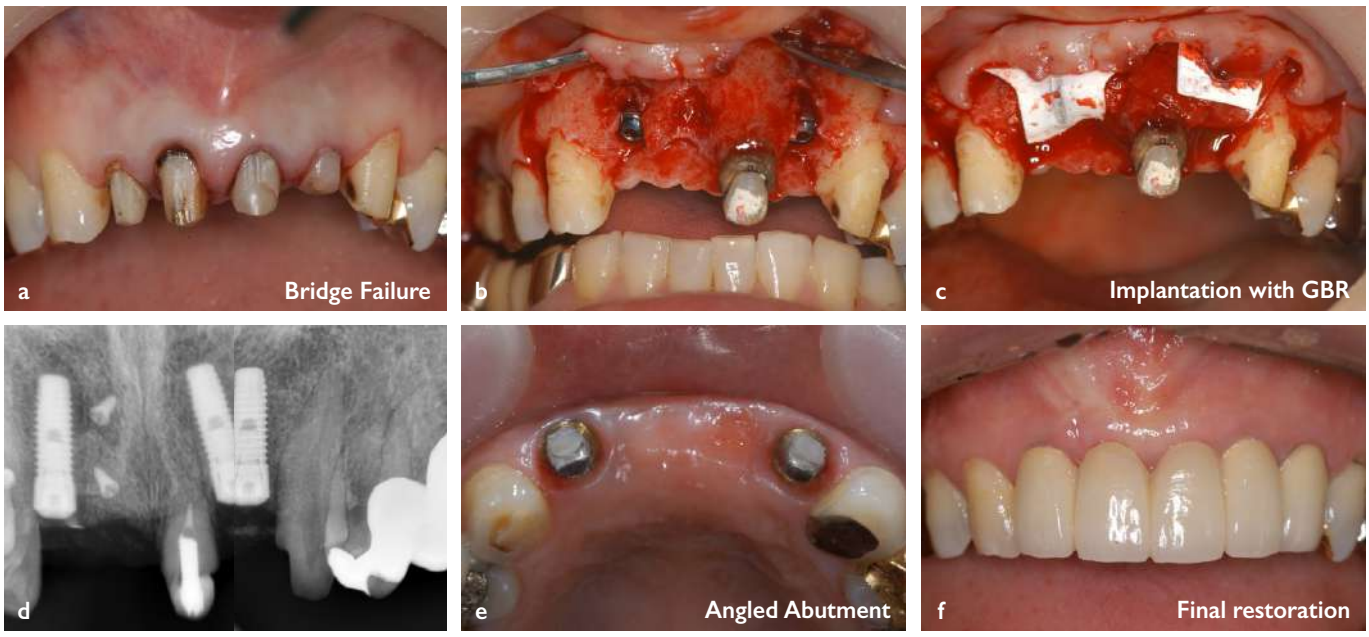


Fig. 20a-f. The implant surgery was performed after failure of a 4-unit bridge in the anterior maxilla due to weak retention and bone regeneration procedure was performed simultaneously with implant fixture installation. The fixture had been inserted toward the remaining alveolar ridge for initial stability, and thus the screw hole was placed too labially. In the end, the case was solved using an angled abutment. The outcome was not aesthetically satisfying, as the labially skewed abutment caused the final prosthesis to be lengthened

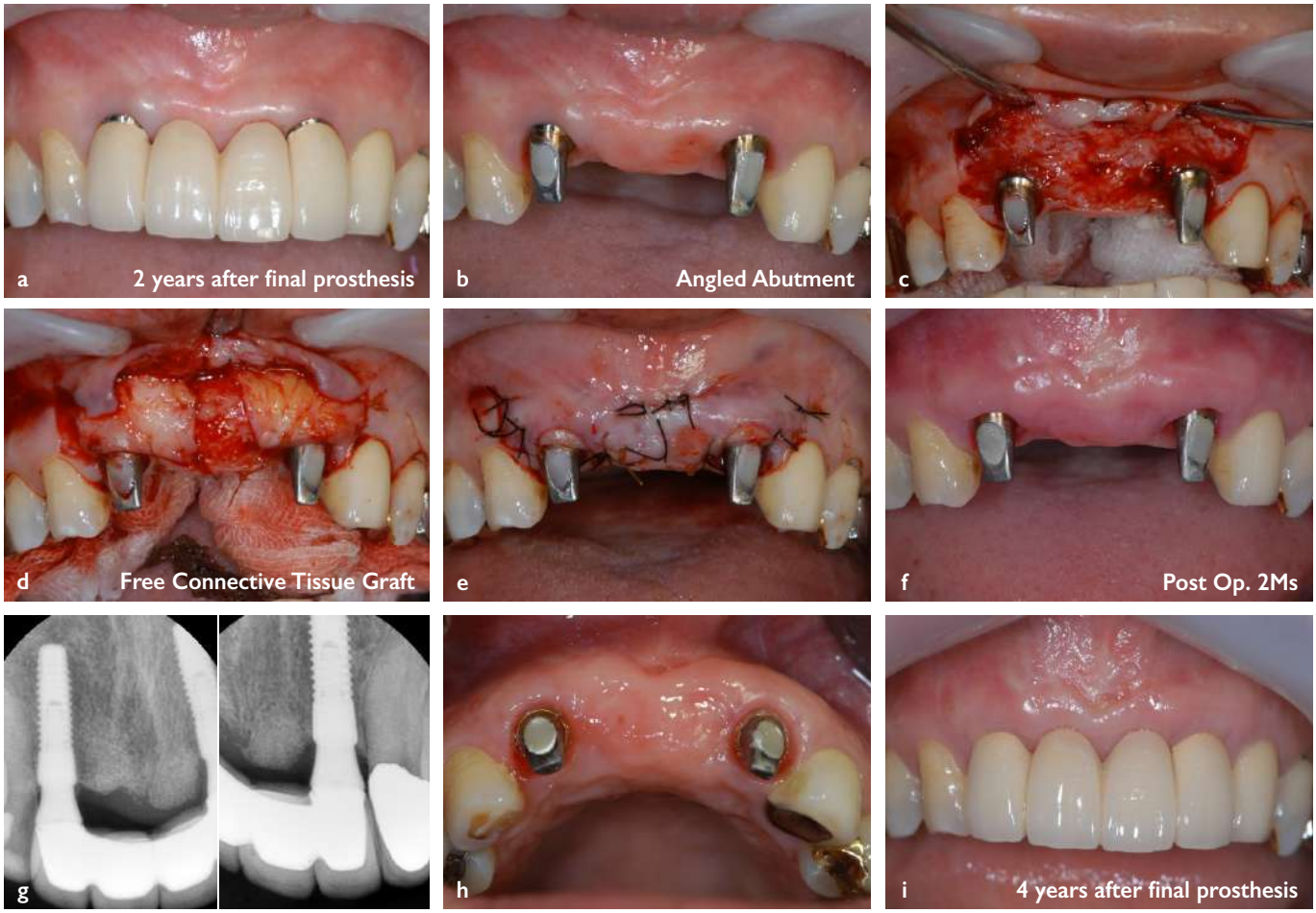


Fig. 21a-i. Two years after the final prosthesis, the thin labial gingiva receded, exposing the abutment. Re-fabrication of the prosthesis could be the first thought, but it implies lengthening of the crown. I instead used SCTG to solve the gingival recession and at the same time I could increase the gingival thickness at the marginal area and was able to obtain good long-term results

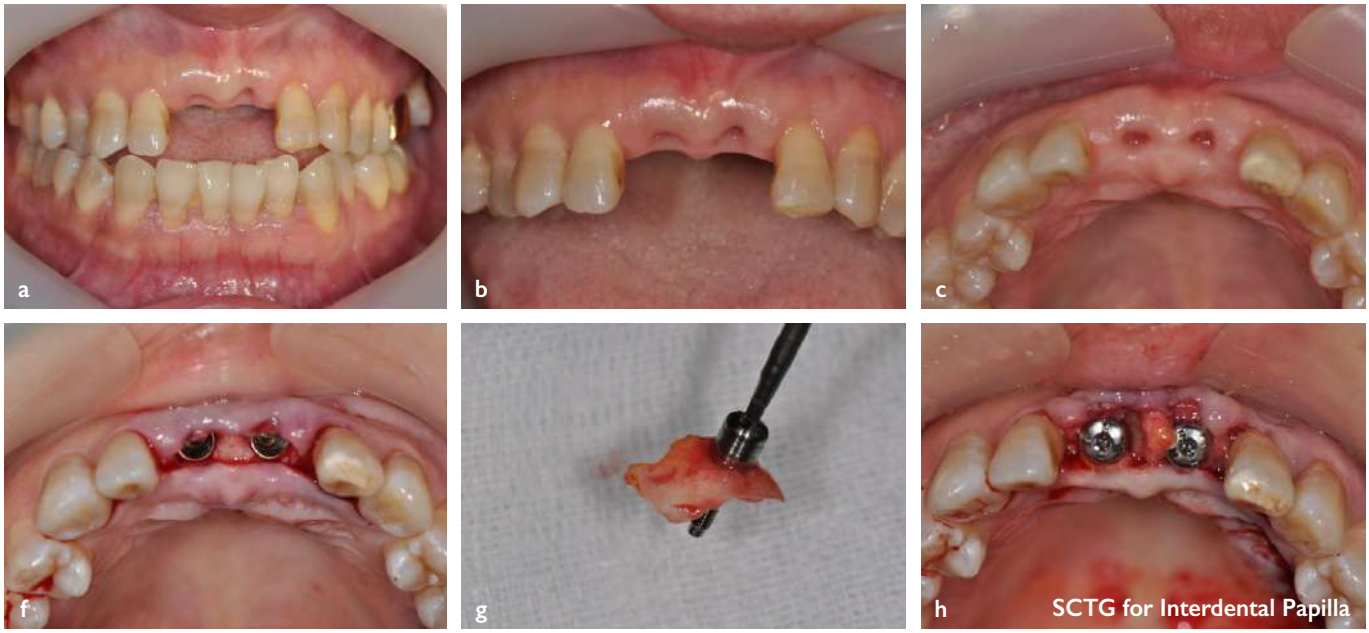


Fig. 22a-f. When two consecutive teeth are extracted from the anterior maxilla, it is difficult to reconstruct the interdental papilla between the implants finally. Since the amount of soft tissue is most important, I penetrated the SCT with a narrow healing abutment and fixed it to the recipient site after implant placement for the regeneration of the interdental papilla and resorbed the issue of the thin alveolar ridge on the labial side of implant #21

Fig. 23a-f. The final prosthesis was fabricated after having confirmed that the graft was well-engrafted, but gingival recession occurred only 6 months after surgery in the #21 region which originally had a thin labial gingiva and alveolar ridge. It may be also one reason for gingival recession that the implant fixture was placed in a slightly labially-inclined direction for normal overjet relationship to compansate the protruded mandible. Since surgery is difficult in such a narrow area and the abutment is tooth-colored, the case is tooth-colored; the case is currently under maintenance without re-surgery

Case 2
Alveolar ridge augmentation and preservation without a membrane

The most pending question that arises after CTG in the gingival recession area is, "what is the relationship between the CTG and the root surface when it heals?" In general, after a guided tissue regeneration (GTR) therapy in the gingival recession area, we can expect the formation of a new attachment in which the newly formed periodontal ligament connects the newly formed bone and cementum[38]. Whether such a new attachment will occur after CTG will be a highly critical factor in evaluating the prognosis after surgery. Bruno [39] et al. and Goldstein M [40] et al. each used the Bruno Technique and Nelson Technique[41] respectively for root coverage, performed block biopsy for tooth extraction in orthodontic treatment, and reported human histologic findings. According to these two reports, after grafting of SCT including the periosteum, formation of new bone, periodontal ligament and cementum were confirmed and new attachment was eventually attained. However, in an animal study comparing the effects of GTR and SCTG, Weng [42] reported that more new bone formation was observed in GTR. In addition, Pasquinelli [43] studied the histology of tooth root coverage by a thick FGG of 1.5 mm and reported that of the 5 mm gain in root coverage,histologic measurement showed 4.4 mm of new attachment and 4.0 mm of new bone growth. According to this report, unlike the previous two reports, a greater amount of new bone was formed even without including the palatal periosteum. More research on this topic is required in the future. [44]

Of the gingival recession cases, there are hidden recession cases in which inflammation occurs in the periodontal ligament space causing bone loss (Figure 25). Michele Paolantonio et al. (2010) [45] reported that they were able to obtain results comparable to those of GTR by performing both autogenous bone graft and Autogenous Periosteal Barrier Membranes together. In particular, the group receiving CTG showed a greater defect fill and less postoperative gingival recession than the group receiving GTR, and these results can be applied in cases can be applied in cases where it is difficult to utilize a barrier membrane to the partial alveolar bone loss around the exposed root surface, as shown in Figure 25.

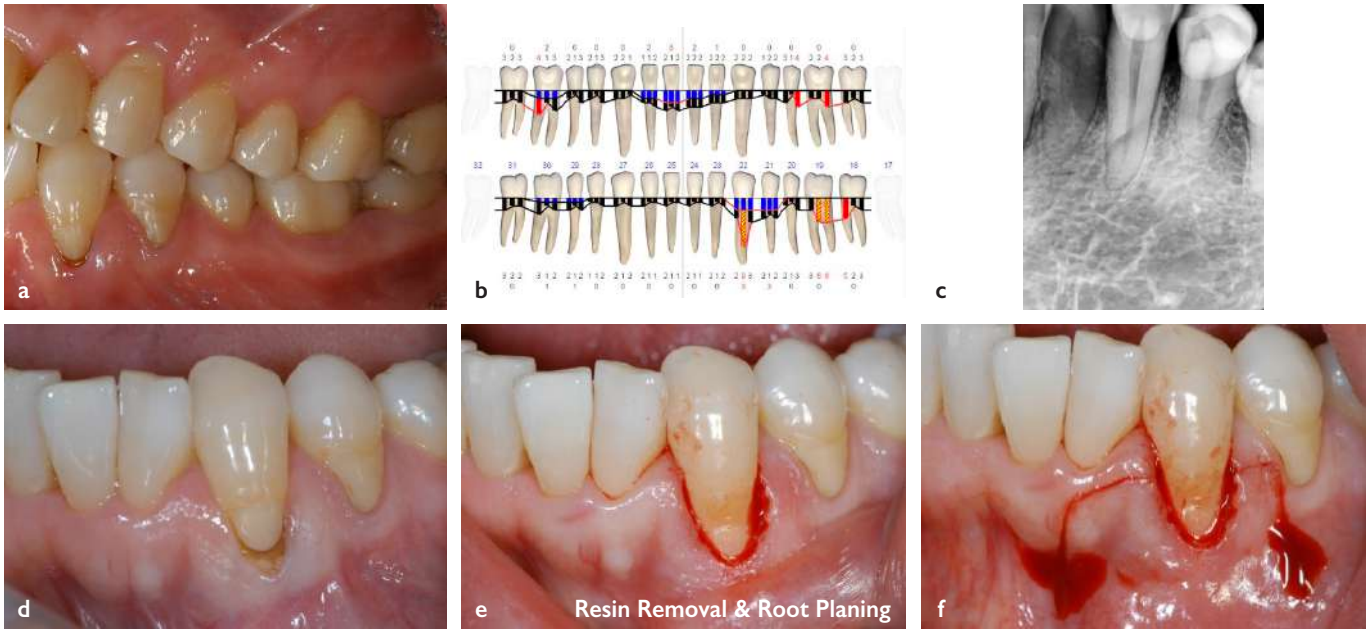


Fig. 24a-f. If a periodontal pocket and bone defect are present together with gingival recession, then the inner surface of the flap forming the pocket wall must be removed thoroughly. Since the periosteum in this area is damaged, a CTG of sufficient size must be harvested and grafted. If it is impossible to harvest the required amount of CT, then a resorbable barrier membrane should be placed below

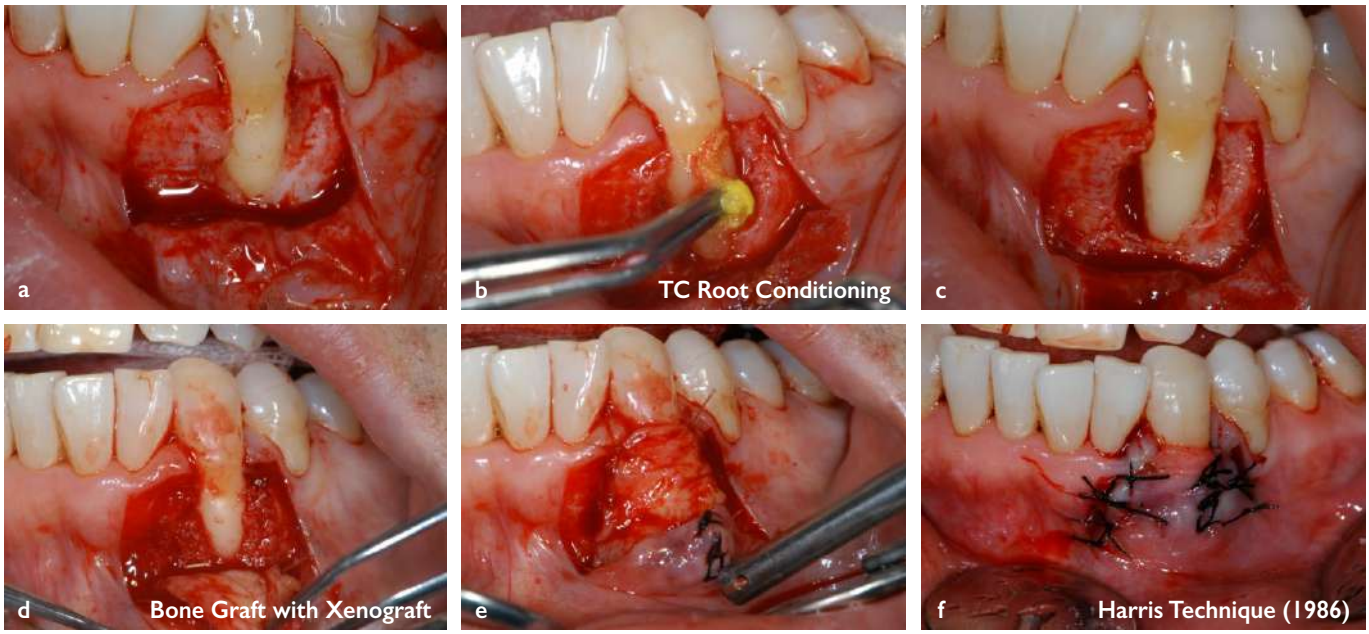


Fig. 25a-f. The hidden area of gingival recession can be seen as a kind of periodontal pocket. and the resulting chronic inflammation can cause bone defects around the periodontal ligament space. Xenograft was grafted in the aleolar bone defect on mesial side of the root. A sufficiently large CT, that could cover up the exposed root surface and bone defect, was grafted

After thoroughly removing the granulation tissue of the defect around the root, I applied the bone graft material, and then covered up the defect area and the exposed root surface with SCT harvested from the palatal side, and immobilized it using absorbable suture material. For blood supply to the upper part of the exposed root surface, we used a double papilla technique to cover the graft with a flap as much as possible. For reference, a free gingival graft also can be applied directly over the alveolar bone. Dordick transplanted the graft directly on the alveolar bone to obtain a more robust attachment. In other words, a periosteal elevator is used to lift the full-thickness flap and a graft is placed directly on the bone, which reduces postoperative graft mobility, hemorrhage, and thus swelling and results in 1.5 – 2 times less graft contraction than when grafted on the periosteum.

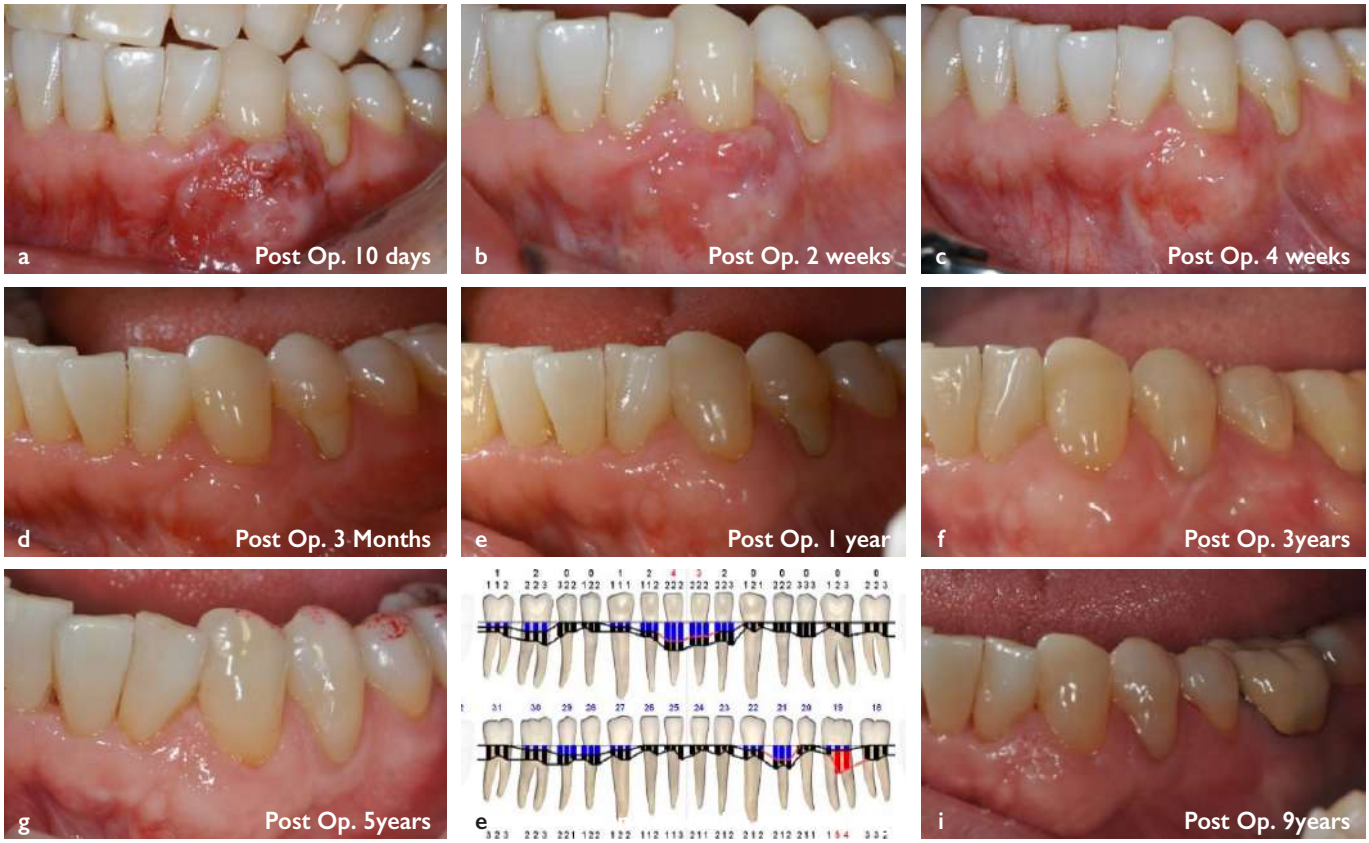


Fig. 26a-i. The sutures are typically removed about 10 days after surgery when revascularization is completed. Since there was enough space in the upper part of the bone defect for CT to attach to the root surface, we could obtain new attachments without using a membrane. A follow-up at 9 years post-surgery shows the graft looking more rigid than before

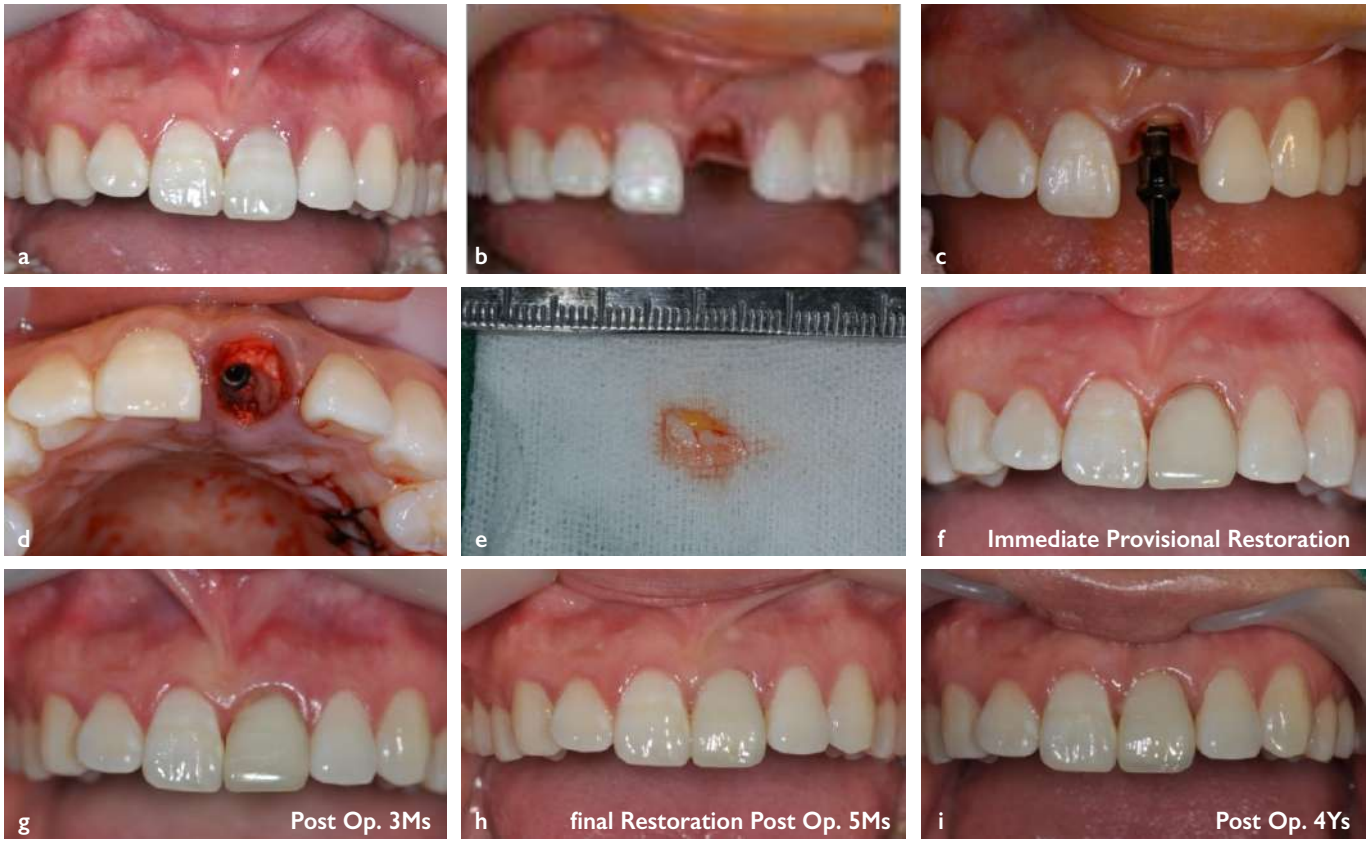


Fig. 27a-i. In the case of immediate implantation, if SCTG is performed to fill the supra-crestal soft tissue dead space, care must be taken to ensure that the graft is placed inside the flap since there is not enough blood supply from below. If the amount of graft is excessive, then even worse consequences can be caused through graft sloughing and exposure of bone graft material

In the case of immediate implant placement after tooth extraction, we often encounter situations where SCTG is applied to the upper part of the bone graft material as in the case shown above. Cabello et al. [48] and Evans CD et al. [49] reported in a short-term study that there was no correlation between gingival biotype and the amount of gingival recession after immediate implant placement and prosthetic loading, while Kan JY et al. (2003, 2011)[50,51] reported in a long-term study on the immediate implant placement after tooth extraction that the amount of gingival recession gradually increased from 0.55 mm at postoperative year 1 to the mean of 1.13 mm in the postoperative follow-up period of 2-8 year, especifically 1.50 mm for the thin biotype, which was greater than the 0.56 mm observed in the thick biotype.To overcome such limitation of immediate implant placement, they argued that gingival recession problem must be prevented by performing SCTG simultaneously, regardless of the gingival biotype, and turn all cases into the thick gingival biotype. Lee et al. (IJPRD 2012) [52] also argued that the esthetics can be improved by performing SCTG around the immediately placed implant. However, in the esthetic zone like the anterior maxilla, since the flap must be formed in a way that minimizes soft tissue damage, the blood supply in the recipient site is limited.Therefore, the graft itself must also be prepared in a minimum amount and firmly fixed to the recipient site, and it is important to avoid exposing the graft out of the flap as much as possible. [53] As shown in Figure 27, in the case of a high-scalloped, thin-biotype, the implant must be placed without a flap reflection to prevent the loss of interdental papilla and a detailed treatment plan must be established before the fixture installation considering the bone graft and CT graft.

To be continued in the next issue.

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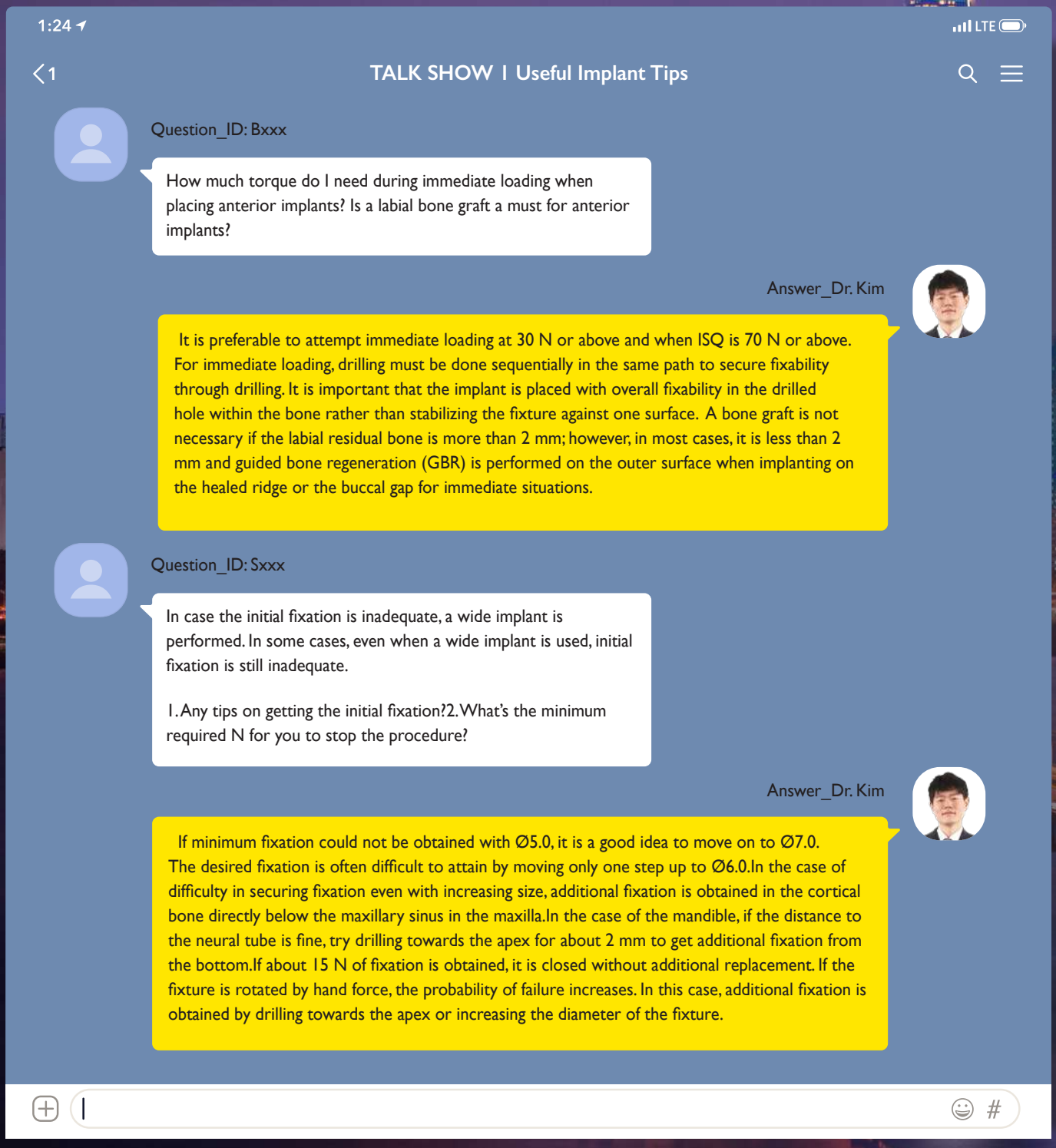
Useful implant tips from leading Dentis implant provider
SQ Implant System with the correct approach: we identified clinical validity using statistical evidence and had some QnA time discussing the various solutions to clinical challenges with oral surgeons, periodontists, and prosthetists.
The original text translated to use. However, use of 'user' here would suggest that the advice is coming from a patient. I think you meant the Healthcare professionals. Please make sure I have correctly interpreted your meaning here.



1:24 LTE

1 TALK SHOW I Useful Implant Tips

Question_ID: Jxxx

I would like to know more about incisions and surgical techniques to retain or increase the attached gingiva

Answer_Dr. Kim

Regarding the retaining of attachment gingiva, it is critical to always check the mucogingival junction line and not to make a mid-crestal incision in this area.
If the attached gingiva is insufficient, a lingualized incision can be performed and a healing abutment can be used to secure additional gingival attachment with a corresponding thickness.In cases of severe insufficiency, a free gingival graft must be performed.It is difficult to explain only using text; I would love to explain with some examples and illustrations if there is a chance..

Question_ID: Sxxx

In the case of bilateral loss of the maxillary molar, I wonder if the coping bite or habitual contact is used to guide the CR position.

Do you use a temporary prosthesis step?

Answer_Dr. Na

I try to retain the habitual co-position if it showed repeated reproducibility without issues. Temporary prostheses may be used due to the sinking down phenomenon in the posterior part. However, if the occlusal condition suggests that the occlusion will be restored even though sinking occurs, the temporary prosthesis is omitted and the final prosthesis is placed with a follow-up check for occlusion.

Question_ID: Sxxx

For teeth with a significant bone absorption, like #15 at the end, is immediate loading the first choice after tooth extraction for all cases? Wouldn't the outcome be better if the implant is done once the bone has formed after bone graft following the extraction?

Answer_Dr. Kim

Immediate loading after extraction in cases with severe bone absorption. If sufficient stability for a fixture can be attained through drilling, a fixture implant is done in most cases. It is delayed if stability cannot be achieved because the distance between the residual alveolar bone in the apex and the inferior alveolar canal at the fixture site is too short, or if the residual bone below the maxillary sinus is only about 1 mm and stability cannot be achieved.

1:24 LTE

1 TALK SHOW I Useful Implant Tips

Answer_Dr. Kim

Even in cases with severe bone fractures, there is not much of a difference in outcome if primary closure is done after using an appropriate membrane once the fixture is implanted and GBR is done, compared with cases in which a bone graft is done before loading the implant. Of course, when performing a transmucosal GBR after a healing abutment or immediate loading on the upper part of the fixture, the outcome is an insufficient amount of bone compared to delayed loading; thus, in cases with severe bone absorption, primary closure is done wherever possible.

Question_ID: Sxxx

For the top-down approach to implants, how do you design the prosthetics for patients with malocclusion or bad chewing habits who do not have normal or ideal occlusion? Or should it be accompanied by antagonist tooth treatment?

Answer_Dr. Na

It is difficult to address this question with a short answer.Answering this question would take about a 4-hour lecture on implants. I expect to have an opportunity to answer this question through an implant prosthetics lecture by Dentis. If required, antagonist tooth treatment should be accompanied.

Question_ID: Sxxx

You mentioned that tansgingival length is at least 4 mm but the image is an astra type; does the same apply for ITI type?

Answer_Dr. Na

The ITI type has a fixed length for the machined surface that will be placed on the transmucosal part of the fixture. In other words, the transmucosal part is already defined. The length of the machined surface varies from company to company, and there are usually lineups that offer two types, 1.8 mm and 2.8 mm, while others offer 2.0 or 1.7 mm.

When placing an ITI type, I think it is a good idea to place fixtures with long machined surfaces.

This is because the ITI type has a structure where the crown or abutment covers the bevel of the fixture and this area becomes the margin of the crown or abutment.

1:24 LTE

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TALK SHOW I Useful Implant Tips

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Question_ID: Jxxx

It is natural and correct to perform a bone graft in anticipation of the absorption surrounding the labial plate when placing anterior implants, but if the amount of bone in the labial plate area of the already implanted toe is thin, is it a good idea to perform a bone graft albeit a bit late considering the long-term prognosis?

Answer_Dr. Jeon

If the prosthesis is already in place, opening the valve again can be dangerous, so it's best to leave it alone.
If future gingival recession occurs, it is better to consider CTG at that time.

Question_ID: Jxxx

Which criteria are used when selecting an absorbent/non-absorbent membrane?

Answer_Dr.Kim

This depends on the type of bone fracture. It's a bit complicated, so it would be advisable to listen to the lecture.
However, if more than half of the total length of the implant is exposed, it is better to use a non-absorbent membrane; for vertical bone augmentation, a nonabsorbable membrane must be used.

How to cite this article: Jeon IS, Na KW, Kim JW. Useful Implant Tips. *J Clin Digit Dent.* 2020;2(1)37-40. www.jcdd.org

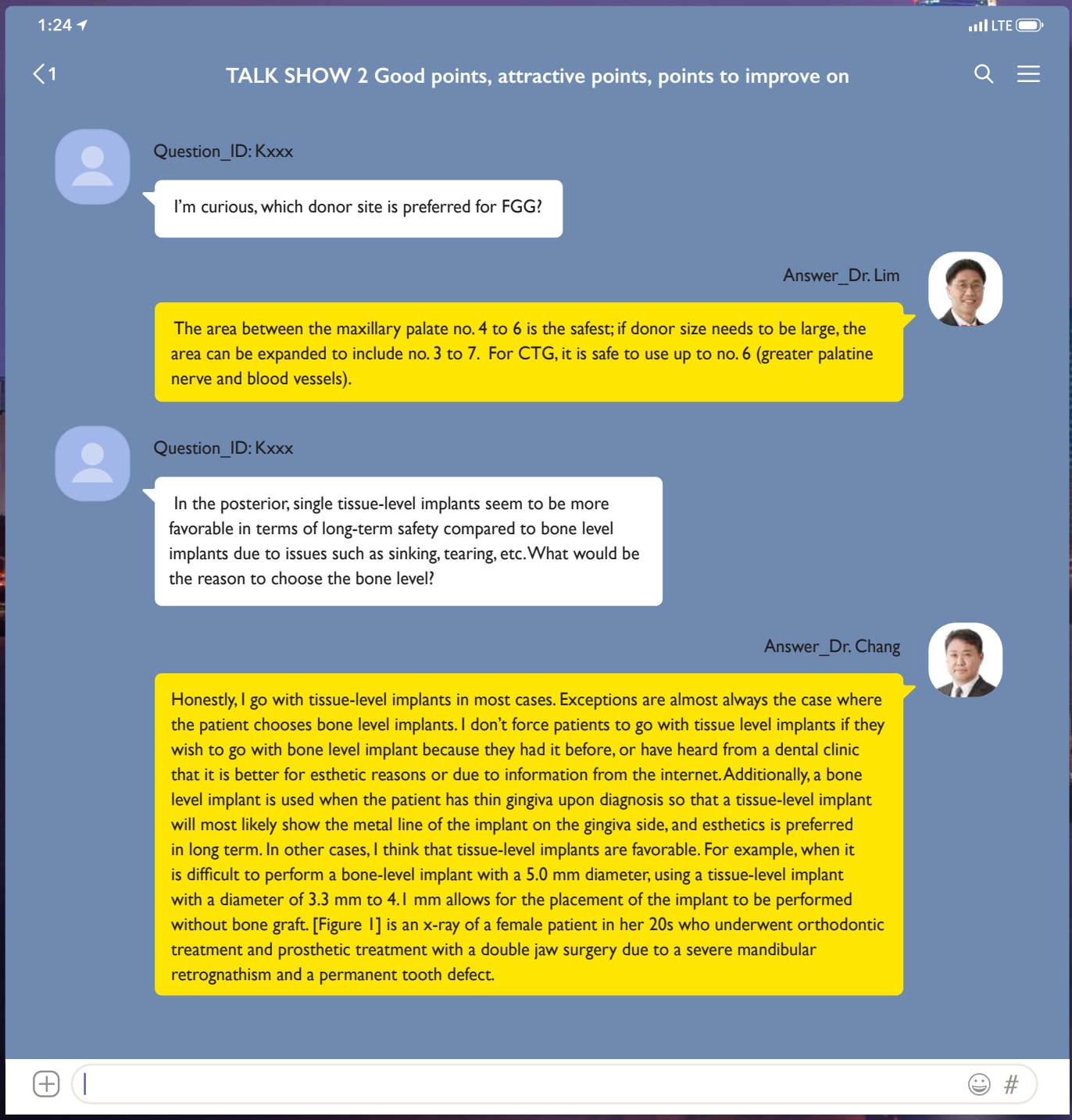
2019 DWS in Seoul Talk Show QnA

TALK SHOW 2 Good points, attractive points, points to improve on (points, points, points.)

Director: Dr. Chang Wongun, Dr. Lim Pil, Dr. Choi Yongkwan

Summary of Lecture

Time to have an open conversation on what new users of Dentis thought of the products while using them in the past couple of years from a variety of perspectives! We shared the good things after the first use, suggestions on the optimal method of use, and things to improve for the future.



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TALK SHOW 2 Good points, attractive points, points to improve on

Answer_Dr. Chang

Bone graft was necessary because the width of the molar 30 was too narrow but the patient wanted to have the implant without a bone graft as the patient was leaving abroad and was only visiting for treatment. A tissue-level implant with a diameter of 3.3 mm was performed without bone graft and it has been 5 years since the treatment. Even in cases that are not so severe, I think tissue-level implants can be a good choice if bone grafts for the molar tooth is not an option.

Answer_Dr. Choi

Once again, there are many advantages to tissue-level implants. However, there are also disadvantages. Disadvantages
1. Difficult to perform primary closure after GBR as submerging cannot be done.
2. Use is restricted for esthetic areas such as the anterior and premolar areas.
3. Even when GBR cannot be performed because there is enough molar width, use is restricted when the vertical diameter is limited. Except for the 3 cases above, this is a very good implant concept. However, if an implant with a wide diameter is placed a little deeper with GBR and if errors in prosthetics connection can be reduced, this can provide long-term stable results. But, I think tissue-level implants have a great advantage when a short implant has to be used because there is enough space with the antagonist tooth in the posterior area with sufficient bone width but not enough vertical height.

Answer_Dr. Lim

The advantages of tissue-level procedures is that one-stage surgery is possible and there is almost no possibility of tearing (there is still a slight possibility); disadvantages include that it is difficult for the surgeon to control the emergence profile because the gingival cuff (machined surface) is already determined; it is difficult to use when interocclusal clearance is short, and it is difficult to submerge when submerging is required.
In comparison, despite the disadvantage of the likelihood of tearing, bone-level procedures allow the surgeon to decide between submerge/nonsubmerge without restriction (use healing abutment for nonsubmerge) and allows for a variety of prosthetics options as the emergence profile can be adjusted with an abutment.
For posterior, single tissue-level implants, I use the minimum diameter of 5.0 mm to minimize tearing, actively use bone grafts and pay attention to the occlusion of the final prosthesis to avoid overload.

Question_ID: Kxxx

After the 1st implant surgery with GBR, the flap was lifted during 2nd surgery but there was an insufficient bone formation and 2 to 3 fixture threads could be seen. Should I perform additional bone grafts?

1:24 LTE

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TALK SHOW 2 Good points, attractive points, points to improve on

Answer_Dr. Lim

Yes, perform additional bone grafts.

Unless the fixture thread is completely contaminated due to complete exposure to the oral environment, successful bone regeneration can be achieved with bone grafts.

Question_ID: Sxxx

What is your reason for using the cement type prosthetics most of the time?

Answer_Dr. Lim

This prosthetic type is easier than the screw type.
You don't have to worry about the screw hole position during the implantation procedure.
Because there is no hole in the prosthesis, it is easy to give the prosthesis occlusal contact. The screw type usually fills the hole with a resin, which makes it difficult to form a stable bite. During loading, cement plays the role of a stress breaker.
In the screw type, the load is likely to be concentrated on the screw.
There is the problem of eliminating the excess cement, which is a disadvantage of this cement type, and also the difficulty in removal if necessary, both being shortcomings that can be sufficient to deal with. I use custom abutment for all implants, the equigingival level for the finish line in the posterior, sometimes using supra but using 1 mm sub in the anterior, and then I mix and remove the cement myself and sometimes I use the SCRP type, etc.

Question_ID: Sxxx

Which membrane do you use before bone graft for maxillary sinus perforation?

Answer_Dr. Choi

When the maxillary sinus mucosa is perforated, the shielding membrane that can be used differs depending on the area and degree of perforation.
This is explained in detail in the 2003 JP paper by Vlassis and Fugajotto. (If you have time, please read it as you may find it helpful.)
I use materials like Surgicel or collagen tape when the perforation is small and there are no significant pathological changes in the maxillary sinus.
However, when the perforation is large and pathological changes appear inside the maxillary sinus, an absorbent shield such as a collagen membrane should be used.
In general, the shielding film used for GBR should be selected with good sealing ability when used with saline.

1:24 LTE

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TALK SHOW 2 Good points, attractive points, points to improve on

Question_ID: Pxxx

When making a surgical guide, do you locate the appropriate bone using the CT image?
In that case, it tends to tilt towards the lingual side. When the implant is placed in the lingual side but it tilts to the labial side to be implanted in the bone, should it still be placed with appropriate tilt even with fenestration?

Answer_Dr. Chang

This is a very good question but also a very difficult question considering the application in actual clinical practice. If it is placed in the labial side, due to the bone width, it is difficult to produce the actual prosthesis and the surgery is performed in a way that makes the preparation of the abutment easier. However, even with fenestration, using an appropriate tilt is not intentional; GBR is used to resolve the inevitable thinning post-surgery or fenestration. In that sense, the surgical guide is used. This is because it is possible to predict how the prosthesis and abutment will be located so that the operation can be performed without any possible problems during surgery. In the case in [Figure 2], the implant was placed on the labial side according to the direction of the gum bone but the prosthesis could not be manufactured appropriately, and an implant had to be added to no. 30 in the anterior; eventually, #41 implant could not be used as prosthesis and treatment was ended. We don't usually emphasize prosthodontic implant surgery but this is in situations where it may be difficult to have esthetic results, especially in the anterior teeth. We think that we can minimize problems by using the guide and with the design of the surgical guide. Coming back to your question, I think we can place the implant with fenestration in mind for unavoidable prosthetic restoration. This is because we think that no one wants a prosthetic treatment that is located in good bones but is not esthetically pleasing.

Question_ID: Pxxx

I'm curious about the gap distance during the anterior maxillary surgery.

Answer_Dr.Chang

This live surgery was not performed immediately after extraction. Extraction was 6 weeks prior to surgery and the implant was placed after socket preservation. Thus, there was no gap in distance.

Question_ID: Txxx

What do you use do bond the Maryland bridge?

1:24 LTE

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TALK SHOW 2 Good points, attractive points, points to improve on

Answer_Dr. Chang

Maryland provisional prostheses are attached using flowable resin.
Our clinic mostly uses a single bond universal as a bonding agent.
(1) corrosion on tooth surface → single bond universal bonding
(2) after processing the surface of the provisional prosthetics that comes in contact with the tooth with plastic conditioner, bonding is applied and flowable resin is used for attachment

Question_ID: Jxxx

What are the possible problems when the implant is placed too deep? Which is prosthetically and periodontally more disadvantageous, too shallow or too deep?

Answer_Dr. choi

First, "too" shallow or "too" deep are both not good in terms of esthetical or biomechanical results. However, shallow placement causes the fixture-abutment gap to invade the biological width of the implant and it will cause bone resorption in the upper part later. Therefore, I recommend planting a little deeper as opposed to a little shallow.

The advantages of deep placement are: 1. In general, the thickness of the lower alveolar bone is increased, so that more healthy bone tissues can be secured around the fixture. 2. It helps to have a more ideal emergence profile of the prosthesis.

This will allow for more healthy soft tissue around the fixture-abutment gap and will help reduce food retention in the prosthesis in the future. 3. More soft tissue is secured than the biological width required in the fixture-abutment gap, and patients with thin gums can prevent compensatory bone resorption caused by shallow placement. Therefore, we recommended placing it a little deeper.

Answer_Dr. choi

The maxillary denture and mandibular implant clam may be worse than if the maxillary clam is natural. The occlusion between the maxillary denture and the mandibular implant may not be as good as in the case where the maxillary antagonist tooth is natural. Conversely, the patient feels less discomfort compared to the case where the implant is in the maxilla with a mandibular denture. Because the maxilla is softer than the mandible, the degree of bone resorption is high when the denture is installed.
Since the maxillary denture has a large overpad area, the load is distributed so bone absorption or discomfort of denture is not as much as you think.
Of course, the maxillary antagonist tooth may be better if it is an implant, but this is only if the patient chooses a denture.

1:24 LTE

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TALK SHOW 2 Good points, attractive points, points to improve on

Question_ID: Lxxx

Are there any criteria for choosing lateral and crestal methods for maxillary sinus elevation? Even if the maxillary sinus membrane is torn, can I assume that it will heal?

Answer_Dr. choi

The criteria Summers mentioned through BAOSFE (Oeteotome technique) refers to maxillary sinus elevation using the adjustment of teeth when the height of the remaining alveolar bone is more than 5-6 mm, and maxillary sinus elevation using the lateral approach below if it's less than that.

However, many factors determine the approach for maxillary sinus elevation. 1. Basically, set the first criterion to residual alveolar bone according to Summers' theory.2. Lower the margin of the maxillary sinus.During elevation using an alveolar approach, the probability of membrane perforation increases when the lower margin of the maxillary sinus is wider compared to when it is narrower. 3.The shape of the arch.

The sideways approach becomes more difficult for people with a square arch due to limited visibility. 4.The thickness of the maxillary sinus sidewalls. It is difficult to form windows in patients with thick sidewalls, which also increases the chances of perforation of the mucosa. 5. If the position of the Posterior Superior Alveolar maxillary Artery (PSA) is too low, the surgery may become a bit more complicated when forming windows in the lateral approach due to the exposure of blood vessels.6.The shape of the septum. 7. Pathological changes inside the maxillary sinus. Such as mucous cysts, acute maxillary sinusitis, etc.

8. Systemic disease and age of the patient.As shown, deciding between the crestal and lateral approach must be done after conducting a comprehensive assessment of various factors.When the maxillary sinus mucosa is torn and healed, it is repaired into fibrotic tissue rather than being regenerated. If there is no pathological change inside the maxillary sinus, the damage is repaired to become fibrous tissue in most cases.

How to cite this article: hang WG, Lim P, Choi WK. Good points, attractive points, points to improve on (points, points, points). *J Clin Digit Dent.* 2020;2(1):41-46. www.jcdd.org

2019 DWS in Seoul Talk Show QnA

TALK SHOW 3 Endless game? Awesome digital solutions

- DIGITAL DENTISTRY, a rapidly changing and endless story -

Director: Dr.Chung Taegu, Dr. Suh Sangjin, Dr. Park Sichan Dr. Kim Hyundong

Summary of Lecture

The limitations and bitter experiences of Digital Dentistry for both those who are new to digital and those already using it. We also talked about where we are now and what the future has in store, a discussion on endless solutions from digital implant surgery to prosthetics, and about the current situations that need addressing and the future.

1:24 LTE

1 TALK SHOW 3 Endless game? Awesome digital solutions

Question_ID: Kxxx

In the case of completely edentulous patients, the guide is not yet available – when will it become available?

Answer_Dr. Suh

While Shape Implant studio offers the guide option for completely edentulous patients, Dentiq has not been able to provide this option. This option has recently been added to the latest version but the software is still somewhat unstable so it is expected to be available in the subsequent version after stabilization.

Question_ID: Lxxx

Are there any criteria for selecting PFM / zirconia for the implant of full-mouth prostheses?

Answer_Dr. Park

Since implant prostheses are produced digitally, you can assume that implant prostheses are almost always produced digitally, except for insurance implants. Most prostheses are made of zirconia. However, in some cases were patients have high alveolar absorption, a hybrid type of prosthesis may be useful. In patients without an anterior alveolar ridge, zirconia prosthesis may fracture when there is a relatively long-span edentulous mandible (may not reach reference value despite a relatively high marked flexural strength), in which case it may be preferable to manufacture PFM.

Question_ID: Txxx

How do you check for CBCT errors?

Answer_Dr. Suh

The simplest way is to do this is to take a CBCT of a structure with known geometry and measure the dimensions in multiple directions on the viewer to check the error and reliability.
A more professional way is to create a phantom for checking and comparing the model's scan with the CBCT scan using a program that takes a model scan and a CBCT and then converts it into a STL file.
In the case of CBCT of a specific company (Sirona), a calibration phantom and a calibration schedule are built into the program. Calibration can be performed upon request by the company. If not, you can ask the company to do the calibration.

How to cite this article: Jung TG, Suh SJ, Park SC, Kim HD. Implant Restoration Design With Stress Optimization Using Digital Vector Analysis: A Case Report. J Clin Digit Dent. 2020;2(1):47. www.jcdd.org

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The First Half of 2020
DENTIS Seminar Schedule

DATE		EVENT		DIRECTOR	VENUE
Mar.	21/22/29	Seminar	**[DENTIS]All IN ONE Course**	Jeayoon Kim/ Kiwon Na	Seoul (Korea)
Apr.	4/5		**[DENTIS]All IN ONE Course**	Jeayoon Kim/ Kiwon Na	Seoul (Korea)
	11/12		**[DENTIS X DENTAL BEAN] Red Course** - Start of Implant surgery and prosthetics	Yongseok Cho/Sewoung Kim	Seoul (Korea)
	18/19		**[DENTIS X CTS]Gold Course** - Start of Implant surgery diagnosis and treatment plan	Wongun Chang/ Pil Lim/ Dohoon Kim/ Hyundong Kim	Seoul (Korea)
May.	9/10		**[DENTIS X DENTAL BEAN] Black Course** - All about Sinus lift surgery and maxillary molar treatment strategy	Yongseok Cho/Sewoung Kim	Seoul (Korea)
	2/3/16/ 17		**[DENTIS X DENTAL BEAN] Black Course** - All about Sinus lift surgery and maxillary molar treatment strategy	Insung Jeon/Sewoung Kim	Seoul (Korea)
	16/17		**[DENTIS X CTS]Gold Course** - Molar Implant Surgery Hands-on (Single/Multiple)	Pil Lim/Dohoon Kim Donghoon Lee/ Yongkwan Choi	Seoul (Korea)
	24		**[DENTIS X DENTAL BEAN] Suture Hands** - on one day Course	Jeayoon Kim	Seoul (Korea)
Jun.	6/7		**[DENTIS X DENTAL BEAN]] Black Course** - All about Sinus lift surgery and maxillary molar treatment strategy	Insung Jeon/Sewoung Kim	Seoul (Korea)
	20/21		**[DENTIS X DENTAL BEAN] Red Course** - Start of Implant surgery and prosthetics	Yongseok Cho/Sewoung Kim	Seoul (Korea)
	27/28		**[DENTIS X CTS]Gold Course** - Implant 2nd surgery hands-on/ Implant Prosthetics and Overdenture hands-on	Hyundong Kim/ Yongkwan Choi	Seoul (Korea)
	28		**[DENTIS X DENTAL BEAN] Anterior implant Hands** - on one day Course	Jeayoon Kim	Seoul (Korea)

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