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# THE Graft™ Collagen

# Case Book

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Purgo Dental Biologics Solution

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Article

## 01

# Augmentation Stability of Guided Bone Regeneration for Peri-Implant Dehiscence Defects with L-shaped Porcine-Derived Block Bone Substitute

Jae-Hong Lee | Eun-Hee Jung | Seong-Nyum Jeong

• Department of Periodontology, Daejeon Dental Hospital, Institute of Wonkwang Dental Research, Wonkwang University College of Dentistry, Daejeon, Korea

**Purpose:** Block bone substitutes have better augmentation stability for guided bone regeneration (GBR) than particulate bone substitutes. This study sought to determine whether GBR with an L-shaped porcine block bone (DPBM-C; THE Graft Collagen) differs from GBR with an L-shaped bovine block bone (DBBM-C) based on clinical, radiographic, and volumetric outcomes for peri-implant dehiscence defects. A total of 42 peri-implant defects were grafted with 20 L-shaped DPBM-C and 22 DBBM- C groups.

**Method:** The horizontal and vertical thicknesses of the augmented hard tissue were measured using sagittal cone-beam computed tomography, and the volumetric tissue change was evaluated by stereolithography image superimposition. Postoperative discomfort, early wound healing outcomes, and implant stability were also assessed.

**Results:** Among the clinical (subjective pain and swelling, wound dehiscence, membrane exposure, and periotest values),radiographic(changes in horizontal and vertical hard tissue thickness), and volumetric parameters of the L-shaped DPBM-C and DBBM-C groups during the healing period, only the periotest values showed a statistically significant difference (0.67 1.19, p = 0.042).

**Conclusion:** Within the limitations of this study, an L-shaped DPBM-C is not inferior to an L-shaped DBBM-C based on their clinical, radiographic, and volumetric outcomes for GBR of peri-implant dehiscence defects.

LEE, Jae-Hong; JUNG, Eun-Hee; JEONG, Seong-Nyum. Augmentation stability of guided bone regeneration for peri-implant dehiscence defects with L-shaped porcine-derived block bone substitute. Materials, 2021, 14.21: 6580.



## 02

# Use of Porcine-derived Block Bone Substitutes for Guided Bone Regeneration in the Peri-implant Dehiscence Defects of the Mandibular Anterior Region

Jae-Hong Lee | Seong-Nyum Jeong

• Department of Periodontology, Daejeon Dental Hospital, Institute of Wonkwang Dental Research, Wonkwang University College of Dentistry, Daejeon, Korea

**Purpose:** Various bone graft materials are currently used for guided bone regeneration (GBR), but data are lacking on the superiority of one biomaterial relative to the other. In addition, achieving successful bone augmentation remains challenging. When used in GBR, block bone substitutes show better augmentation stability of the bone than particulated bone substitutes. Recently developed soft- type block bone substitutes are widely used in clinical practice.

**Method:** : This study enrolled 12 patients who underwent implant placement with GBR in the mandibular anterior region between September 2016 and May 2021 in the Department of Periodontology, Daejeon Dental Hospital, Wonkwang University. GBR was performed using demineralized porcine bone mineral with 10% collagen (DPBM-C; THE Graft® Collagen) and a resorbable collagen membrane. The surgical site was sutured with 4-0 e-PTFE (Biotex®) and 5-0 nylon (Monosof®) by using modified horizontal mattress and interrupted suture methods. Stitch-out was performed two weeks after the operation, and reentry surgery was performed within four to six months after the implant surgery.

**Results:** There was a significant decrease in bone thickness after five months of implant surgery with GBR compared with the decrease immediately after surgery. However, bone gains of more than 1.5 mm were observed at all measurement sites compared with those at baseline.

**Conclusion:** GBR performed using demineralized porcine bone mineral with 10% collagen in combination with a resorbable collagen membrane is an effective and favorable treatment modality for peri-implant dehiscence defects in terms of clinical and radiographic outcomes during the healing period.

LEE, Jae-Hong; JEONG, Seong-Nyum. Use of Porcine-derived Block Bone Substitutes for Guided Bone Regeneration in the Peri-implant Dehiscence Defects of the Mandibular Anterior Region. Journal of implantology and applied sciences, 2021, 25.4: 170-178.

03

# Profilometric, volumetric, and esthetic analysis of guided bone regeneration with L-shaped collagenated bone substitute and connective tissue graft in the maxillary esthetic zone: A case series with 1-year observational study

Jae-Hong Lee | Eun-Hee Jung | Seong-Nyum Jeong

• Department of Periodontology, Daejeon Dental Hospital, Institute of Wonkwang Dental Research, Wonkwang University College of Dentistry, Daejeon, Korea

**Purpose:** The aim of this study was to evaluate 1-year stability and maintenance of peri-implant soft and hard tissues after guided bone regeneration (GBR) with L- shaped collagenated bone substitute (THE Graft Collagen) and subepithelial connective tissue graft (CTG) in the maxillary anterior region using profilometric, volumetric, and esthetic analyses.

**Method:** Fourteen peri-implant defects were grafted with L-shaped collagenated bone substitute, and 5 months after implant placement with GBR, reentry surgery in combination with CTG was performed in all participants. CBCT scans and STL files were acquired at baseline (after implant surgery, T1), reentry surgery (T2), and 1-year follow-up (T3). The profilometric and volumetric changes of the peri-implant tissues were measured, and the pink esthetic score (PES) was assessed at T3.

**Results:** One year after GBR and CTG at the buccal aspect of the maxillary esthetic zone, the mean thickness of the hard tissue (HT) decreased (HT0: 0.87 ± 0.67 mm, HT1: 0.74 ± 0.75 mm, HT2: 0.92 ± 0.48 mm, 45-HT: 0.87 ± 0.73 mm) and the corresponding thickness of the soft tissue (ST) increased (ST0: 0.96 ± 1.06 mm, ST1: 0.85 ± 0.95 mm, ST2: 0.38 ± 0.82 mm, 45-ST: 0.12 ± 0.62 mm), and as a result, there was no statistically significant difference in the total tissue thickness between T1 and T3 ($p < 0.05$). The mean volumetric changes of the peri-implant tissues increased after 1-year of implant surgery (T1–T2: 1.52 ± 0.83 mm, T2–T3: 0.88 ± 1.04 mm, T1–T3: 0.64 ± 0.90 mm), and a statistically significant difference was shown in all compared time periods ($p < 0.05$). The mean PES score was 8.07 ± 1.54 at T3 (range, 6–10).

**Conclusion:** Within the limitations of this 1-year follow-up study, GBR with an L- shaped collagenated bone substitute and subepithelial CTG in the maxillary esthetic zone was beneficial for stable and maintainable peri-implant hard and soft tissues.

LEE, Jae-Hong; JUNG, Eun-Hee; JEONG, Seong-Nyum. Profilometric, volumetric, and esthetic analysis of guided bone regeneration with L-shaped collagenated bone substitute and connective tissue graft in the maxillary esthetic zone: A case series with 1-year observational study. Clinical Implant Dentistry and Related Research, 2022, 24.5: 655-663.

2

GBR with THE Graft Collagen in Peri-implant Dehiscence Defect

# Case01

# Mandibular peri-implant dehiscence defect. GBR with simultaneous implant placement


## Jung-Seok Lee

• Department of Periodontology, Research Institute for Periodontal Regeneration, Yonsei University College of Dentistry

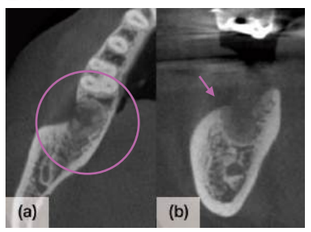

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Late-forties | Grafting Area | 7 |
| Treatment Plan | Simultaneous approach: Implant placement (two-stage) and GBR with THE Graft Collagen and resorbable collagen membrane. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | A buccal dehiscence defect following implant placement was augmented using The Graft Collagen and a resorbable collagen membrane. |
| | Membrane | Resorbable collagen membrane | | |

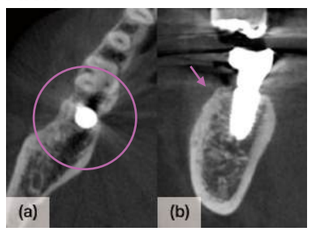
| Methods | Category | Indication | Approach | Surgical Procedures |
|---|---|---|---|---|
| | ■ Implantology | ☐ Extraction sockets | ☐ Alveolar ridge preservation | ☐ One-stage |
| | ☐ Periodontology | ■ Dehiscence | ☐ Intra-socket | ■ Two-stage |
| | | ☐ Fenestration | ■ Bone augmentation | ☐ Immediate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

## Before




Observation of damaged labial alveolar bone.

## After

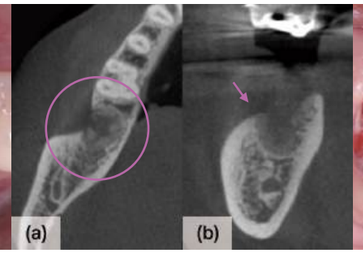



1 year post-GBR. Observation of corticalization similar to the adjacent alveolar bone on radiographs.

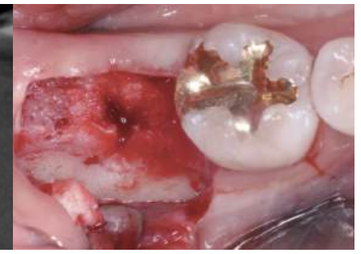
DEHISCENCE DEFECT | BONE AUGMENTATION

## Case Summary

**1. Pre-operation.**




**2. Pre-operation, CBCT findings. (a) Axial view; (b) Coronal view.** Observation of damaged labial alveolar bone.

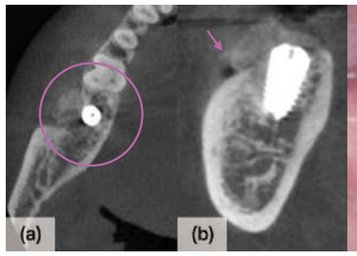


**3. Intra-first operation.** Incision and flap elevation.

**4. Intra-first operation.** Implant placement and THE Graft Collagen were applied in an L-shape to the buccal and occlusal surface.

**5. Intra-first operation.** Covered with a resorbable collagen membrane.

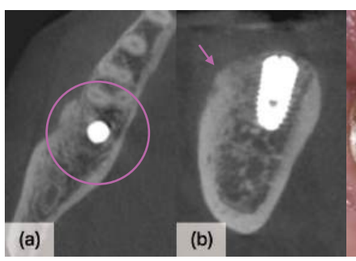
**6. Intra-first operation.** Sutured.




**7. Post-first operation, CBCT findings. (a) Axial view; (b) Coronal view.** Observation of increased volume due to GBR.

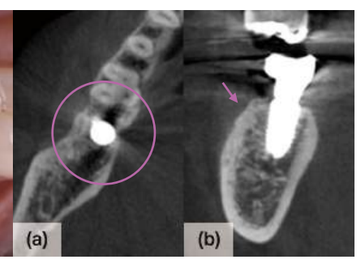
**8. Pre-second operation, 4 months post-GBR.**

**9. Pre-second operation, 4 months post-GBR.**




**10. Post-second operation, 4 months post-GBR. (a) Axial view; (b) Coronal view.** Natural bone remodeling occurs according to the bone envelope.

**11. Final prosthesis, 1 year post-GBR.**




**12. Final prosthesis, 1 year post-GBR. (a) Axial view; (b) Coronal view.** Observation of corticalization similar to the adjacent alveolar bone on radiographs.

# Case02

# Mandibular peri-implant dehiscence defect. GBR with simultaneous implant placement


## Dong-Woon Lee

• Department of Periodontology, Dental Hospital, Wonkwang University College of Dentistry

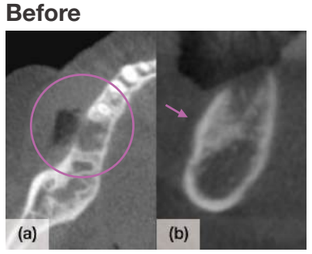

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Mid-Seventies | Grafting Area | 6 |
| Treatment Plan | Simultaneous approach: Implant placement (two-stage) and GBR with THE Graft Collagen and resorbable collagen membrane. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | A buccal dehiscence defect following implant placement was augmented using THE Graft Collagen and a resorbable collagen membrane. |
| | Membrane | Resorbable collagen membrane | | |

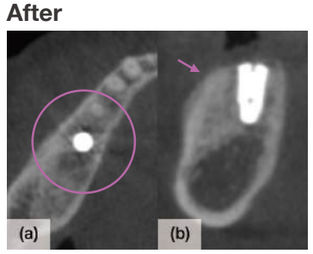
| Methods | Category | Indication | Approach | Surgical Procedures |
|---|---|---|---|---|
| | ■ Implantology | ☐ Extraction sockets | ☐ Alveolar ridge preservation | ☐ One-stage |
| | ☐ Periodontology | ■ Dehiscence | ☐ Intra-socket | ■ Two-stage |
| | | ☐ Fenestration | ■ Bone augmentation | ☐ Immediate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

## Before




Observation of damaged buccal alveolar bone.

## After

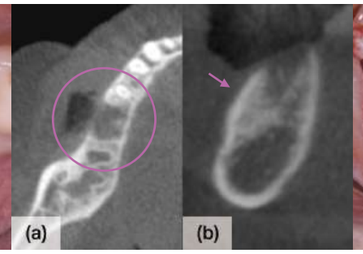



4 months post-GBR. Natural bone remodeling occurs according to the bone envelope.

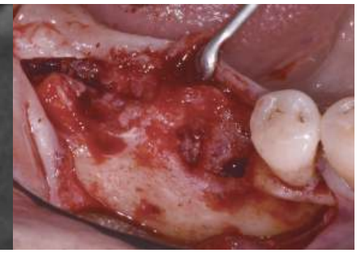
DEHISCENCE DEFECT | BONE AUGMENTATION

## Case Summary

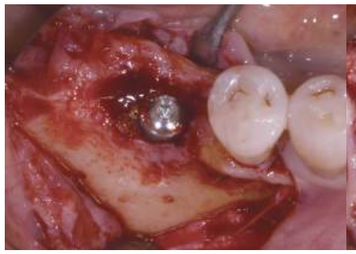
**1. Pre-operation.**




**2. Pre-operation, CBCT findings. (a) Axial view; (b) Coronal view.** Observation of damaged labial alveolar bone.



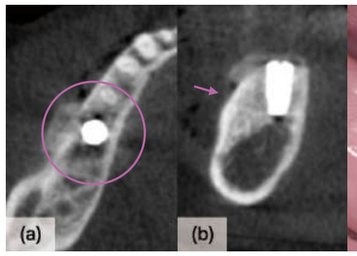
**3. Intra-first operation.** Incision and flap elevation.



**4. Intra-first operation.** Implant placement.

**5. Intra-first operation.** THE Graft Collagen is applied in an L-shape to the buccal and occlusal surfaces and covered with a collagen membrane.

**6. Intra-first operation.** Sutured.

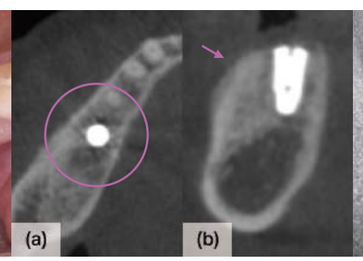



**7. Post-first operation, CBCT findings. (a) Axial view; (b) Coronal view.** Observation of increased buccal bone volume following GBR.

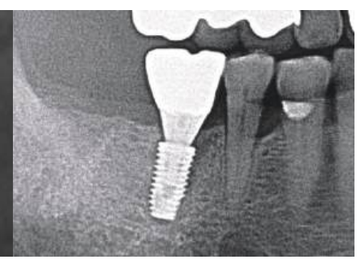
**8. Pre-second operation, 4 months post-GBR.**

**9. Intra-second operation, 4 months post-GBR.**

**10. Post-second operation, 4 months post-GBR.**




**11. Post-second operation, 4 months post-GBR. (a) Axial view; (b) Coronal view.** Natural bone remodeling occurs according to the bone envelope.



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

## Conclusion

# Regeneration of peri-implant dehiscence defect resolution by GBR with simultaneous implant placement

**Prof. Jung-Seok Lee**[1] | **Prof. Dong-Woon Lee**[2]

1 Department of Periodontology, Research Institute for Periodontal Regeneration, Yonsei University College of Dentistry
2 Department of Periodontology, Dental Hospital, Wonkwang University College of Dentistry

A block-type collagenated bone substitute cannot be categorized as a conventional ‘block-bone’ that is widely used for regeneration of an extensive alveolar bone defect. Even though it has the block morphology and is able to provide cohesion of particulate bone substitutes at the time of surgery, the original shape and volume may be lost at an early stage by the rapid resorption of collagen binder within the material. In order to enhance the space-maintaining property of the block, THE Graft Collagen has been manufactured with a binder of physically crosslinked collagen matrix, which is able to effectively maintain the augmented volume by slowing down the resorption rate of the collagen binder.

In the clinical cases in this case-book, THE Graft Collagen had been grafted beyond the alveolar bony envelope, considering the possible resorption of the collagen binder. Four months later, we observed restoration of the alveolar ridge with bone regeneration as well as substantial shrinkage of the augmented volume. Thus, alveolar ridge regeneration could be achieved up to the bony envelope extending from the outer shape of the adjacent alveolar ridge. Based on the reference line of bony envelope, the conventional guided bone regeneration (GBR) and the simplified GBR with THE Graft Collagen could produce similar bone regeneration. In most cases, the reconstruction of alveolar ridge up to the same level as the adjacent tissues is clinically sufficient to surround and support the dental implant. Therefore, in these sites, THE Graft Collagen could be a good option for successful regeneration of alveolar ridge. In addition, the collagen binder enhances manageability of the grafted materials and maintains the bone substitutes within the defect site. THE Graft Collagen could be a successful option for bone grafting technique due to its simplicity to apply in the defect and capacity to maintain its stability.

This work was supported by the Korea Medical Device Development Fund grant funded by the Korea government(the Ministry of Science and ICT, the Ministry of Trade, Industry and Energy, the Ministry of Health & Welfare, the Ministry of Food and Drug Safety)(Project number: ,KMDF_PR_20200901)

3

Clinical Cases

# Maxillary right and left central incisor implants with intra-socket bone graft and ridge preservation of maxillary right and left lateral incisors

**Yong-Seok Cho**
• The 22nd Century Seoul Dental Hospital

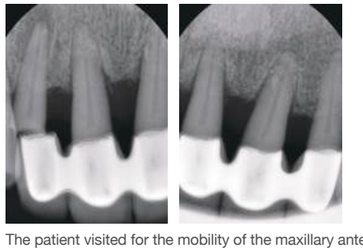
## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Late Fifties | Grafting Area | 2 1 \| 1 2 |
| Chief Complaint | Crown fracture of the maxillary right and left lateral incisors.<br>Alveolar bone resorption of maxillary right and left central incisors. | | | | |
| Treatment Plan | 1. Extraction of the upper lateral and central incisors, bilaterally.<br>2. Immediate implant on placement on the left and right central incisor areas.<br>3. Alveolar ridge preservation using a collagenated bone block. | | | | |

| | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| Materials | Bone graft | THE Graft Collagen | Single used | Alveolar ridge preservation and intra-socket gap filling. |

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

## Before



The patient visited for the mobility of the maxillary anterior bridge.

## After

The periapical X-ray showed well-integrated implants.

## Conclusion

THE Graft Collagen made intra-socket bone grafting and ridge preservation simple and effective.

**EXTRACTION SOCKETS** | ALVEOLAR RIDGE PRESERVATION AND INTRA-SOCKET

## Case Summary

**1. Pre-operation.** The patient visited for the mobility of the maxillary anterior bridge.

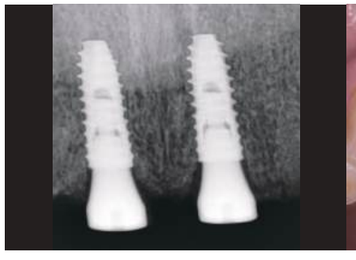
**2. Pre-operation.**

**3. Intra-operation.** Observed insufficient residual alveolar bone width and height.

**4. Intra-operation.** THE Graft Collagen was used to preserve the ridges of the maxillary right and left lateral incisors.

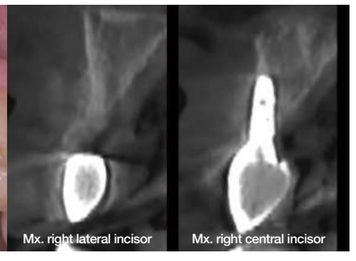
**5. Intra-operation.** THE Graft Collagen was used to perform an intra-socket bone graft at the maxillary right and left central incisors labial gap.


**6. Intra-operation.** Flap approximation with 4-0 nylon.



**7. Post-operation.**

**8. Final prosthesis, 2 months and 3 weeks post-operation.**




**9. Final prosthesis, 2 months and 3 weeks post-operation.**


**10. Final prosthesis, 2 months and 3 weeks post-operation.**

**11. Follow-up, 10 months post-operation.**

**12. Follow-up, 10 months post-operation.**

# Implant with intra-socket bone graft on the maxillary left canine

Yong-Seok Cho
• The 22nd Century Seoul Dental Hospital

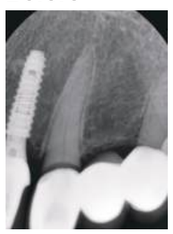
## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Late Eighties | Grafting Area |   |
| Chief Complaint | Severe mobility of a bridge spanning from the upper left canine to the second premolar. | | | | |
| Treatment Plan | 1. Extraction of the maxillary left canine and second premolar.<br>2. Immediate implant placement on the maxillary left canine and second premolar.<br>3. Intra-socket bone graft with THE Graft Collagen. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | Intra-socket bone graft and ridge preservation. |

| 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 visited for discomfort on the maxillary left canine to the second premolar bridge.

## After

The periapical X-ray showed well-integrated implants with stable marginal bone.

## Conclusion

Intra-socket bone graft using THE Graft Collagen was effective in preserving the alveolar bone contour.

EXTRACTION SOCKETS | INTRA-SOCKET

## Case Summary

1. **Pre-operation.** The patient visited for the severe mobility of the maxillary left to the second premolar bridge.

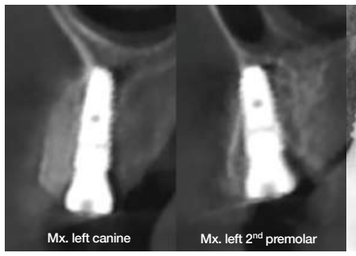

2. **Pre-operation.**

3. **Intra-operation.** Maxillary left canine and second premolar were extracted. Sequential osteotomy was performed at the palatal slope of the extraction sockets.

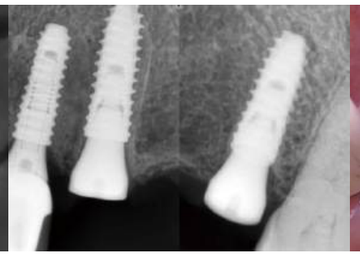
4. **Intra-operation.** Implants were placed on the palatal slope. A >3.0 mm gap was found on the labial aspects of the placed implants.

5. **Intra-operation.** Bone grafting was performed to fill the gaps using THE Graft Collagen.

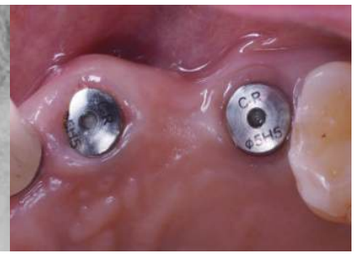
6. **Intra-operation.** The healing abutments were connected.




7. **Post-operation.**

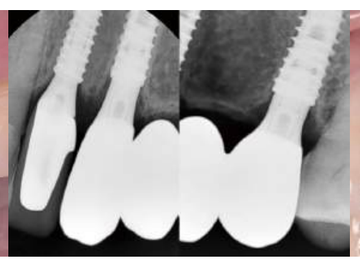


8. **Post-operation.**



9. **Follow-up, 2 months post-operation.**

10. **Final prosthesis, 3 months and 2 weeks post-operation.**



11. **Final prosthesis, 3 months and 2 weeks post-operation.**

12. **Follow-up, 6 months and 3 weeks post-operation.**

# Implant with intra-socket bone graft on the maxillary right lateral incisor and canine

Yong-Seok Cho
• The 22nd Century Seoul Dental Hospital

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Early fifties | Grafting Area | 3 2 |
| Chief Complaint | Mobility and discomfort on the maxillary right lateral incisor and canine. | | | | |
| Treatment Plan | 1. Extraction of the maxillary right lateral incisor and canine.<br>2. Implant on the maxillary right lateral incisor and canine.<br>3. Intra-socket bone graft with a collagenated bone. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | Intra-socket bone graft. |

| 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 visited for discomfort on the maxillary right lateral incisor and canine.

## After

The periapical X-ray showed well-integrated implants with stable marginal bone.

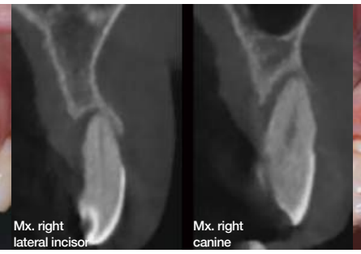
## Conclusion

THE Graft Collagen made intra-socket bone grafting simple and effective.

**EXTRACTION SOCKETS** | INTRA-SOCKET

## Case Summary

**1. Pre-operation.** The patient visited for mobility and discomfort on the maxillary right lateral incisor and canine.



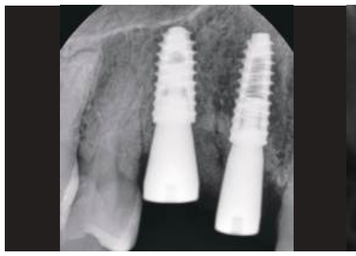

**2. Pre-operation.**

**3. Intra-operation.** Extraction of the maxillary right lateral incisor and canine.

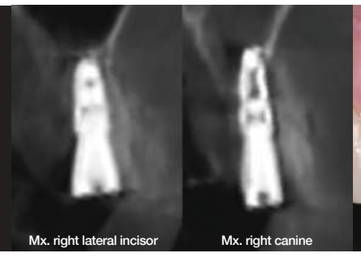
**4. Intra-operation.** Implants were placed on the palatal slope.

**5. Intra-operation.** THE Graft Collagen was used to perform an intra-socket bone graft at the labial gaps within the extraction sockets of maxillary right lateral incisor and canine.

**6.Intra-operation.** The healing abutments were connected. Labially exposed graft materials were left without approximation.



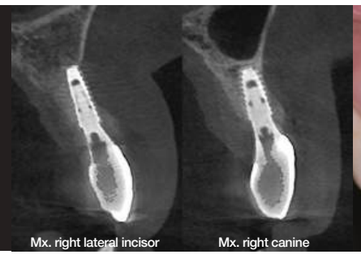
**7. Post-operation.**




**8. Post-operation.**

**9. Final prosthesis, 4 months post-operation.**

**10. Final prosthesis, 4 months post-operation.**




**11. Final prosthesis, 4 months post-operation.**

**12. Follow-up, 5 months post-operation.**

# Immediate implant placement with gap filling at the extraction sockets on the maxillary left central incisor and alveolar ridge preservation at the maxillary left lateral incisor

Yong-Seok Cho
• The 22nd Century Seoul Dental Hospital

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Late forties | Grafting Area |   |
| Chief Complaint | Crown fracture of the maxillary left lateral incisor. | | | | |
| Treatment Plan | 1. Extraction of the maxillary left central and lateral incisors.<br>2. Immediate implant placement on the maxillary left central incisor.<br>3. Intra-socket bone graft and ridge preservation with a collagenated bone substitute. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | Intra-socket bone graft and ridge preservation. |

| 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 visited for discomfort on the maxillary left central and lateral incisors.

## After

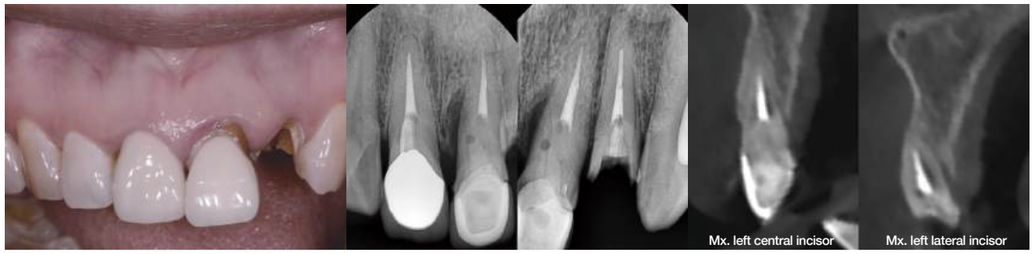
The periapical X-ray showed a well-integrated implant with a cantilever bridge.

## Conclusion

THE Graft Collagen made intra-socket bone graft and ridge preservation very simple and effective.

**EXTRACTION SOCKET** | ALVEOLAR RIDGE PRESERVATION AND INTRA-SOCKET

## Case Summary




**1. Pre-operation.** The patient visited for a crown fracture and discomfort on the maxillary left lateral incisor.

**2. Pre-operation.** Alveolar bone resorption of the maxillary left central incisor. Crown fracture of the maxillary left lateral incisor.

**3. Pre-operation. CBCT findings.**

**4. Intra-operation.** Extraction and immediate implant placement on the maxillary left central incisor. The implant was positioned on the palatal slope (ISQ value: 80/80).

**5. Intra-operation.** Extraction of the maxillary left lateral incisor.

**6. Intra-operation.** THE Graft Collagen was used for gap filling after immediate implant placement. A healing abutment was connected.


**7. Intra-operation.** Ridge preservation was done at the maxillary left lateral incisor using THE Graft Collagen.

**8. Post-operation.** Flap approximation with 4-0 nylon.

**9. Post-operation, CBCT findings.**


**10. Final prosthesis, 3 months and 3 weeks post-operation.**

**11. Final prosthesis, 3 months and 3 weeks post-operation.**

**12. Final prosthesis, 3 months and 3 weeks post-operation.**

# Gap filling with THE Graft Collagen at the time of immediate implantation

Sang-Chul Lim
• Mi-Sa Well Dental Clinic, Korea

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | nd Korean | Age | Late Thirties | Grafting Area | 5 4 |
| Chief Complaint | Presence of pus in the gums and a cavity at the tooth. | | | | |
| Treatment Plan | 1. Immediate implant placement after tooth extraction.<br>2. Implantation of graft materials into the gap between the placed implant and the extraction socket. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | Intra-socket grafting takes place immediately following extraction and implant placement. |
| | Membrane | Not used | | |

| 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**

Immediately after extraction.

**After**

4 months after intra-socket grafting.

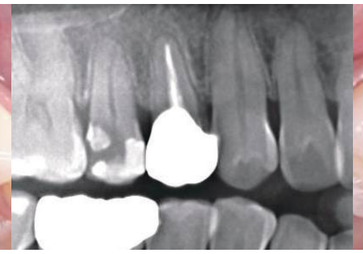
## Conclusion

In the case of immediate implant placement after extraction, intra-socket grafting could be performed simply by using THE Graft Collagen instead of particle-type bone graft material. Furthermore, by using THE Graft Collagen, particles were fixed at the applied position without scattering, thereby enhancing surgical manipulation and reducing surgery time.

EXTRACTION SOCKETS | INTRA-SOCKET

## Case Summary

**1. Pre-extraction.** Observation of caries and fistula on the maxillary first and second premolars.



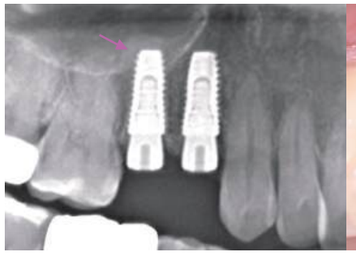
**2. Pre-extraction.** Observation of caries and fistula on the maxillary first and second premolars.

**3. Intra-operation.** Extraction of the right maxillary first and second premolars.

**4. Intra-operation.** Immediate implant placement at the extraction sockets.

**5. Intra-operation.** After implant placement, healing abutments were connected. And gap filling was performed using THE Graft Collagen.

**6. Intra-operation.** Sutured.

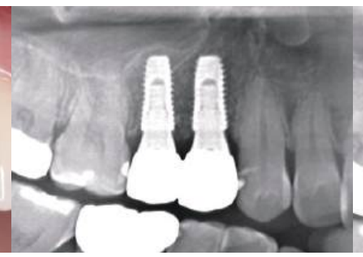


**7. Post-operation.** The day of implant placement.

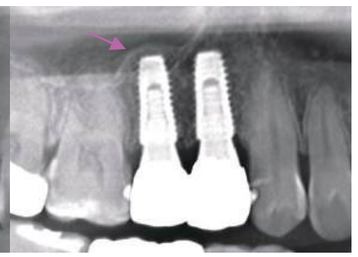
**8. Suture removal was performed, 2 weeks after the bone grafting.** Good healing was achieved without swelling, pain, or complications.

**9. Post-operation, 4 months.** The gingiva around the healing abutments healed well.

**10. Final prosthesis, 4 months after the bone grafting.** Clinically observed excellent implant fixation due to new bone formation.



**11. Final prosthesis, 4 months after the bone grafting.** New bone formation and stable marginal bone levels could be observed on the panoramic radiograph.



**12. Follow up, 6 months after the bone grafting.** Elevated sinus floor and marginal bone levels were maintained.

# Contour augmentation at the molar site with early implantation

Sang-Chul Lim
• Mi-Sa Well Dental Clinic, Korea

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Early Sixties | Grafting Area |   |
| Chief Complaint | Tooth mobility and pain on biting at the lower left area. | | | | |
| Treatment Plan | 1. Extraction of the madibular left first molar due to vertical root fracture.<br>2. Re-evaluation after 3-4 months due to periapical pathology.<br>3. Implant placement and bone augmentation at the mandibular left first molar region. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | In order to achieve buccal contour augmentation, THE Graft Collagen was applied on the buccal side. |
| | Membrane | Not used | | |

| 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**

Implant placement was performed 3 months after the extraction.

**After**

2 months post-GBR. The gingiva around healing abutments healed very well.

## Conclusion

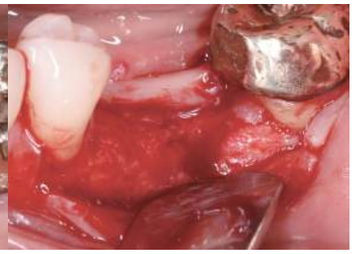
Buccal contour augmentation can be performed successfully using THE Graft Collagen with stable long-term loutcomes.

**HORIZONTAL BONE LOSS** | BONE AUGMENTATION

## Case Summary

**1. Post-extraction, healing socket.**

**2. Post-extraction, 3 months.** Remodeling of the extraction socket

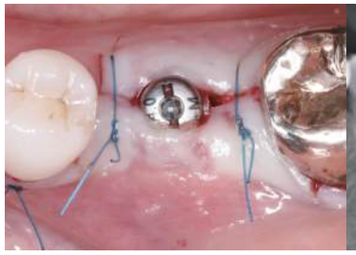


**3. Intra-operation.** The defect remained partially.

**4. Intra-operation.** Implant placement (one-stage) and the healing abutments were connected.

**5. Intra-operation.** THE Graft Collagen was applied to the buccal side for buccal contour augmentation.

**6. Intra-operation.** THE Graft Collagen was applied and condensed on the buccal side.



**7. Intra-operation.** Sutured.

**8. Post-operation.** The implant was ideally positioned.

**9. Post-operation, 2 months post-GBR.** The gingiva around healing abutments healed very well with good volume.

**10. Final prosthesis, 2 months post-GBR.** It was observed that the buccal contour was maintained.

**11. Final prosthesis, 2 months post-GBR.** Stable marginal bone.

**12. Follow up, 6 months post-GBR.** It was observed that the buccal contour was well maintained.

# Contour augmentation for the long-term success of implantation

**Sang-Chul Lim**
• Mi-Sa Well Dental Clinic, Korea

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Early sixties | Grafting Area | 2 1 \| 1 2 |
| Chief Complaint | Mobility in the mandibular anterior teeth. | | | | |
| Treatment Plan | 1. Extraction of the lower anterior teeth.<br>2. Implant placement on the mandibular right and left lateral incisors.<br>3. Layered bone grafting (First layer: autogenous bone, second layer: THE Graft Collagen).<br>4. Second operation and additional bone graft with THE Graft Collagen.<br>5. Final prosthesis. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | Autogenous bone, THE Graft Collagen | Layering | The autogenous bone is layered first, followed by THE Graft Collagen. 2 months after the initial bone graft, an additional bone graft was performed to recover from labial bone resorption due to periodontitis. |

| 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

Periodontally compromised anterior teeth with gum bleeding in the mandibular anterior area.

### After

Despite the severe bone loss and subsequent bone defect, the labial contour could be reconstructed by GBR.

## Conclusion

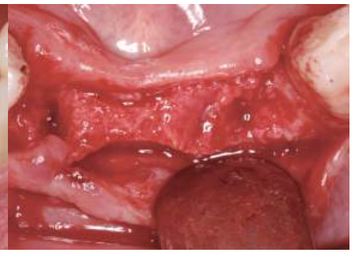
THE Graft Collagen could be successfully used for regeneration of the alveolar ridge.
Additionally, the quality of the newly formed bone was sufficient for implant placement.
THE Graft Collagen was easier to manipulate compared to the particulate bone graft material for guided bone regeneration.

HORIZONTAL BONE LOSS | BONE AUGMENTATION

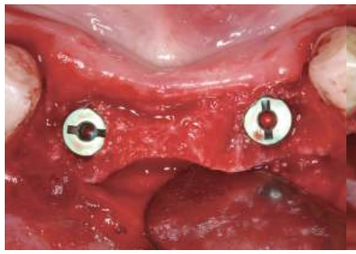
## Case Summary

**1. Pre-extraction.** A narrow ridge was observed in the mandibular anterior area.

**2. Post-extraction, 1 month.**



**3. Intra-first operation.** Insufficient healing of the extraction socket could be seen after flap elevation.



**4. Intra-first operation.** Implant placement on the mandibular right and left lateral incisors.

**5. Intra-first operation.** Autogenous bone was first layered on the extraction sockets.

**6. Intra-first operation.** THE Graft Collagen was second-layered on autogenous bone.

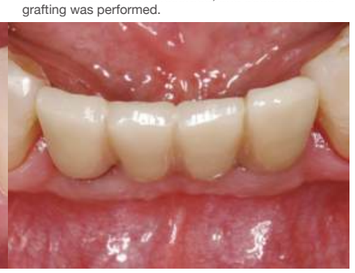
**7. Intra-first operation.**

**8. Intra-first operation.** Flap repositioning and suture.

**9. Intra-second operation, 2 months after the bone grafting.** The extraction socket cavity was filled with new bone, and the quality of the new bone was very similar to that of the host bone, and there was no visible boundary between them. The depression disappeared, but the labial bone was resorbed, and additional bone grafting was performed.

**10. Post-first operation, 5 months after the bone grafting.** Volume recovery by creating sufficient bone on the labial side.

**11. Final prosthesis, 5 months after the bone grafting.**



**12. Follow up, 7 months after the bone grafting.** The bone level was well maintained.

# Space provision in the lower posterior region using THE Graft Collagen

Sang-Chul Lim
• Mi-Sa Well Dental Clinic, Korea

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Mid-Fifties | Grafting Area |   |
| Chief Complaint | Difficulty in chewing because of the mobility of lower left molars. | | | | |
| Treatment Plan | 1. Extraction of the mandibular left first and second molars due to failed prostheses.<br>2. Implantation of the mandibular left first and second molars with GBR on the buccal site for horizontal augmentation. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | GBR was performed to increase the narrowed ridge on the buccal-lingual side. THE Graft Collagen was used to make space. |
| | Membrane | Collagen membrane | Primary closing | Buccal bone defect covered. |

| 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**

4 months after extraction, implant placement.

**After**

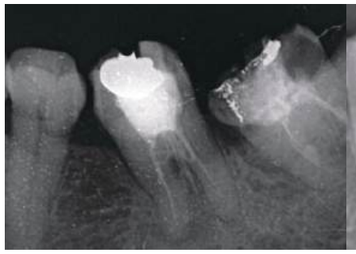
2 months post-GBR, final prosthesis.

## Conclusion

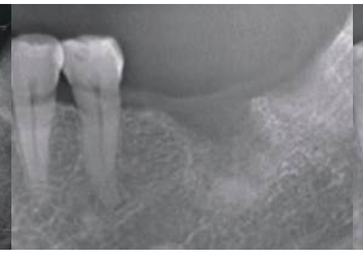
When GBR is performed at the same time as implant placement, it is thought that THE Graft Collagen is more advantageous in making the space than the particulate bone. Furthermore, THE Graft-THE Graf Collagen combination technique was thought to be a simple space-creating device.

VERTICAL AND HORIZONTAL BONE LOSS | BONE AUGMENTATION

## Case Summary



**1. Pre-extraction.**

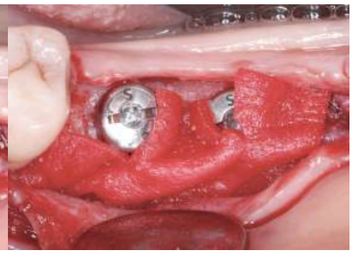


**2. Post-extraction, 5 weeks.**

**3. Post-extraction, 4 months.**

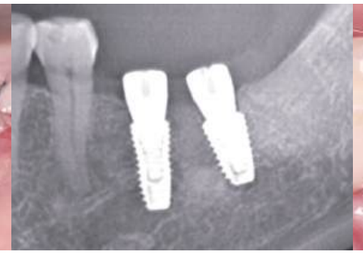
**4. Intra-operation.** Implant placement (one-stage) and healing abutments were connected.

**5. Intra-operation.** Simultaneously with implant placement, GBR was performed to increase the narrowed ridge on the buccal-lingual side. THE Graft Collagen was applied to maintain space.

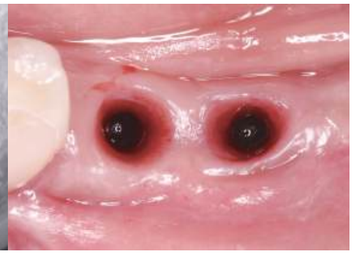


**6. Intra-operation.** Covered with a resorbable collagen membrane.

**7. Intra-operation.** Sutured.



**8. Post-operation.** Well-positioned implants were observed.



**9. Final prosthesis, 2 months post-GBR.** Buccal volume was well maintained.

**10. Final prosthesis, 2 months post-GBR.**

**11. Final prosthesis, 2 months post-GBR.**

**12. Follow up, 5 months post-GBR.** Marginal bone and cresteal bones are remodeled and stable. The buccal ridge remained stable, so the soft tissues also remained stable.

# Minimalistic bone augmentation procedure using a combination of THE Graft and THE Graft Collagen

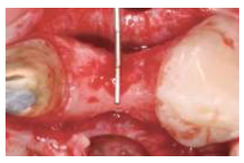
Sang-Chul Lim
• Mi-Sa Well Dental Clinic, Korea

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Early forties | Grafting Area |   |
| Chief Complaint | Treatment for the front teeth was required. | | | | |
| Treatment Plan | 1. Removal and evaluation of the cantilever bridge on the maxillary left and right central incisors.<br>2. Implantation and bone grating were done on the maxillary left lateral incisor pontic area simultaneously.<br>3. Immediate implantation with gap filling was performed on the maxillary left and right central incisors.<br>4. Final restoration is supported by the maxillary right central incisor, left central and lateral incisors implants. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft, THE Graft Collagen | Layering | To restore the narrow ridge, THE Graft and THE Graft Collagen were applied using the layering technique. |

| 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

Observation of the narrow ridge of the maxillary left lateral incisor.

### After

A new bone was formed very well up to the top of the cover screw, and the labial volume was recovered. It was difficult to check the boundary between the new bone and the host bone.

## Conclusion

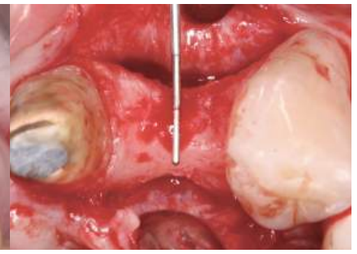
When THE Graft Collagen was applied, the sufficient new bone formation could be confirmed even in narrow ridges. Bone regeneration went well up to the top of the cover screw. The quality of the bone was good enough and did not loosen during drilling. The healing was very good, and after the new bone was formed, the particles of the bone graft material did not move in the soft tissue.



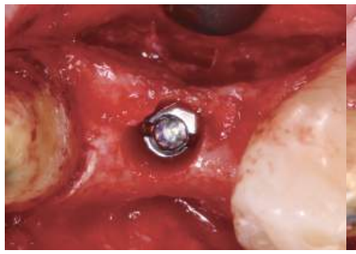
## Case Summary

**1. Pre-operation.** The old bridge was moving.

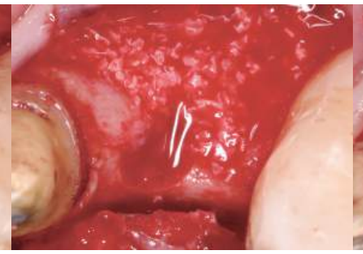
**2. Intra-first operation.** Observation of the narrow ridge of the maxillary left lateral incisor site (pontic).



**3. Intra-first operation.** Observation of the narrow ridge of the maxillary left lateral incisor pontic area.

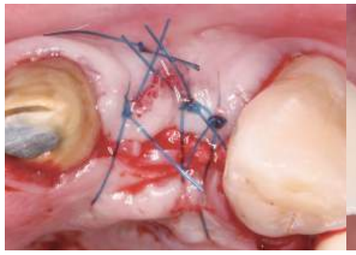


**4. Intra-first operation.** Implant placement.



**5. Intra-first operation.** THE Graft was first layered on the labial area.

**6. Intra-first operation.** THE Graft Collagen was layered on top of THE Graft.



**7. Intra-first operation.** Sutured.

**8. Post-first operation.** A temporary bridge was built.

**9. Intra-second operation, 5 months after the bone grafting.** A new bone was formed very well up to the top of the cover screw, and the labial volume was recovered. It was difficult to check the boundary between the new bone and the host bone.

**10. Final prosthesis, 9 months after the bone grafting.**

**11. Final prosthesis, 9 months after the bone grafting.**

**12. Follow up, 1 year and 8 months after the bone grafting.** The bone level was well maintained.

# Overcoming sinus membrane perforation with THE Graft Collagen

Sang-Chul Lim
• Mi-Sa Well Dental Clinic, Korea

## Case Summary

| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Late fifties | Grafting Area | 6 4 |
| Chief Complaint | Difficulty in chewing because of the absence of the maxillary right first premolar and first molar. | | | | |
| Treatment Plan | 1. Sinus elevation with implantation (lateral approach).<br>2. GBR on narrow ridge simultaneously.<br>3. Zirconia bridge. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | THE Graft Collagen was applied without a membrane covering the maxillary sinus perforation. Following that, GBR was performed with THE Graft Collagen. |
| | Membrane | Not used | | |

| 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**

Before treatment.

**After**

5 months after sinus augmentation, final prosthesis.

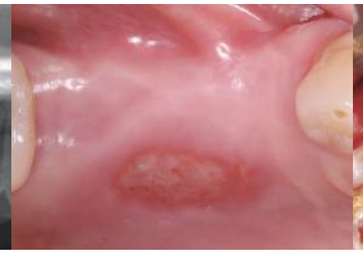
## Conclusion

During maxillary sinus lifting, the maxillary sinus membrane was often torn. At this time, it was better to use THE Graft Collagen than particulate bone graft material. THE Graft Collagen did not flow through the perforated sinus membrane, which was the cause of the problem.
It may be suggested that without covering the perforated sinus membrane with a membrane, it was possible to perform a sufficiently successful operation with THE Graft Collagen alone.

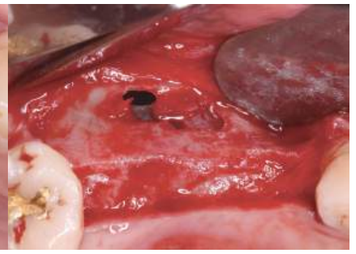
**SINUS PNEUMATIZATION** | LATERAL APPROACH

## Case Summary

**1. Pre-operation.**



**2. Pre-operation.**

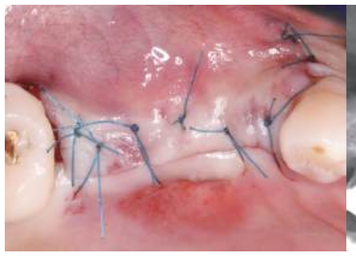


**3. Intra-first operation.** Maxillary sinus membrane perforation during maxillary sinus detaching.

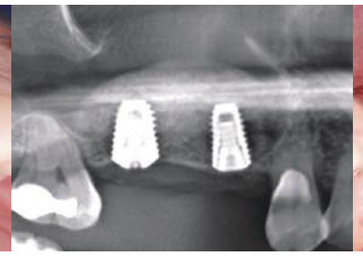
**4. Intra-first operation.** THE Graft Collagen, which was less likely to scatter than particulate bone material was applied for sinus augmentation.

**5. Intra-first operation.** THE Graft Collagen was used for simultaneous GBR and implant placement.

**6. Intra-first operation.** Covered with a resorbable collagen membrane.



**7. Intra-first operation.** Sutured.

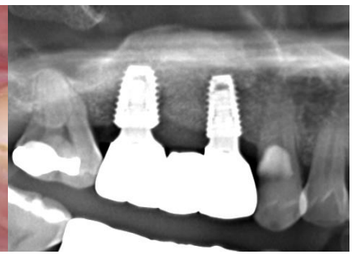


**8. Intra-first operation.** Well-placed implants were observed, and THE Graft Collagen applied in the maxillary sinus was observed.

**9. Intra-second operation, 5 months post-GBR.** Good bone formation patterns could be observed.

**10. Intra-second operation, 5 months post-GBR.** The healing abutments were connected and sutured.

**11. Final prosthesis, 6 months post-GBR.** Delivered zirconia bridge.



**12. Final prosthesis, 6 months post-GBR.** New bone formation was observed in the maxillary sinus.

# Regenerative therapy of peri-implantitis in the mandibular first molar area

Yong-Seok Cho
• The 22nd Century Seoul Dental Hospital

## Case Summary

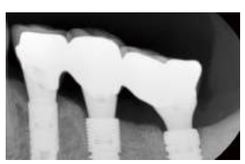
| | | | | | |
|---|---|---|---|---|---|
| Nationality | Korean | Age | Early Sixties | Grafting Area |   |
| Chief Complaint | Gingival swelling and bleeding around the mandibular left first molar implant. | | | | |
| Treatment Plan | 1. Decontamination of the mandibular left first molar implant.<br>2. GBR with collagenated bone and non-resorbable membrane.<br>3. Free gingival graft. | | | | |

| Materials | Category | Products | Method | Description of the method |
|---|---|---|---|---|
| | Bone graft | THE Graft Collagen | Single used | GBR with collagenated bone and non-resorbable membrane. |
| | Membrane | OpenTex-TR | Primary closure | Covered with a non-resorbable titanium-reinforced polytetra-fluorethylene (PTFE) membrane over the graft. |
| | Others | HybenX | | Chemical cleaning of the mandibular left first molar implant surface using HybenX. |

| 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 | ☐ Staged/Delayed approac |
| | | ■ Peri-implantitis | | ■ Peri-implantitis treatment by mechanical and chemical cleaning. |
| | | ☐ Furcation | | |

### Before

The patient visited for discomfort and bone loss around the mandibular left first molar implant.



### After

A periapical X-ray showed well-regenerated bone around the mandibular left first molar implant.

## Conclusion

GBR using THE Graft Collagen and a non-resorbable membrane resulted in successful bone regeneration in the implant with peri-implantitis.

**PERI-IMPLANTITIS** | BONE AUGMENTATION

## Case Summary

**1. Pre-operation.** The patient visited for swelling and bleeding around the implant of the mandibular left first molar, which had been placed 11 years and 6 months ago.

**2. Pre-operation.** Severe bone resorption was found around the implant of the mandibular left first molar, which indicated peri-implantitis.

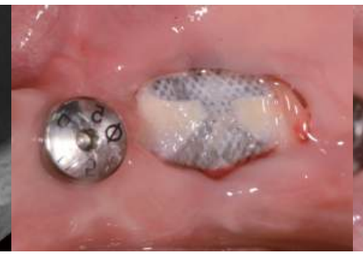
**3. Intra-first operation.** Mechanical cleaning of the mandibular left first molar implant surface using the scaler. Chemical cleaning of the mandibular left first molar implant surface using HybenX.

**4. Intra-first operation.** THE Graft Collagen was grafted around the mandibular left first molar implant.

**5. Intra-first operation.** Over the graft, a non-resorbable titanium-reinforced PTFE membrane was covered with OpenTex-TR.

**6. Intra-first operation.** A flap approximation was done.

**7. Post-first operation.**



**8. Post-first operation, 1 month post-GBR.** The membrane was exposed and removed.

**9. Post-second operation, 2 months post-GBR.**

**10. Post-operation, 3 months and 2 weeks post-GBR.** Gingival attachment failure around implants. So, a free gingival graft was done.

**11. Post-operation, 1 year and 9 months post-GBR.** A healthy gingival condition was observed.

**12. Post-operation, 1 year and 9 months post-GBR.** A CT view showed bone regeneration around the mandibular left first molar implant.

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