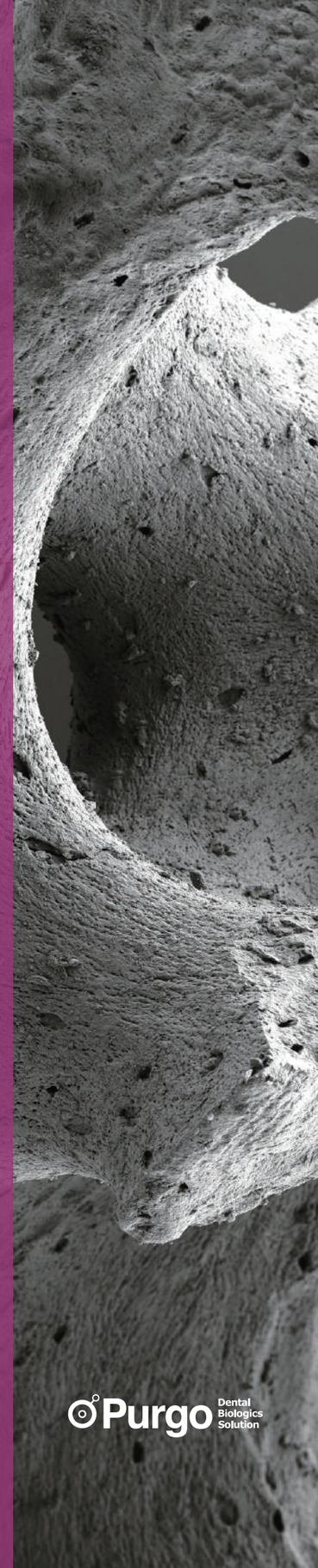
Long-Term Clinical Case

THE Graft™



Purgo Dental Biologics Solution

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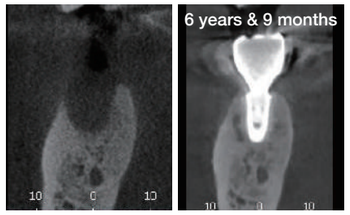
1

Dehiscence and vertical bone defect

Contents

Guided bone regeneration with a simultaneous approach for large dehiscence and vertical defect around single implant



Chang-Kyun Lee
Crystal Dental Clinic

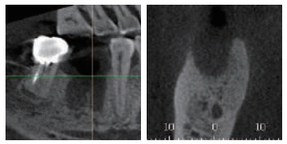
Case Summary

Nationality	Korean	Age	Mid-Sixties	Grafting Area	
Chief Complaint	Swelling of the gingiva and tenderness when biting on the lower right posterior.				
Treatment Plan	1. Extraction of the mandibular right first molar due to vertical root fracture and alveolar bone loss. 2. Waiting 6 to 8 weeks for soft tissue healing. 3. Implant placement with guided bone regeneration (GBR) at 8 weeks after extraction (simultaneous approach, submerging an implant). 4. Implant second surgery. 5. Final prosthesis delivery.				

Materials	Category	Products	Method	Description of the method
	Bone graft	THE Graft, autogenous bone	Mixed	Mixed with autogenous bone particle harvested from drilling site for implant placement with 50 rpm low speed drilling.
	Membrane	Collagen membrane	Primary closure	A collagen membrane was used to cover the graft site.

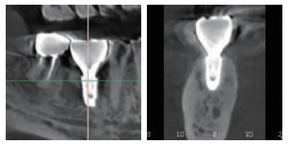
Methods	Category	Indication	Approach	Surgical Procedures
	■ Implantology	☐ Extraction sockets	☐ Alveolar ridge preservation	☐ One-stage
	☐ Periodontology	■ Dehiscence	☐ Intra-socket	■ Two-stage
		☐ Fenestration	■ Bone augmentation	☐ Immediate placement/Immediate loading
		☐ Horizontal bone loss	☐ Ridge Split	■ Simultaneous approach
		■ Vertical bone loss	☐ Lateral	☐ Staged/Delayed approach
		☐ Sinus pneumatization	☐ Crestal	
		☐ Peri-implantitis		
		☐ Furcation		

Before



1 month after extraction, the buccal plate of the extraction socket was partially resorbed.

After



2 years post-GBR, the implant's buccal bone had been augmented and well-maintained.

Conclusion

A large defect (horizontally 3 mm, vertically 4-5 mm, contained) was resolved by the GBR procedure with THE Graft and collagen membrane. The collapsed ridge was well augmented, therefore the ridge contour around the implant crown was in harmony with the adjacent periodontium. The augmented ridge was well maintained for over 6 years, and the regenerated bone became mature during this period confirmed by the radiological observation.

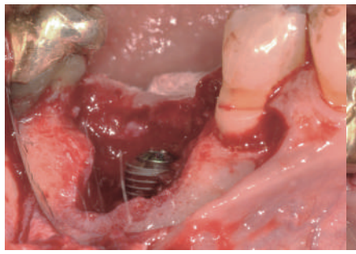
DEHISCENCE AND VERTICAL BONE DEFECT | BONE AUGMENTATION

Case Summary

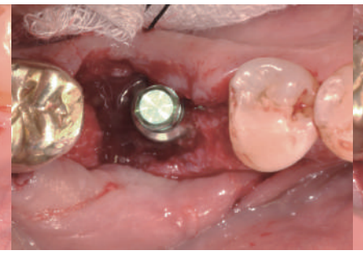
1. Pre-extraction. Gingival swelling was observed at the mandibular right first molar.

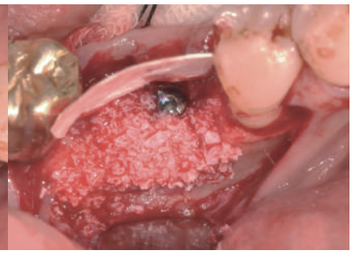
2. Pre-extraction. The distal root of the mandibular right first molar was fractured, and alveolar bone loss was observed.

3. Post-extraction, 6 weeks. The soft tissue was healed. The ridge was resorbed both horizontally and vertically.

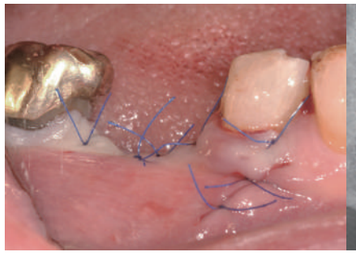


4. The first implant surgery. (a) Buccal view; (b) Occlusal view. After flap reflection, an implant was placed in the proper position for the mandibular right first molar crown. The buccal plate had been resorbed, and the implant surface was exposed by 3 to 5 mm.

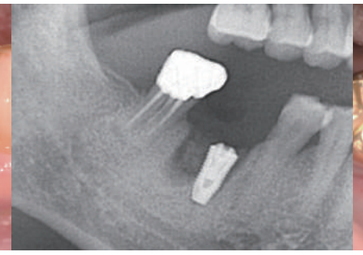




5. Guided bone regeneration. THE Graft was used to fill the defect, which was then covered with a collagen membrane.



6. Primary closure of the flap. The buccal flap was coronally advanced, and flap closure was done without tension.



7. A panoramic radiograph after the surgery showing ideal placement of the implant fixture.

8. Suture removal, 11 days post-GBR. Wound healing was uneventful.

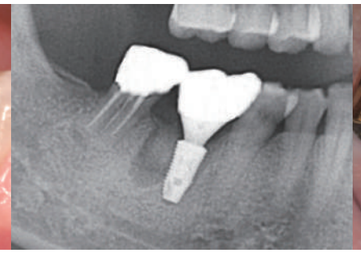
9. Preoperative photography taken before the second surgery, 3 months and 2 weeks post-GBR.

10. Second surgery was performed, 3 months and 2 weeks post-GBR. A single short incision was made at the crest, and the healing abutment was connected.

11. Delivery of the final prosthesis, 5 months post-GBR. The customized abutment was connected, and the full zirconia crown was cemented.

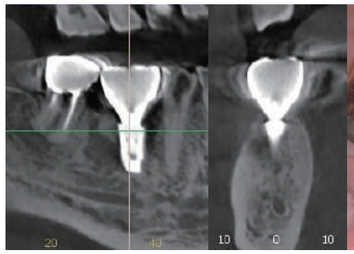
Case Summary

12. Final prosthesis, 5 months post-GBR. The ridge contour around the implant crown was successfully augmented and was in harmony with the adjacent periodontium.



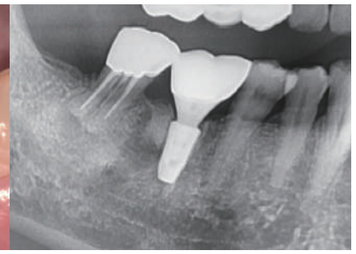
13. Final prosthesis, 5 months post-GBR. The crestal bone level was well maintained.

14. Follow up, 2 years post-GBR. The peri-implant tissue was healthy and well maintained for 2 years.



15. Follow up, 2 years post-GBR. The buccal bone of the implant was well maintained.

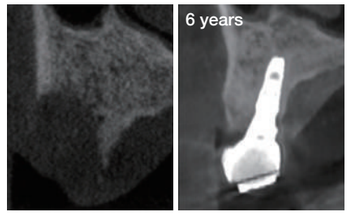
16. Follow up, 5 years and 4 months post-GBR. The ridge contour around the implant crown was well maintained.



17. Follow up, 6 years and 9 months post-GBR. The crestal bone level was well maintained.

DEHISCENCE AND VERTICAL BONE DEFECT | BONE AUGMENTATION

GBR procedure for large dehiscence and vertical defect of implants with simultaneous approach



Chang-Kyun Lee
Crystal Dental Clinic

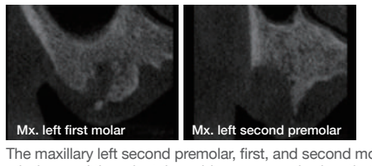
Case Summary

Nationality	Korean	Age	Early Seventies	Grafting Area	5 6
Chief Complaint	Lost teeth on the upper left posterior, and a restoration was required.				
Treatment Plan	1. Implant placement with GBR on the maxillary left second premolar and first molar (simultaneous approach) and apicoectomy on the maxillary left first premolar. 2. Re-root canal treatment on the maxillary left first premolar and crown. 3. Splinted implant crowns on the maxillary left second premolar and first molar.				

Materials	Category	Products	Method	Description of the method
	Bone graft	THE Graft	Single	THE Graft was grafted on the peri-implant bone defect.
	Membrane	BioCover	Primary closure	A collagen membrane was used to cover the graft site.

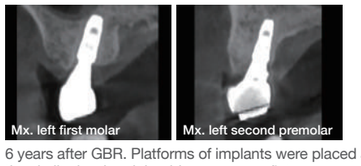
Methods	Category	Indication	Approach	Surgical Procedures
	■ Implantology ☐ Periodontology	☐ Extraction sockets ■ Dehiscence ☐ Fenestration ☐ Horizontal bone loss ■ Vertical bone loss ☐ Sinus pneumatization ☐ Peri-implantitis ☐ Furcation	☐ Alveolar ridge preservation ☐ Intra-socket ■ Bone augmentation ☐ Ridge Split ☐ Lateral ☐ Crestal	☐ One-stage ■ Two-stage ☐ Immediate placement/Immediate loading ■ Simultaneous approach ☐ Staged/Delayed approach

Before



The maxillary left second premolar, first, and second molars were missing, and the edentulous ridge was resorbed vertically, especially on the maxillary left second premolar area.

After



6 years after GBR. Platforms of implants were placed at the similar level and the ridge crest was flat.

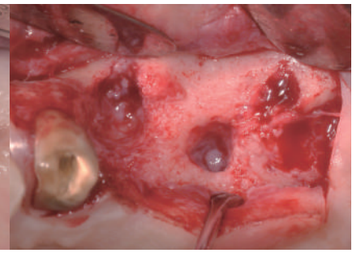
Conclusion

The GBR procedure using THE Graft and BioCover was very effective for augmenting large dehiscence defects. The augmented bone around implants was well maintained, both horizontally and vertically for 6 years.

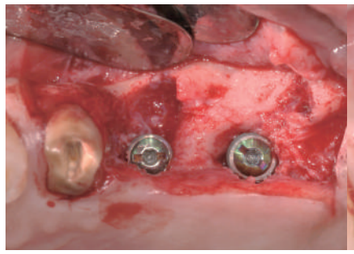
Case Summary

1. Pre-operation view. The edentulous ridge on the upper left region was collapsed both horizontally and vertically.

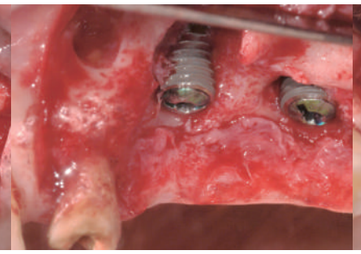
2. Pre-operative view. The maxillary left first premolar with formation of a sinus tract on the buccal gingiva.



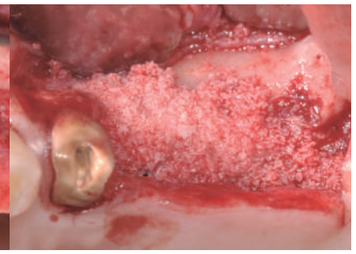
3. Implant first surgery. There were bone defects on the edentulous ridge, especially at the maxillary left second premolar area.



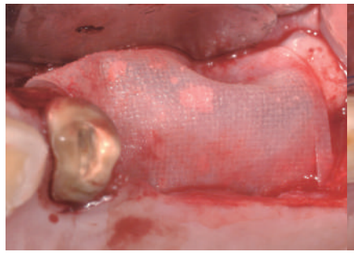
4. Implant placement. Implants were placed in the area of the maxillary left second premolar and first molar. Implants were placed in the proper position.



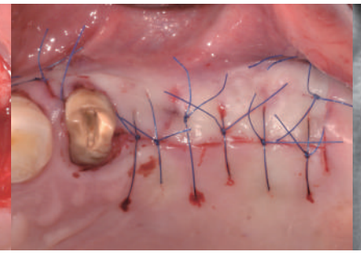
5. Buccal view of the placed implants. Dehiscence defects were observed on implants. The dehiscence of the maxillary left second premolar implant was particularly large over half of the implant's length. Apicoectomy was done on the second premolar.



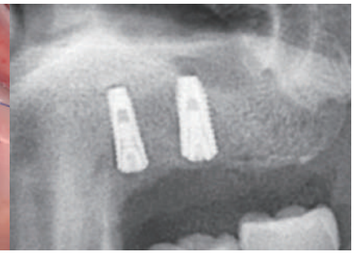
6. Guided bone regeneration. THE Graft was grafted on the peri-implant bone defect.



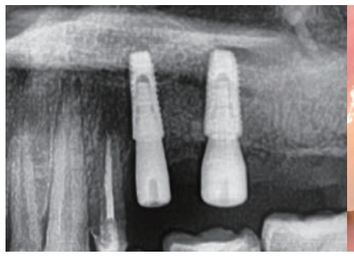
7. Guided bone regeneration. The collagen membrane, BioCover, was applied to the grafted site.



8. Suturing. The buccal flap was coronally advanced, and flaps were closed without tension.

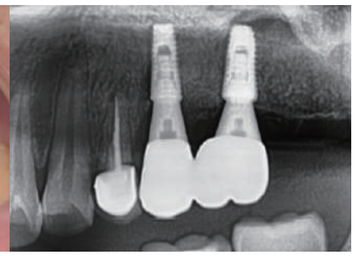


9. Radiograph after surgery. This panoramic radiograph was taken right after the implant placement with GBR.



10. Radiograph taken after the second surgery 4 months following GBR.

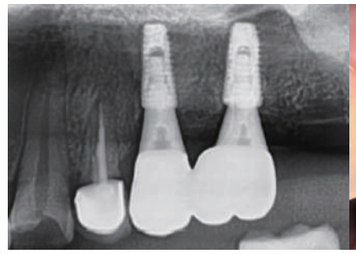
11. Final prosthesis, 5 months post-GBR.



12. Final prosthesis, 5 months post-GBR.

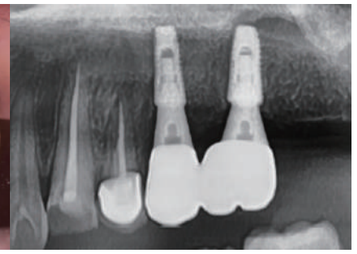
DEHISCENCE AND VERTICAL BONE DEFECT | BONE AUGMENTATION

Case Summary



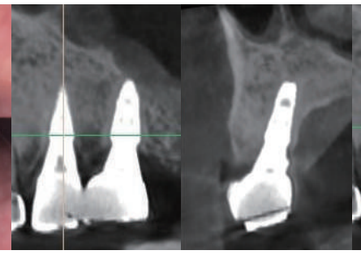
13. Follow up, 1 year post-GBR. The bone level of the implants was well maintained. The periapical lesion of the maxillary left first premolar had disappeared.

14. Follow up at 1 year post-GBR. The peri-implant tissue was in harmony with the adjacent teeth.

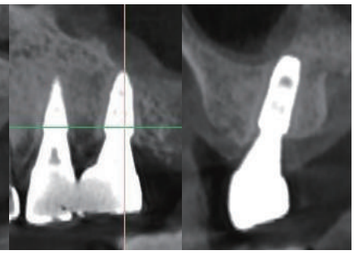


15. Follow up, 6 years post-GBR. The bone level around implants was well maintained.

16. Follow up, 6 years post-GBR. Gingival recession occurred on the maxillary left first premolar, but the margin of the peri-implant mucosa was stable.



17. Follow up, 6 years post-GBR. The buccal bone of the maxillary left second premolar implant was well augmented horizontally and vertically and maintained.

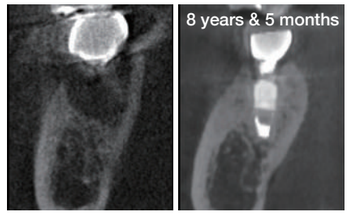


18. Follow up, 6 years post-GBR. The buccal and palatal bone of the maxillary left first molar implant was well maintained in this period.

2

Vertical and horizontal bone defect

Delayed implant placement with GBR procedure to reconstruct a vertical bone defect caused by periodontitis



Chang-Kyun Lee
Crystal Dental Clinic

Case Summary

Nationality	Korean	Age	Early Seventies	Grafting Area	
Chief Complaint	Discomfort on the lower right posterior.				
Treatment Plan	1. Extraction. 2. Implant placement with GBR & bone graft (delayed placement, simultaneous approach, one-stage). 3. Implant crown delivery.				

Materials	Category	Products	Method	Description of the method
	Bone graft	THE Graft	Single	The bone defect was observed around the implant. The defect was filled with THE Graft.
	Membrane	Collagen membrane	Primary closure	The collagen membrane was placed over the graft site. The membrane was punched and stabilized by the healing abutment.
	Suture	Biotex		Biotex was used for suture.

Methods	Category	Indication	Approach	Surgical Procedures
	■ Implantology ☐ Periodontology	☐ Extraction sockets ☐ Dehiscence ☐ Fenestration ■ Horizontal bone loss ■ Vertical bone loss ☐ Sinus pneumatization ☐ Peri-implantitis ☐ Furcation	☐ Alveolar ridge preservation ☐ Intra-socket ■ Bone augmentation ☐ Ridge Split ☐ Lateral ☐ Crestal	☐ One-stage ■ Two-stage ☐ Immediate placement/Immediate loading ■ Simultaneous approach ☐ Staged/Delayed approach

Before

Before the extraction, the buccal plate was vertically resorbed but the lingual plate was intact.

After

8 years and
5 months post-GBR.
The buccal bone was vertically augmented and well maintained.

Conclusion

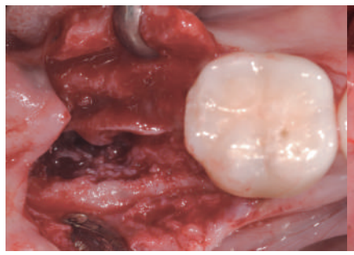
In the simultaneous approach, GBR with THE Graft and collagen membrane was very effective for bone augmentation. Trasmucosal GBR could be performed successfully in a large sized defect using THE Graft and a collagen membrane.

Case Summary

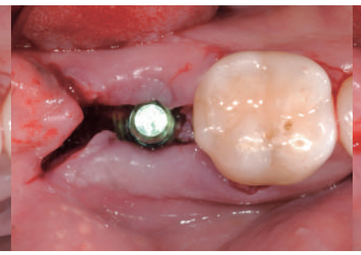
1. Initial radiograph. Localized, severe alveolar bone loss was observed at the mandibular right second molar.

2. Post-extraction, 4 months. The bone defect was broad, but the lingual plate was intact.

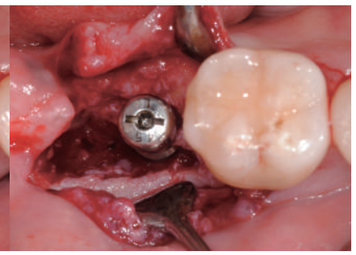
3. Pre-operative photography. This picture was taken right before implant placement with GBR.



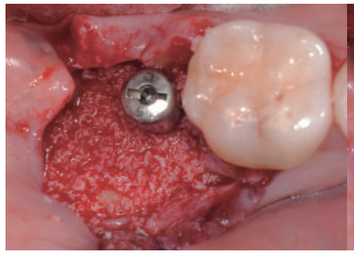
4. Intra-operation. Flaps were reflected, and the bone defect was observed. The soft tissue at the coronal portion of the bone defect was removed.



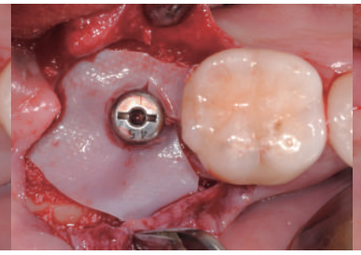
5. Intra-operation. An implant was placed in the proper position for the final prosthesis.



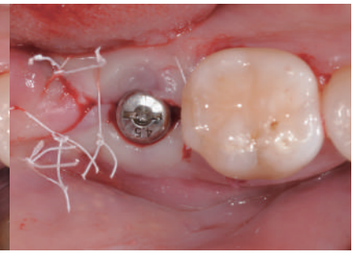
6. Intra-operation. The bone defect was observed around the implant. The implant was placed at the level of the resorbed buccal plate.



7. Intra-operation. The defect was filled with THE Graft.



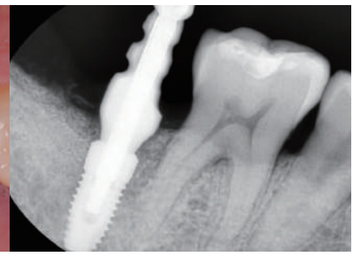
8. Intra-operation. The collagen membrane was placed over the graft site. The membrane was punched and stabilized by the healing abutment.



9. Intra-operation. Biotex was used for suturing.

10. Post-operation. The implant appeared to be placed deeply because the buccal plate was vertically resorbed.

11. Stitch out, 1 week post-GBR.



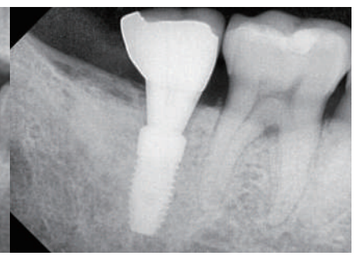
12. Impression, 2 months and 2 weeks post-GBR. The impression was taken with transfer impression coping.

VERTICAL AND HORIZONTAL BONE DEFECT | BONE AUGMENTATION

Case Summary

13. Final prosthesis, 3 months post-GBR.

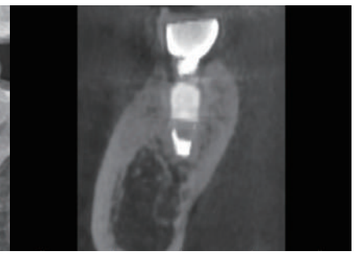
14. Follow up, 1 year and 8 months post-GBR. The bone defect was totally resolved. The implant appeared to be placed deeply. The crestal bone level was well maintained.



15. Follow up, 7 years post-GBR. The crestal bone level was well maintained.

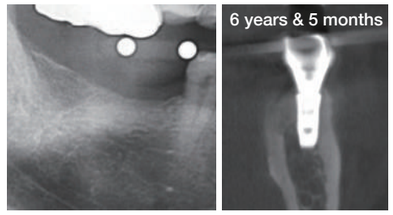
16. Follow up, 8 years and 5 months post-GBR. The peri-implant mucosa appeared to be healthy.

17. Follow up, 8 years and 5 months post-GBR. The crestal bone level was well maintained.



18. Follow up, 8 years and 5 months post-GBR. The buccal bone was vertically augmented and well maintained.

Horizontal bone augmentation for narrow ridge using THE Graft and titanium-mesh after ridge split



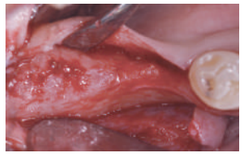
Kyoung-Man Min
Seoul Mei Dental Clinic

Case Summary

Nationality	Korean	Age	Mid-forties	Grafting Area	7 6
Chief Complaint	Mastication with the right posterior teeth.				
Treatment Plan	1. Clinical crown lengthening procedure for new fixed right maxillary molar prosthesis: to prepare adequate “biological width” and “inter-occlusal space.” 2. Implant placement with ridge splitting for the narrow ridge of the right mandibular molar area. 3. Second-stage surgery was performed using a partial thickness apically positioned flap, considering the attached gingiva and vestibular depth. 4. The final prosthesis was a screw-cement-retained prosthesis (SCRP) splinted porcelain-fused-to-metal (PFM) crown with stock abutment.				

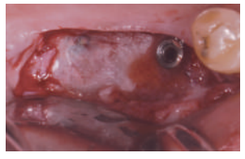
	Category	Products	Method	Description of the method
Materials	Bone graft	THE Graft	Single used	A cortical bony plate was used as a kind of membrane after THE Graft was grafted to the contained defect formed during ridge splitting.
	Membrane	Pre-formed titanium mesh and resorbable membrane	Lay on defect site; attached to the implant fixture	Titanium mesh was connected to the implant to form a space on the side of implant fixture top area A resorbable membrane was applied thereon.
	Suture	Biotex	For membrane fixation	Biotex was used to fix the resorbable membrane to reduce movement and achieve flap adaptation.
	Others	An ointment containing epidermal growth factor (EGF)	-	An ointment containing EGF was applied to the buccal area several times a day after the second-stage surgery.

	Category	Indication	Approach	Surgical Procedures
Methods	■ Implantology ☐ Periodontology	☐ Extraction sockets ☐ Dehiscence ☐ Fenestration ■ Horizontal bone loss ■ Vertical bone loss ☐ Sinus pneumatization ☐ Peri-implantitis ☐ Furcation	☐ Alveolar ridge preservation ☐ Intra-socket ■ Bone augmentation ■ Ridge Split ☐ Lateral ☐ Crestal	☐ One-stage ■ Two-stage ☐ Immediate placement/Immediate loading ■ Simultaneous approach ☐ Staged/Delayed approach



Before

Initial Presentation
(Before treatment).



After

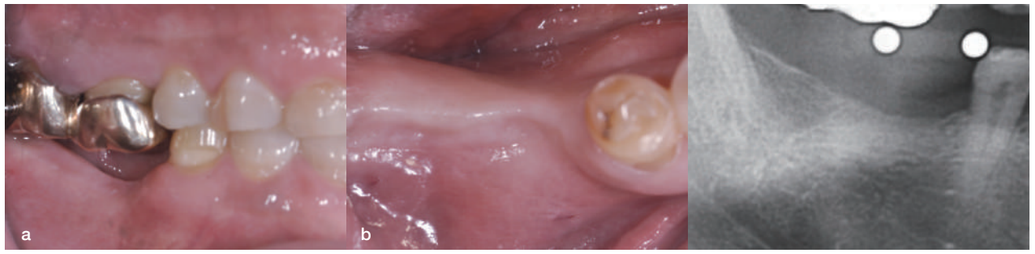
4 months post-GBR.
Clinical findings of newly formed bone-like tissue after removal of the preformed titanium mesh.

Conclusion

6 years and 6 months after the procedure and 6 years after the function, the patient had no complaints of any discomfort. In particular, even on the buccal side of the mandibular right first molar implant, which had no alveolar bone, it was confirmed that a sufficient amount of cortical bone had been formed in the cone beam computed tomography (CBCT) findings 6 years and 6 months after surgery.

VERTICAL AND HORIZONTAL BONE DEFECT | RIDGE SPLIT AND BONE AUGMENTATION

Case Summary



1. Post-extraction, 6 years. (a) Buccal view; (b) Occlusal view. At the initial presentation, the mandibular three-unit fixed bridge failed, and the pontic area of the mandibular right first molar showed ridge resorption. Additionally, maxillary molars erupted, and then interocclusal space was reduced due to the long-term loss of opposing molars.

2. Pre-operation, a panoramic radiograph.

3. Intra-first operation. The alveolar bone of the mandibular right first molar area was resorbed to the buccal side and showed narrow bone width. But the mandibular right second molar area showed generally normal alveolar bone width. A releasing incision was performed for the primary closure post-GBR.

4. Intra-first operation. A partial corticotomy was performed at the mandibular right first molar area for ridge splitting.

5. Intra-first operation. Implants were placed at the mandibular right first and second molar sites, and a contained defect was formed inside the bony housing around the mandibular right first molar implant. Decortication was performed before GBR at the mandibular right first molar area.

6. Intra-first operation. A cover screw was connected at the right second molar implant and titanium mesh was connected at the first molar implant for vertical bone augmentation.

7. Intra-first operation. THE Graft was grafted over the defect area, and titanium mesh was connected to the mandibular right first molar implant, forming space on the side of the fixture top and giving it additional space for new bone. A cortical bony plate was placed on it and used as a kind of membrane.

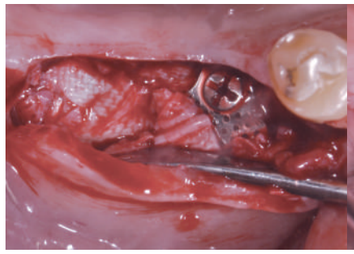
8. Intra-first operation. To reduce movement, a collagen membrane was applied to the grafted area and secured with Biotex using the periosteal suture technique.

9. Intra-first operation. The flap was closed without tension through a horizontal mattress suture technique, and the final suture was completed with a simple interrupted suture using Biotex.

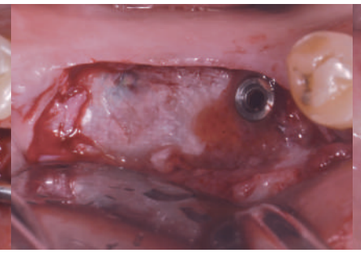
10. A postoperative periapical radiograph taken after suture removal.

11. Post-operation, 4 months post-GBR. The surgical site showed good healing conditions without any problems.

Case Summary



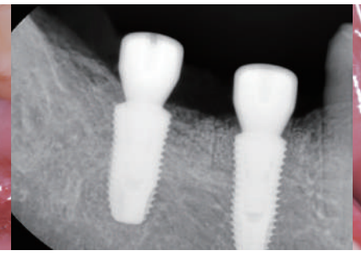
12. **Intra-second operation, 4 months post-GBR.** A dense fibrous pseudo-membrane was observed over the preformed titanium mesh.



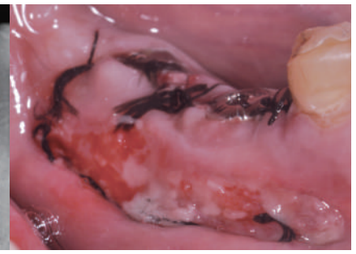
13. **Intra-second operation.** Clinical findings of newly formed bone-like tissue after removal of the preformed titanium mesh.

14. **Intra-second operation.** The newly formed bone-like tissue between the healing abutments could be protected with a keratinized soft tissue using the Palacci technique.

15. **Intra-second operation.** The partial thickness flap was sutured apically. Afterward, a free gingival graft was not performed; instead, an ointment containing EGF was applied several times a day.



16. **Post-second operation.** The day after the second operation.



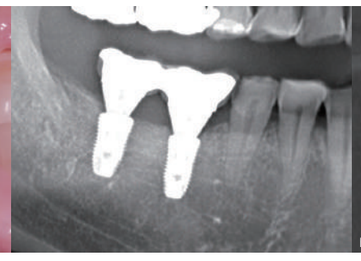
17. **4 months and 3 days post-GBR and 3 days after applying an EGF-containing ointment.** A slight epithelial growth could be observed above the periosteum exposed on the buccal side.

18. **4 months and 9 days post-GBR and 9 days after applying an EGF-containing ointment.** Most of the epithelial growth can be observed above the periosteum exposed on the buccal side.

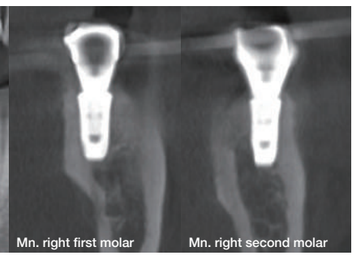
19. **Final prosthesis, 5 months post-GBR.**

20. **Follow up, 3 years post-GBR.** Good oral hygiene was maintained, and there was slight soft tissue growth at the buccal gingival level of the prosthesis.

21. **Follow up, 6 years and 5 months post-GBR. CBCT findings.** There was a slight soft tissue recession.

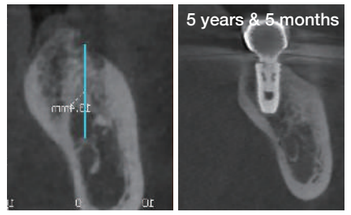


22. **Follow up, 6 years and 5 months post-GBR. Panorama view.** No alveolar bone loss was observed on radiographs.



23. **Follow up, 6 years and 5 months post-GBR. CBCT findings.** The crestal alveolar bone level was well maintained, and cortical bone was observed on the buccal side of the mandibular right first molar implant fixture top area.

Simultaneous alveolar ridge augmentation at dehiscence-type peri-implant defects using THE Graft and titanium-mesh with transmucosal healing component



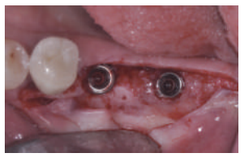
Kyoung-Man Min
Seoul Mei Dental Clinic

Case Summary

Nationality	Korean	Age	Late fifties	Grafting Area	6 7
Chief Complaint	Required an implant treatment on the extraction site.				
Treatment Plan	Implant placement with horizontal alveolar bone augmentation.				

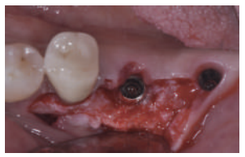
Materials	Category	Products	Method	Description of the method
	Bone graft	THE Graft	Single used	THE Graft was applied at the buccal side.
	Membrane	Pre-formed titanium mesh and resorbable membrane	Primary closure	Titanium mesh was connected to the implant to form a horizontal space on the top of the fixture. A resorbable membrane was applied thereon.
	Suture	Biotex	Fixed membrane	Biotex was used to fix a resorbable membrane and obtain primary closure.

Methods	Category	Indication	Approach	Surgical Procedures
	■ Implantology	☐ Extraction sockets	☐ Alveolar ridge preservation	■ One-stage
	☐ Periodontology	☐ Dehiscence	☐ Intra-socket	☐ Two-stage
		☐ Fenestration	■ Bone augmentation	☐ Immediate placement/Immediate loading
		■ Horizontal bone loss	☐ Ridge Split	■ Simultaneous approach
		■ Vertical bone loss	☐ Lateral	☐ Staged/Delayed approach
		☐ Sinus pneumatization	☐ Crestal	
		☐ Peri-implantitis		
		☐ Furcation		



Before

After implant placement, a very thin buccal bone plate can be observed.



After

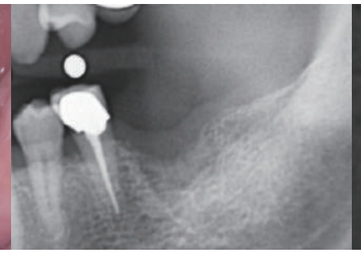
A sufficient amount of newly formed bone-like tissue was observed.

Conclusion

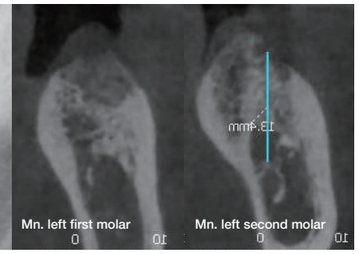
At 5 years and 6 months after the procedure, there was no sign of marginal bone loss, and the CBCT findings showed that the cortical bone was maintained in an appropriate amount, even though its size had shrunk.

Case Summary

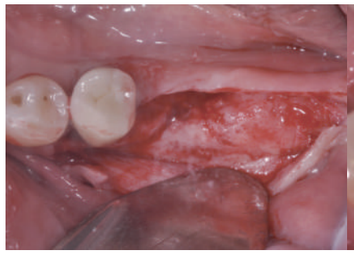
1. Pre-operation. Vertical and horizontal bone loss was observed.



2. Pre-operation.

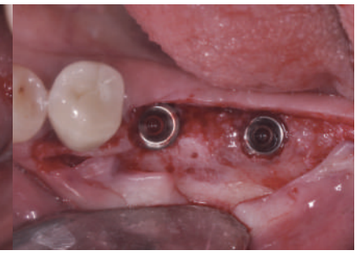


3. Pre-operation. CBCT findings.

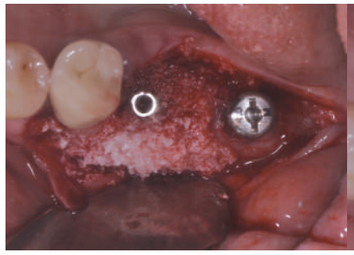


4. Intra-first operation. Observation of a horizontal and slight vertical bone defect at the mandibular left first molar area.

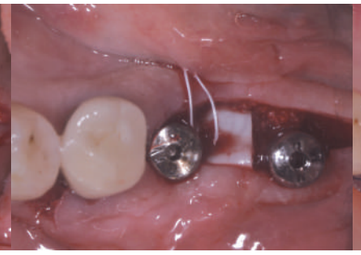
5. Intra-first operation. An implant position guide was inserted to ensure the proper path and interval between implants.



6. Intra-first operation. After decortication, implant fixtures were placed, and a very thin buccal bone plate can be observed at the mandibular left first molar implant site.

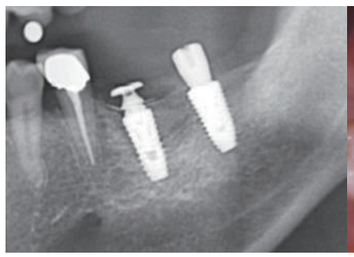


7. Intra-first operation. THE Graft was grafted over the defect area.



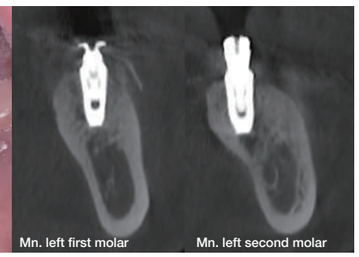
8. Intra-first operation. Pre-formed titanium mesh was connected. On top of that, a collagen membrane was covered.

9. Intra-first operation. Small-size healing abutments were connected for trans-mucosal GBR.



10.Post-first operation.

11.Post-operation, 3 months and 2 weeks post-GBR.

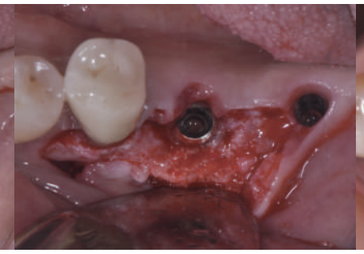


12.Post-operation, 3 months and 2 weeks post-GBR.

VERTICAL AND HORIZONTAL BONE DEFECT | BONE AUGMENTATION

Case Summary

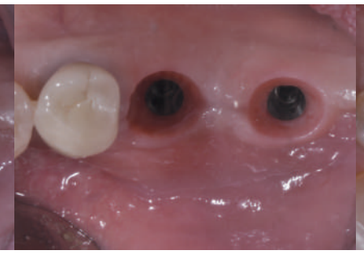
13. Intra-second operation. The titanium mesh was removed during the second operation.



14. Intra-second operation. A sufficient amount of newly formed bone-like tissue was observed.

15. Post-second operation.

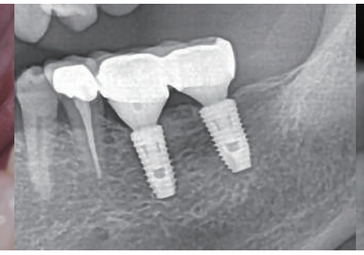
16. Post-GBR, 4 months.



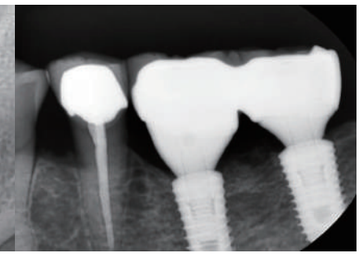
17. Post-GBR, 4 months. The healing abutments were removed for fixture-level impressions.

18. Final prosthesis.

19. Final prosthesis, 1 year post-GBR.

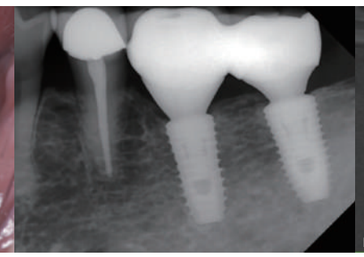


20. Final prosthesis, 1 year post-GBR.

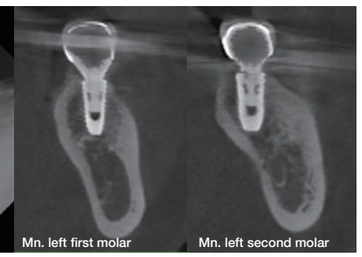


21. Final prosthesis, 1 year post-GBR.

22. Follow up, 5 years and 5 months post-GBR.

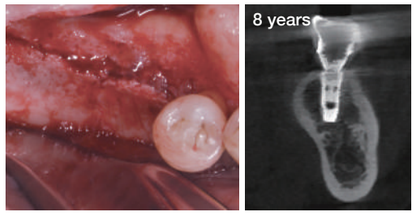


23. Follow up, 5 years and 5 months post-GBR.



24. Follow up, CBCT findings, 5 years and 5 months post-GBR.

Alveolar bone augmentation via staged approach using THE Graft and DBBM after autogenous block bone graft for space-making at horizontal alveolar bone defect



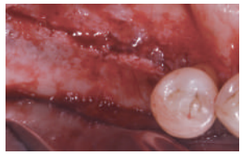
Kyoung-Man Min
Seoul Mei Dental Clinic

Case Summary

Nationality	Korean	Age	Mid-fifties	Grafting Area	7 6
Chief Complaint	Teeth fall out, and gums are always hurting.				
Treatment Plan	1. Lateral augmentation (staged approach). 2. Implant-fixed prosthesis.				

	Category	Products		Method	Description of the method
Materials	Bone graft	Cortical autogenous	Between the mandibular right first and second molars	Single used	Following decortication, a cortical autogenous bone was screwed into the mandibular right first and second molar areas. Following cortical block bone fixation, THE Graft and bovine bone were applied to each isolated contained a defect.
		THE Graft	Mandibular right first molar		
		Deproteinized bovine bone mineral(DBBM)	Mandibular right second molar		
	Membrane	Resorbable membrane		Primary closure	The periosteal suture technique to fix the resorbable membrane was done using Biotex.
	Suture	Biotex		Membrane fixation	The periosteal suture technique to fix the resorbable membrane was done using Biotex.

Methods	Category	Indication	Approach	Surgical Procedures
	■ Implantology ☐ Periodontology	☐ Extraction sockets ☐ Dehiscence ☐ Fenestration ■ Horizontal bone loss ■ Vertical bone loss ☐ Sinus pneumatization ☐ Peri-implantitis ☐ Furcation	☐ Alveolar ridge preservation ☐ Intra-socket ■ Bone augmentation ☐ Ridge Split ☐ Lateral ☐ Crestal	■ One-stage ☐ Two-stage ☐ Immediate placement/Immediate loading ☐ Simultaneous approach ■ Staged/Delayed approach



Before

When the flap was reflected, severe horizontal bone defects were observed.

After

5 months post-GBR. A sufficient amount of newly formed bone-like tissue has formed. Therefore, we were able to secure an appropriate buccal bone thickness even after placing a 5.0 mm diameter fixture.

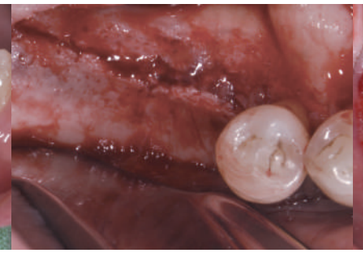
Conclusion

When DBBM and THE Graft were used to treat contained defects, the results were similar from a clinical, radiological, and histological point of view. As a result of observation for 8 years, there were no differences between the 2 materials about cortical bone formation in the CBCT findings.

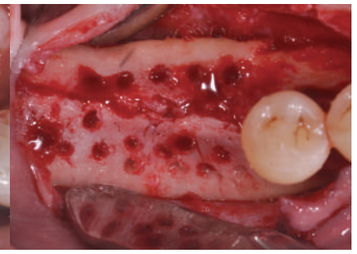
VERTICAL AND HORIZONTAL BONE DEFECT | BONE AUGMENTATION

Case Summary

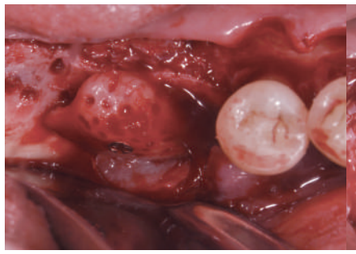
1. Pre-operation. Vertical and horizontal bone losses were observed.



2. Intra-GBR. When the flap was reflected, severe horizontal bone defects were observed.

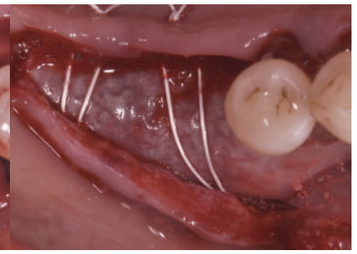


3. Intra-GBR. Decortication was performed.

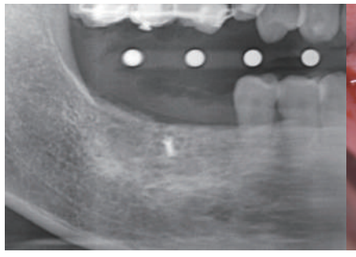


4. Intra-GBR. Autogenous bone was harvested from the lingual mandibular torus and fixed with screws after decortication. This bone block was applied to create a space for new bone.

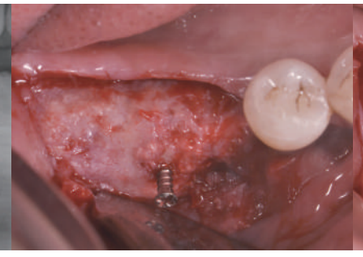
5. Intra-GBR. DBBM was applied to the mandibular right second molar area, and THE Graft was applied to the mandibular right first molar area.



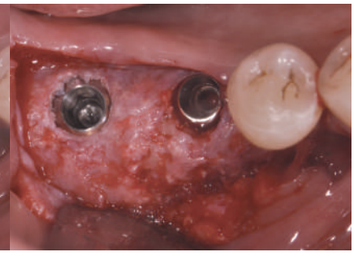
6. Intra-GBR. Membrane stabilization sutures were placed using Biotex for stabilization of the resorbable collagen membrane.



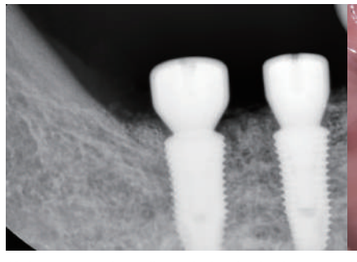
7. Post-GBR, a panoramic radiograph.



8. Intra-first operation, 5 months post-GBR. Flap reflection and screw removal for implant placement.



9. Intra-first operation, 5 months post-GBR. Implants were placed.

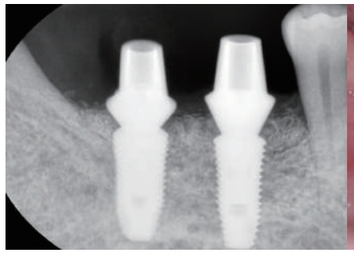


10. A post-operative radiograph showing implants placed in an ideal location.

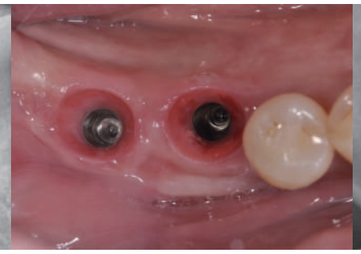
11. Post-operation, 8 months post-GBR. Stock abutments were connected.

12. Post-free gingival graft, 8 months post-GBR. To achieve adequate attached gingiva width and vestibular depth, a free gingival graft was performed.

Case Summary



13. Post- free gingival graft, 8 months post-GBR.

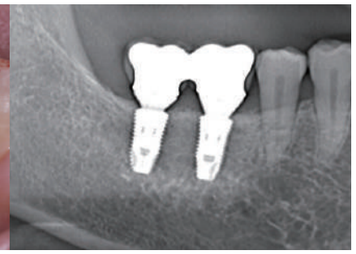


14. 11 months post-GBR. Adequate soft tissue thickness was obtained.

15. Final prosthesis, 11 months post-GBR.

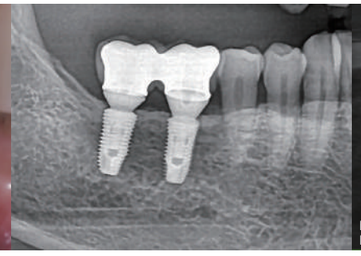
16. Follow up, 1 year and 4 months post-GBR.

17. Follow up, 5 years post-GBR.

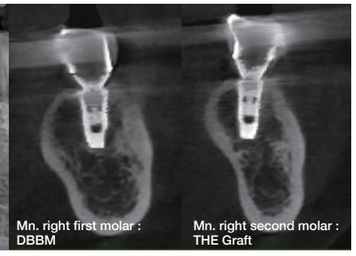


18. Follow up, 5 years post-GBR. Marginal bone resorption was not observed at both the DBBM and THE Graft sites.

19. Follow up, 7 years post-GBR.

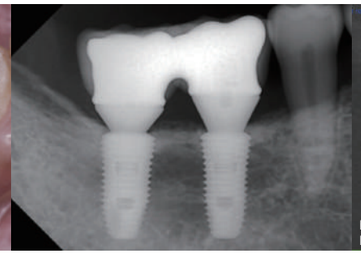


20. Follow up, 7 years and 5 months post-GBR, a panoramic radiograph.

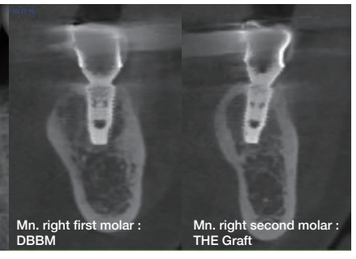


21. Follow up, 7 years and 5 months post-GBR. CBCT findings.

22. Follow up, 8 years post-GBR. No gingival recession was observed.

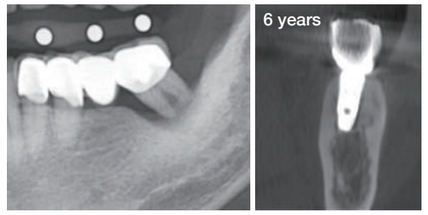


23. Follow up, 8 years post-GBR. A panoramic radiograph. Marginal bone resorption was not observed at both the DBBM and THE Graft sites.



24. Follow up, 8 years and 5 months post-GBR. CBCT findings. It was confirmed that cortical bone was formed and maintained in an adequate amount at both the DBBM and THE Graft sites.

Simultaneous peri-implant bone augmentation after implant placement using THE Graft after ridge split



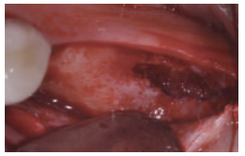
Kyoung-Man Min
Seoul Mei Dental Clinic

Case Summary

Nationality	Korean	Age	Late sixties	Grafting Area	
Chief Complaint	Difficulty in masticating food due to pain when chewing.				
Treatment Plan	Removal of existing prostheses and then simultaneous GBR with implantation.				

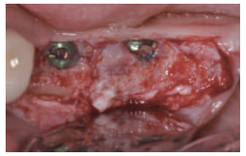
Materials	Category	Products	Method	Description of the method
	Bone graft	Cortical autogenous bone, THE Graft	Layering	A fracture of cortical bone occurred during the ridge split. After implant placement, cortical bone was applied to the defect. THE Graft was then applied on top of that.
	Membrane	Resorbable membrane	Primary closure	A resorbable membrane was applied.
	Suture	Nylon	Periosteal suture for membrane fixation	Nylon was used to fix a resorbable membrane and obtain primary closure.

Methods	Category	Indication	Approach	Surgical Procedures
	■ Implantology	☐ Extraction sockets	☐ Alveolar ridge preservation	☐ One-stage
	☐ Periodontology	☐ Dehiscence	☐ Intra-socket	■ Two-stage
		☐ Fenestration	■ Bone augmentation	☐ Immediate placement/Immediate loading
		■ Horizontal bone loss	■ Ridge Split	■ Simultaneous approach
		■ Vertical bone loss	☐ Lateral	☐ Staged/Delayed approach
		☐ Sinus pneumatization	☐ Crestal	
		☐ Peri-implantitis		
		☐ Furcation		



Before

3 months after extraction, a residual socket was observed.



After

6 months post-GBR, a sufficient new bone-like tissue was observed.

Conclusion

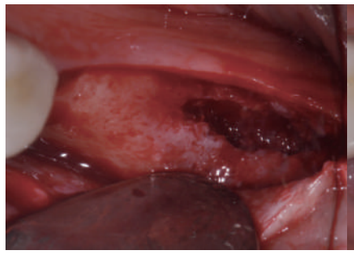
A ridge split technique is often used to maintain space for implant placement.
The horizontal and vertical bone formation could be anticipated as the segmented cortical bone was fixed in the buccal and occlusal directions.
THE Graft showed good results for new bone regeneration.
In the 6 years of CBCT findings post-GBR, it was observed that the new bone formation could be achieved successfully and was well maintained.

Case Summary

1. Pre-extraction.

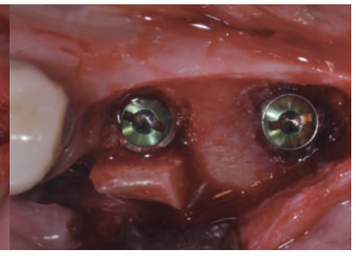
2. Pre-extraction. Severe bone loss was observed.

3. Post-extraction, 3 months.



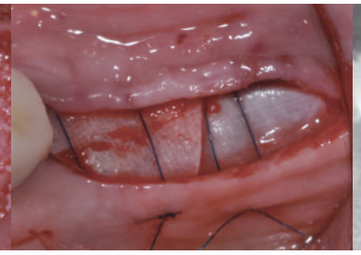
4. Post-extraction, 3 months. Residual extraction was still observed.

5. Intra-first operation.

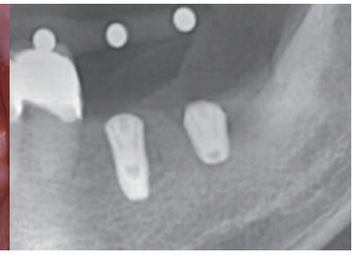


6. Intra-first operation. Cortical autogenous bone adaptation following ridge split.

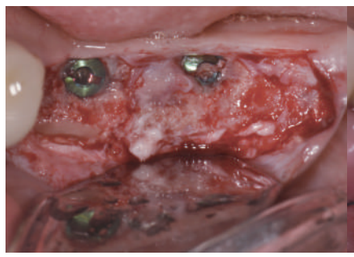
7. Intra-first operation. THE Graft was grafted over the defect area.



8. Intra-first operation. On top of that, a collagen membrane was covered and fixed with nylon using the periosteal suture technique to reduce movement.



9. Post-first operation.



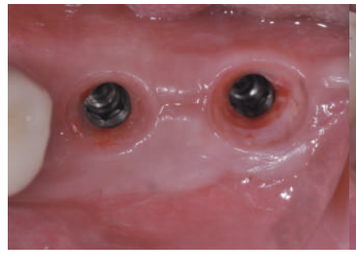
10. Intra-second operation, 6 months post-GBR.

11. Intra-second operation. A free gingival graft was performed after the healing abutment was connected.

12. Post-second operation, 6 weeks (8 months post-GBR). A sufficient zone of keratinized gingiva was obtained, and as a result, adequate vestibular depth was obtained.

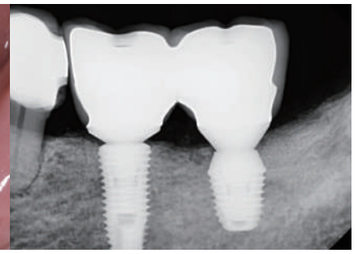
VERTICAL AND HORIZONTAL BONE DEFECT | RIDGE SPLIT AND BONE AUGMENTATION

Case Summary



13. Emergency profile, 8 months post-GBR.

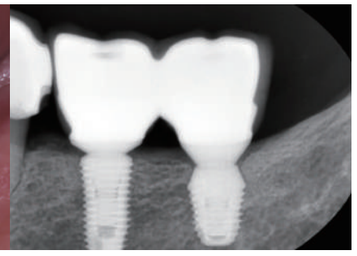
14. Final prosthesis, 10 months post-GBR.



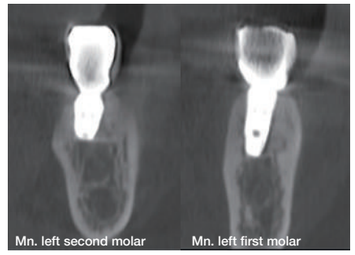
15. Final prosthesis, 10 months post-GBR.

16. Follow up, 3 years post-GBR.

17. Follow up, 6 years post-GBR.

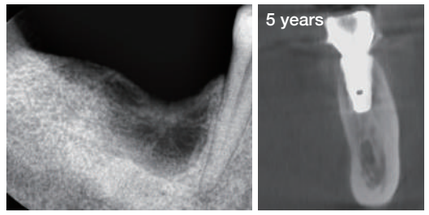


18. Follow up, 6 years post-GBR.



19. Follow up, 6 years post-GBR. 6 years after the operation, corticalization was also observed in CBCT, and the volume was well maintained.

Vertico-Horizontal bone augmentation for healed ridge with severe alveolar bone defect using THE Graft and titanium-mesh after free gingival graft



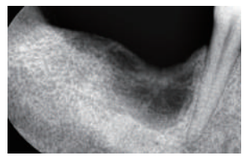
Kyoung-Man Min
Seoul Mei Dental Clinic

Case Summary

Nationality	Korean	Age	Mid-fifties	Grafting Area	7 6
Chief Complaint	Difficulty in chewing because of the lower right posterior teeth.				
Treatment Plan	1. Extraction of the hopeless tooth and root rest. 2. Implant placement with GBR.				

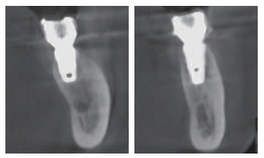
	Category	Products	Method	Description of the method
Materials	Bone graft	THE Graft	Single used	After decortication, THE Graft was applied to the non-contained defect.
	Membrane	Pre-formed titanium mesh and resorbable membrane	Lay on the defect site	Pre-formed titanium mesh was connected to the implant to form a space on the buccal side of the fixture top. A resorbable membrane was applied thereon.
	Suture	Biotex	Membrane fixation primary closure	Biotex was used to fix a resorbable membrane and Nylon was used to obtain the primary closure.

	Category	Indication	Approach	Surgical Procedures
Methods	■ Implantology ☐ Periodontology	☐ Extraction sockets ☐ Dehiscence ☐ Fenestration ■ Horizontal bone loss ■ Vertical bone loss ☐ Sinus pneumatization ☐ Peri-implantitis ☐ Furcation	☐ Alveolar ridge preservation ☐ Intra-socket ■ Bone augmentation ☐ Ridge Split ☐ Lateral ☐ Crestal	☐ One-stage ■ Two-stage ☐ Immediate placement/Immediate loading ■ Simultaneous approach ☐ Staged/Delayed approach



Before

After extraction, 10 months at periapical radiographs, there was still a radiolucent area.



After

5 years after implant placement, GBR marginal bone resorption was not observed at the site where THE Graft was grafted.

Conclusion

The patient did not complain of any discomfort for 5 years after the GBR procedure.
In particular, even on the buccal side of the mandibular right first molar area, where fixture thread exposure existed, it was confirmed that a sufficient amount of cortical bone was formed in the CBCT findings 5 years after treatment.

VERTICAL AND HORIZONTAL BONE DEFECT | BONE AUGMENTATION

Case Summary

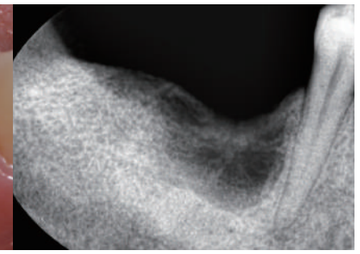
1. **Pre-extraction.**

2. **Pre-extraction.** The mandibular right first molar showed severe radiolucency around the roots.

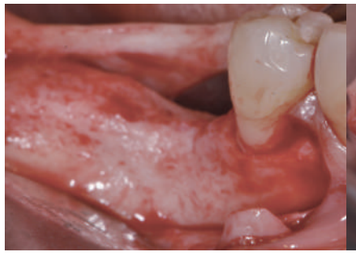
3. **Post-extraction, 2 months.** Vertical and horizontal bone loss around the mandibular first molar area was visible.

4. **Free gingival graft.** A free gingival graft was performed due to a lack of keratinized gingiva.

5. **Post-free gingival graft, 6 months and Post-extraction, 10 months.** Keratinized gingiva was obtained with vestibular deepening.

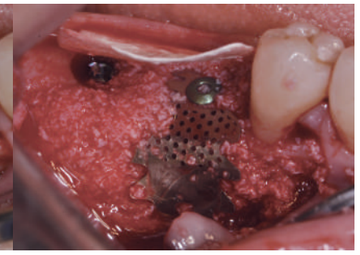


6. **Post-extraction, 11 months.** After 11 months, the bone defect could still be seen on the radiograph.

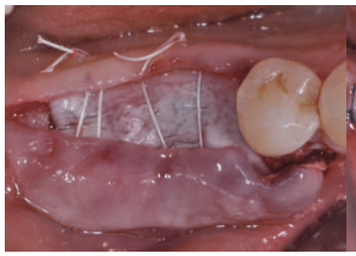


7. **Intra-first operation.** Atrophied alveolar bone was observed after flap reflection.

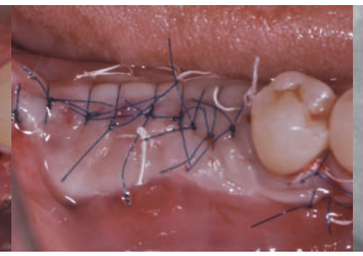
8. **Intra-first operation.** Implants were placed after decortication was done.



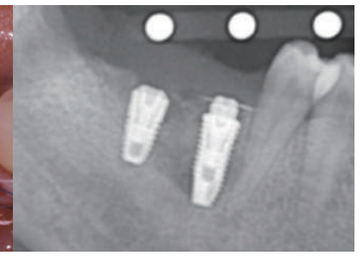
9. **Intra-first operation.** Titanium mesh was connected to the mandibular right first molar implant for space creation. THE Graft was grafted over the defect area.



10. **Intra-first operation.** Biotex was used to placed a membrane stabilizing suture.

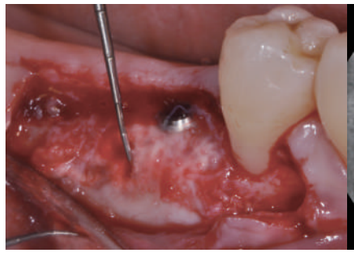


11. **Intra-first operation.** Nylon was used to obtain the primary closure.



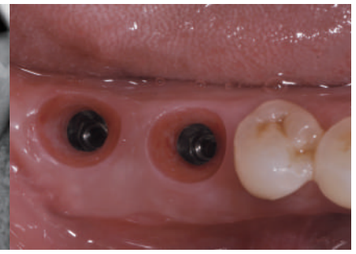
12. **Post-first operation.**

Case Summary



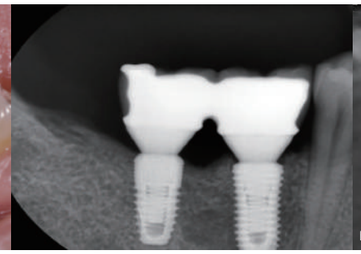
13. Intra-second operation, 8 months post-GBR. Good healing state of newly formed bone-like tissue.

14. Post-second operation, 8 months post-GBR. The healing abutments were connected.

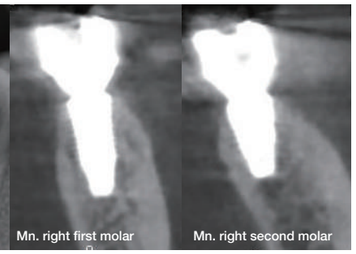


15. Final prosthesis, 10 months post-GBR. Good healing state of peri-implant soft tissue.

16. Final prosthesis, 10 months post-GBR.

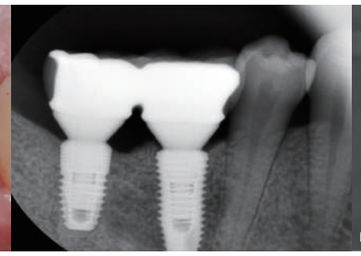


17. Final prosthesis, 10 months post-GBR.

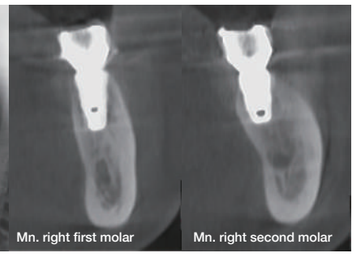


18. Final prosthesis, 10 months post-GBR.

19. Follow up, 5 years post-GBR. Keratinized gingiva was obtained and maintained with vestibular deepening.



20. Follow up, 5 years post-GBR. Marginal bone resorption was not observed at the site where THE Graft was grafted.

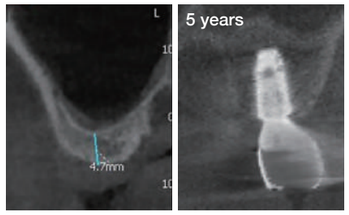


21. Follow up, 5 years post-GBR. CBCT findings. It was confirmed that vital bone with a cortical outline was formed at the regenerated site.

3

Sinus pneumatization and vertical bone defect

Maxillary sinus augmentation via lateral and crestal approach using THE Graft and titanium-reinforced PTFE-membrane



Kyoung-Man Min
Seoul Mei Dental Clinic

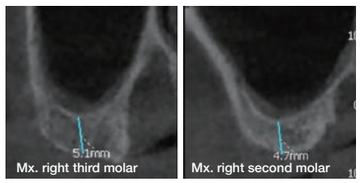
Case Summary

Nationality	Korean	Age	Late forties	Grafting Area	7 6
Chief Complaint	Gum bleeding and pain during mastication.				
Treatment Plan	Implant placement with sinus augmentation.				

Materials	Category	Products	Method	Description of the method
	Bone graft	THE Graft	Single used	Sinus lateral and crestal approaches and horizontal bone augmentation.
	Membrane	Resorbable membrane OpenTex-TR	Primary closure	A resorbable membrane was applied to the lateral window formed during the sinus augmentation procedure. OpenText-TR was applied to the maxillary right first molar.

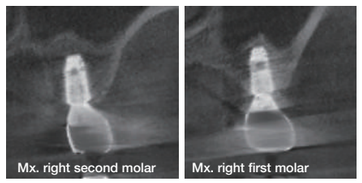
Methods	Category	Indication	Approach	Surgical Procedures
	■ Implantology	☐ Extraction sockets	☐ Alveolar ridge preservation	☐ One-stage
	☐ Periodontology	☐ Dehiscence	☐ Intra-socket	■ Two-stage
		☐ Fenestration	■ Bone augmentation	☐ Immediate placement/Immediate loading
		■ Horizontal bone loss	☐ Ridge Split	■ Simultaneous approach
		■ Vertical bone loss	■ Lateral	■ Staged/Delayed approach
		■ Sinus pneumatization	■ Crestal	
		☐ Peri-implantitis		
		■ Furcation		

Before



The patient had a history of maxillary sinus augmentation failure (crestal approach).

After



5 years post-GBR, radiopacity was observed after sinus augmentation (lateral and crestal approaches).

Conclusion

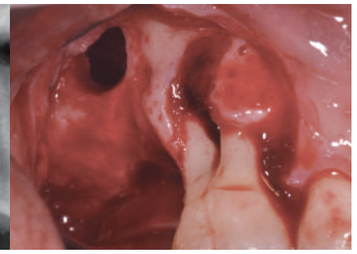
THE Graft used for maxillary sinus augmentation showed good results in both lateral and crestal approaches.

SINUS PNEUMATIZATION AND VERTICAL BONE DEFECT | CRESTAL AND LATERAL APPRAOCH

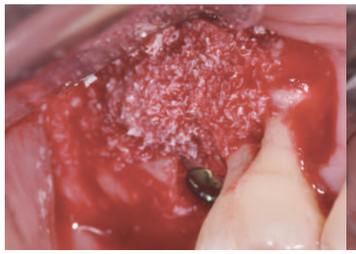
Case Summary

1. **Pre-operation.** The patient had a history of maxillary sinus augmentation failure (crestal approach).

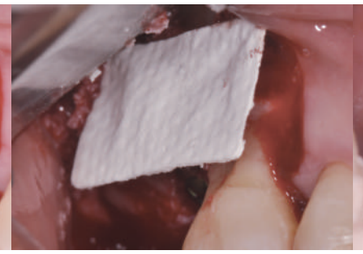
2. **Pre-operation.** There was furcation involvement on tooth #16 but no mobility, so the patient did not want tooth extraction.



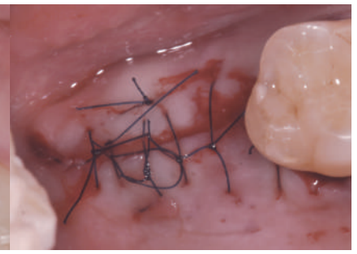
3. **Intra-first operation on the maxillary right second molar.** Sinus augmentation (lateral approach) was performed.



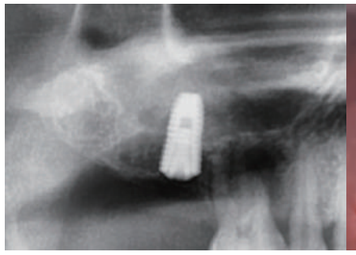
4. **Intra-first operation on the maxillary right second molar.** THE Graft was applied to the buccal side of the maxillary right second molar implant and the furcation defect of the maxillary right first molar after implant placement.



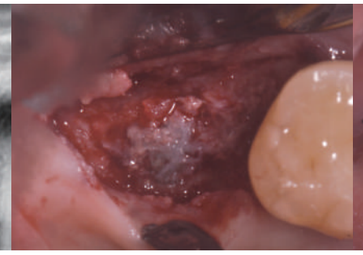
5. **Intra-first operation on the maxillary right second molar.** A collagen membrane was used to cover the surgical site.



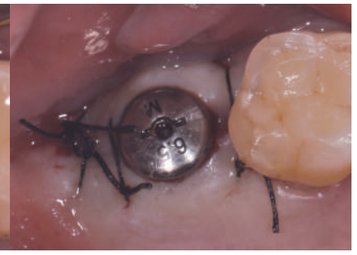
6. **Intra-first operation.** The suture was done with 5-nylon silk.



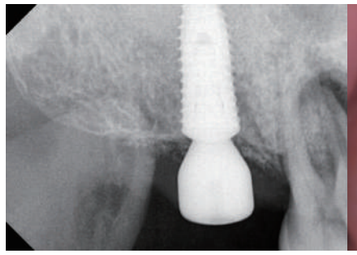
7. **Post-first operation.**



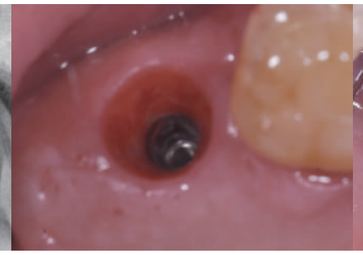
8. **Intra-second operation, 4 months post-GBR.** A sufficient volume of newly formed bone-like tissue was observed.



9. **Post-second operation, 4 months post-GBR.** A healing abutment was connected, and a full-thickness apically positioned flap was performed.



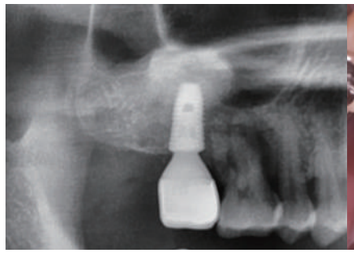
10. **Post-second operation, 4 months post-GBR.** Radiopacity was observed around the tooth #17 fixture area where THE Graft was grafted.



11. **Post-second operation, 7 months post-GBR.** Good healing state of peri-implant soft tissue.

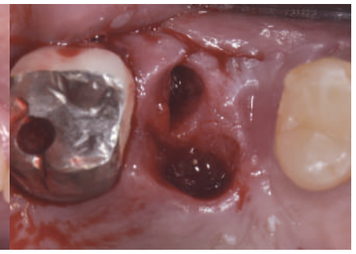
12. **Final prosthesis, 9 months post-GBR.**

Case Summary



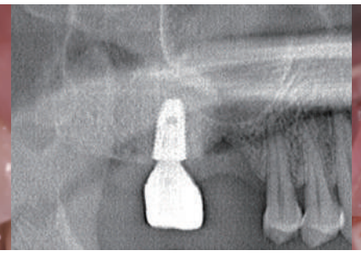
13. **Final prosthesis, 9 months post-GBR.** Radiopacity was observed around the maxillary right second molar fixture area where THE Graft was grafted.

14. **Follow up, 3 years post-operation.** Root resection (mesiobuccal root) was performed on the maxillary right first molar.

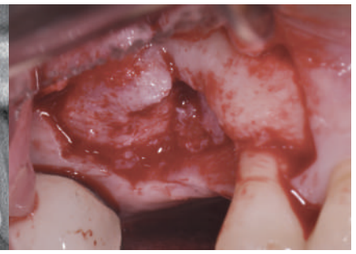


15. **Follow up, 3 years post-operation.** Extraction of hopeless the maxillary right first molar.

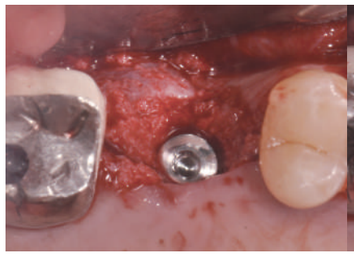
16. **Post-extraction of the maxillary right first molar, 2 months.**



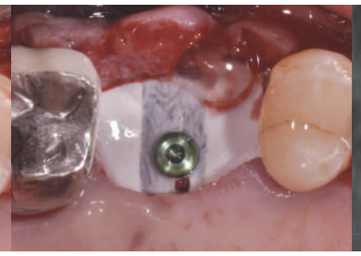
17. **Post-extraction of the maxillary right first molar, 2 months.**



18. **Intra-first operation on the maxillary right first molar.** Sinus augmentation (crestal approach)

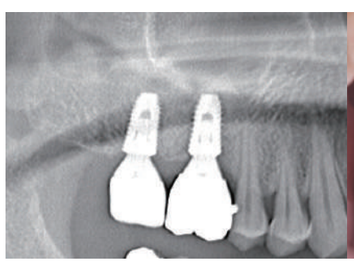


19. **Intra-first operation on the maxillary right first molar.** THE Graft was applied after implant placement.



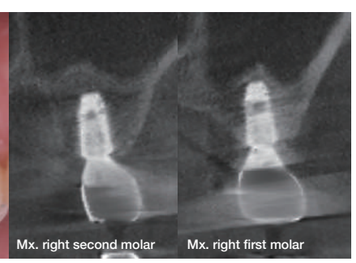
20. **Intra-first operation on the maxillary right first molar.** OpenTex-TR was fixed with an abutment screw.

21. **Post-operation on the maxillary right first molar.** Radiopacity was observed immediately after sinus augmentation (crestal approach).



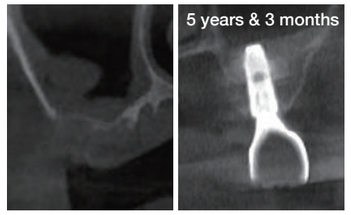
22. **Final prosthesis, 4 years and 10 months post-operation on the maxillary right second molar and 3 years post-operation on the maxillary right first molar.**

23. **Final prosthesis, 4 years and 10 months post-operation on the maxillary right second molar and 3 years post-operation on the maxillary right first molar.**



24. **Follow up, 5 years and 4 months post-operation on the maxillary right second molar and 3 years and 6 months post-operation on the maxillary right first molar.**

Lateral sinus augmentation and simultaneous vertical and horizontal alveolar ridge augmentation using THE Graft and titanium-mesh via staged approach for severe alveolar bone defect



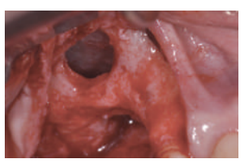
Kyoung-Man Min
Seoul Mei Dental Clinic

Case Summary

Nationality	Korean	Age	Mid-fifties	Grafting Area	7 6
Chief Complaint	Gingival bleeding and discomfort due to tooth mobility.				
Treatment Plan	1. Extraction of hopeless teeth. 2. Sinus augmentation and vertical augmentation (staged approach). 3. Implant placement (one-stage).				

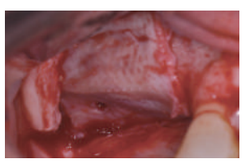
Materials	Category	Products	Method	Description of the method
	Bone graft	THE Graft	Single used	Sinus lateral approach and vertical augmentation
	Membrane	Titanium mesh and resorbable membrane	Fixed with screws	The titanium mesh is covered with a resorbable membrane.
	Suture	Biotex	Fixed membrane	Biotex was used to fix a resorbable membrane and obtain primary closure.

Methods	Category	Indication	Approach	Surgical Procedures
	■ Implantology ☐ Periodontology	☐ Extraction sockets ☐ Dehiscence ☐ Fenestration ■ Horizontal bone loss ■ Vertical bone loss ■ Sinus pneumatization ☐ Peri-implantitis ☐ Furcation	☐ Alveolar ridge preservation ☐ Intra-socket ■ Bone augmentation ☐ Ridge Split ■ Lateral ☐ Crestal	■ One-stage ☐ Two-stage ☐ Immediate placement/Immediate loading ☐ Simultaneous approach ■ Staged/Delayed approach



Before

A lateral window formed at the maxillary sinus and a palatal side vertico-horizontal defect existed prior to GBR.



After

7 months post-GBR, newly formed bone-like tissue with pseudo-periosteum (dense connective tissue under titanium mesh).

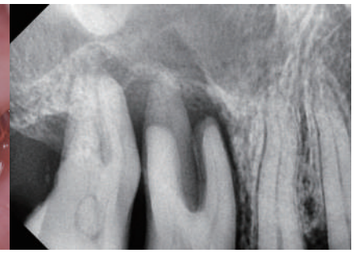
Conclusion

For the severe bone defect in the maxillary posterior region, both vertical bone augmentation and lateral maxillary sinus augmentation were performed. A good result was obtained clinically and radiographically after 5 years of treatment.

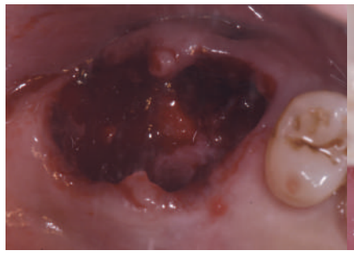
Case Summary

1. **Pre-extraction. Buccal view.**

2. **Pre-extraction.** Gingival recession was observed in the lingual view.

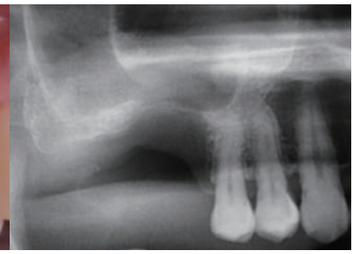


3. **Pre-extraction.** Severe alveolar bone loss invading the maxillary sinus was observed.

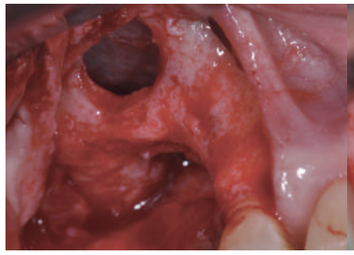


4. **Intra-extraction.** Fortunately, the bony wall of the maxillary sinus was not perforated, and after tooth extraction, the extraction socket was carefully curetted.

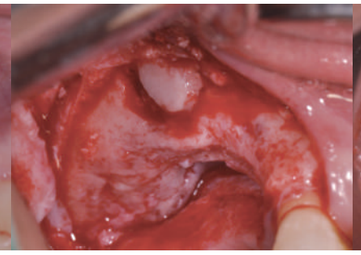
5. **Post-extraction, 7 months.** Severe vertico-horizontal bone loss was observed.



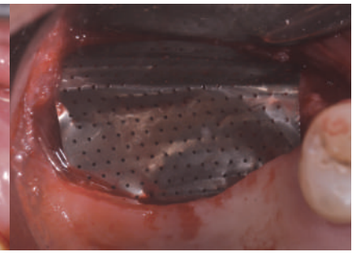
6. **Post-extraction, 7 months.** Severe vertical bone loss was observed, but fortunately intact alveolar bone existed distal to tooth #15.



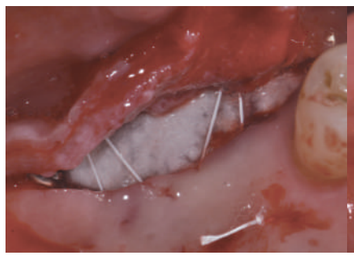
7. **Intra-GBR.** A lateral window formed at the maxillary sinus, and the Schneiderian membrane was detached.



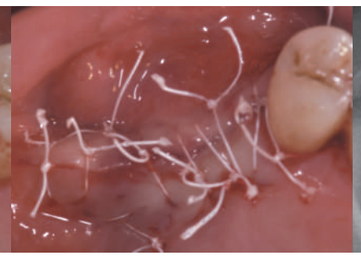
8. **Intra-GBR.** After THE Graft was grafted, the prepared bony lid of the sinus lateral wall was repositioned.



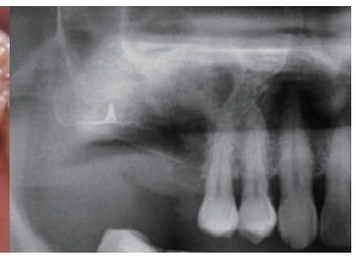
9. **Intra-GBR.** Titanium mesh was trimmed and secured with screws, after THE Graft was applied.



10. **Intra-GBR.** Biotex was used to fix the resorbable membrane.



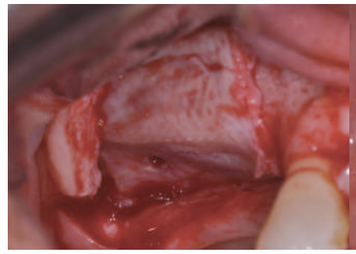
11. **Post-GBR.** Biotex completed the primary closure.



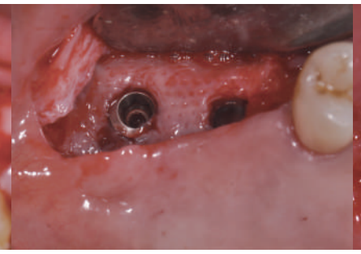
12. **Post-GBR.** In postoperative panoramic radiographs, the outline of THE Graft that was grafted was well observed.

SINUS PNEUMATIZATION AND VERTICAL BONE DEFECT | LATERAL APPRAOCH

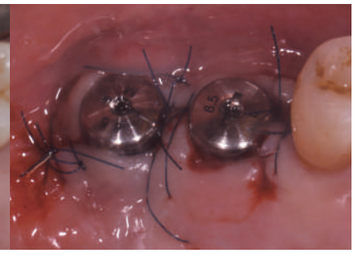
Case Summary



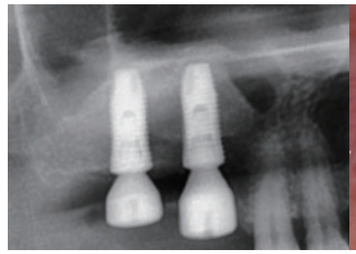
13. **Post-operation. 7 months after sinus augmentation and GBR.** Newly formed bone-like tissue with pseudo-periosteum (dense connective tissue under titanium mesh) was observed.



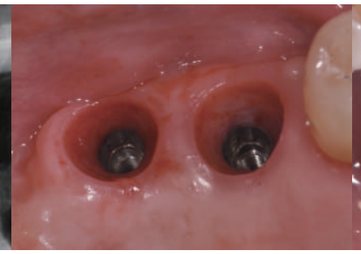
14. **Intra-first operation.** Implants placement (one-stage).



15. **Intra-first operation.** The healing abutments were connected.

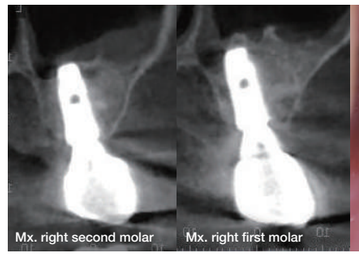


16. **Post-first operation.** 7 months after maxillary sinus augmentation, panoramic radiographs showed radiopaque cortical lines.



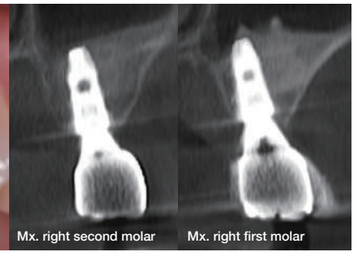
17. **Impression. 1 year after sinus augmentation and GBR.** Good healing state of peri-implant soft tissue at the time of the fixture-level impression.

18. **Final prosthesis. After 1 year of sinus augmentation and GBR.**



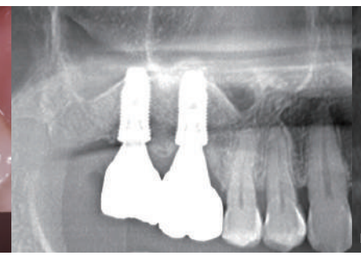
19. **Final prosthesis. After 1 year of sinus augmentation and GBR.**

20. **Follow up. After 2 years and 5 months of sinus augmentation and GBR.**

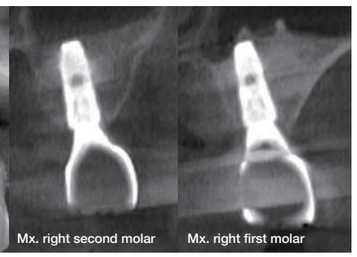


21. **Follow up. After 4 years of sinus augmentation and GBR.** Marginal bone resorption was not observed.

22. **Follow up. After 5 years and 3 months of sinus augmentation and GBR.**



23. **Follow up. After 5 years and 3 months of sinus augmentation and GBR.** In panoramic radiographs, a clear radiopaque cortical line was observed.

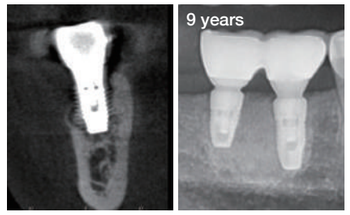


24. **Follow up. After 5 years and 3 months of sinus augmentation and GBR.** Marginal bone resorption was not observed both buccally and palatally.

4

Peri-implantitis

The GBR procedure for unfavorable bone defects induced by peri-implantitis



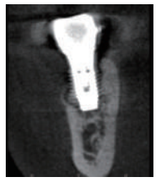
Chang-Kyun Lee
Crystal Dental Clinic

Case Summary

Nationality	Korean	**Age**	Early fifties	**Grafting Area**	
Chief Complaint	Implant mobility on the lower right posterior causes discomfort at the implant site.				
Treatment Plan	1. Explantation and GBR on the implant of the mandibular right first molar and implant placement on the mandibular right second molar area. 2. Implant placement on the mandibular right first molar at 3 months post-GBR. 3. Second surgery with free gingival graft. 4. Splinted implant crown delivery.				

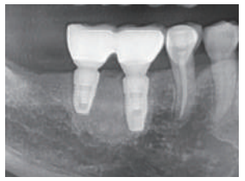
Materials	**Category**	**Products**	**Method**	**Description of the method**
	Bone graft	THE Graft	Single	The bone graft was performed on the mandibular right first molar bone defect and the mandibular right second molar buccal dehiscence defect. THE Graft was used as a bone substitute.
	Membrane	Collagen membrane	Primary closure	THE Graft was covered with a collagen membrane.
	Suture	Biotex		Suture was performed with Biotex

Methods	**Category**	**Indication**	**Approach**	**Surgical Procedures**
	■ Implantology ☐ Periodontology	☐ Extraction sockets ☐ Dehiscence ☐ Fenestration ☐ Horizontal bone loss ☐ Vertical bone loss ☐ Sinus pneumatization ■ Peri-implantitis ☐ Furcation	☐ Alveolar ridge preservation ☐ Intra-socket ■ Bone augmentation ☐ Ridge Split ☐ Lateral ☐ Crestal	☐ One-stage ■ Two-stage ☐ Immediate placement/Immediate loading ☐ Simultaneous approach ■ Staged/Delayed approach



Before

The radiolucency was observed around the mandibular right first molar implant. The osseointegration seemed to be destroyed. This implant had mobility.



After

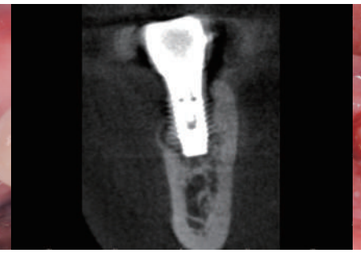
GBR was performed immediately after the mandibular right first molar implant was removed. A mandibular right second molar implant was placed simultaneously with the GBR. 3 months later, a mandibular right first molar implant was placed. A splinted implant crown was delivered.

Conclusion

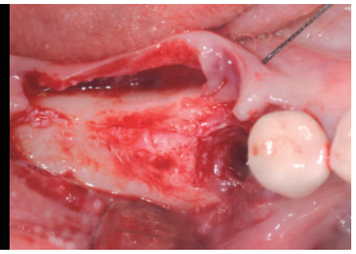
GBR was performed using THE Graft and collagen membrane immediately after the explantation of the mandibular right first molar implant. 3 months later, an implant was placed on the GBR site. The bone quality of the GBR site was good for implant placement in spite of the defect, which was caused by peri-implantitis, an unfavorable defect. And the bone level of the mandibular right first molar implant was well maintained for about 9 years after GBR, and 8 years after loading.

Case Summary

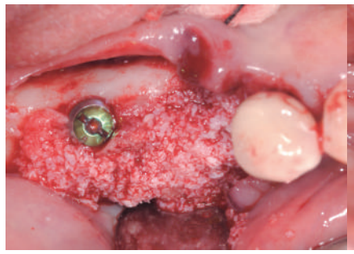
1. Pre-operation. The implant of the mandibular right first molar had mobility. The occlusal reduction of the #46 implant crown was performed to reduce the patient's discomfort while eating at the first visit.



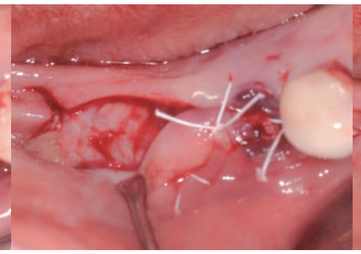
2. Pre-operation. The buccal bone was resorbed over half of the implant length.



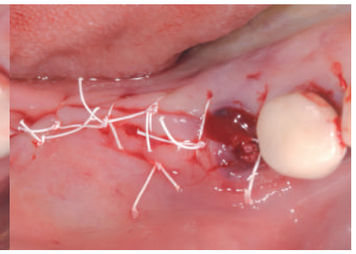
3. Intra-GBR. The implant of the mandibular right first molar was removed. This implant could be removed easily. The bone defect was made by peri-implantitis and the buccal plate disappeared.



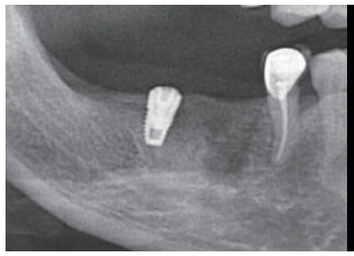
4. Intra-GBR. The implant was placed on the mandibular right second molar area. The bone graft was performed on the mandibular right first molar bone defect and the mandibular right second molar buccal dehiscence defect. THE Graft was used as a bone substitute.



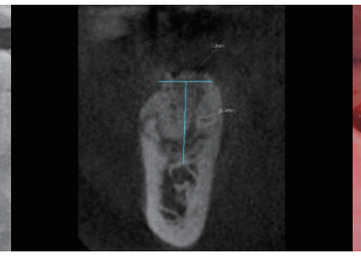
5. Intra-GBR. THE Graft was covered with a collagen membrane.



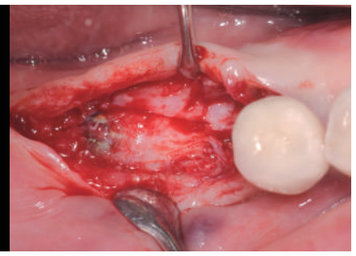
6. Intra-GBR. 4-0 PTFE sutures were placed (Biotex; Purgobiologics, Korea).



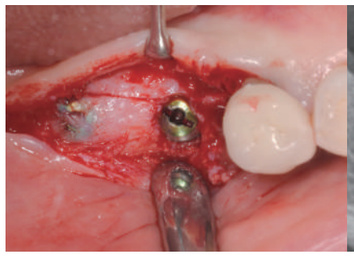
7. Intra-GBR. We could see that the defect was filled with bone graft material. An implant of the mandibular right second molar was placed in a slightly shallow position.



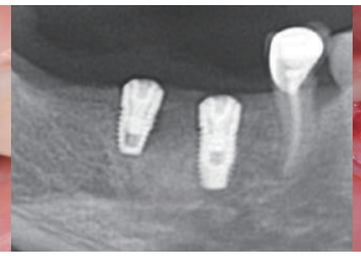
8. Post-GBR, 2 months.



9. Intra-operation, 3 months post-GBR. Only crestal incision and sulcular incision were made. Flaps were reflected. We could observe the newly formed tissue at the GBR site.



10. Intra-operation. 3 months post-GBR. An implant was placed at the GBR site. Bone quantity and quality were sufficient for implant placement. The additional bone graft was unnecessary.



11. Post-operation.

12. Intra-second operation. 6 months post-GBR. The partial-thickness flap was made, and the flap was sutured at the apical position. The gingiva harvested from the palate was grafted on the recipient bed.

PERI-IMPLANTITIS | BONE AUGMENTATION

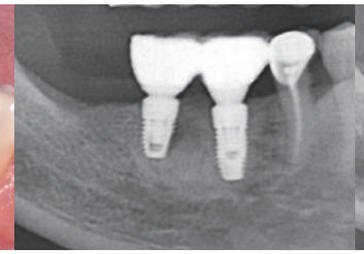
Case Summary

13. Post-second operation. 7 months post-GBR. The attached gingiva was widened through a free gingival graft procedure.

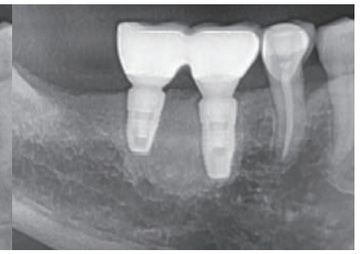
14. Final prosthesis, 8 months post-GBR.

15. Final prosthesis, 8 months post-GBR.

16. Follow up, 1 year and 5 months post-GBR. The peri-implant mucosa appeared to be healthy.



17. Follow up, 1 year 5 months post-GBR.



18. Follow up, 7 years 8 months post-GBR. The crestal bone level was well maintained for about 7 years. Increased radiopacity of the regenerated site could be seen compared to the previous radiogrph.

19. Follow up, 9 years post-GBR and 8 years after final prosthesis delivery. Peri-implant tissue had been well maintained over 9 years after GBR.

20. Follow up, 9 years post-GBR and 8 years after final prosthesis delivery. The crestal bone level was well maintained for about 8 years after loading

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