

Dentium Solution

Presented by Dentium Clinical Research Team

Easy Bone Graft



Easy Bone Graft



Part	Regeneration
Concept	Easy Bone Graft
Material	OSTEON™ 3, OSTEON™ 3 Collagen, OSTEON™ Xeno, OSTEON™ Xeno Collagen, Collagen Graft x1D/x2D, Collagen Membrane Hard/Soft
Key Point	Ossification, Volume Maintenance

When is **Bone Grafting** performed?

Bone grafting is usually performed when there is **insufficient** or **lost alveolar bone**

Main purpose is to **ensure adequate bone volume and quality** for implant placement or other dental restorations

1) Before Implant Placement

- ✓ Insufficient bone height or width
- ✓ Sinus lift
- ✓ Poor bone quality



2) After Periodontal Treatment

- ✓ Bone loss from periodontal disease



3) Immediately After Tooth Extraction or Fixture removal

- ✓ Socket preservation

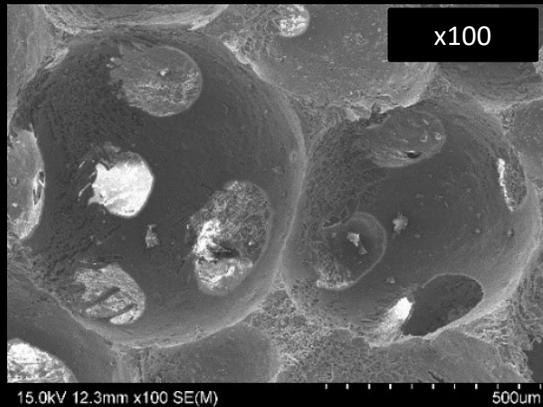


4) For Aesthetic prosthesis

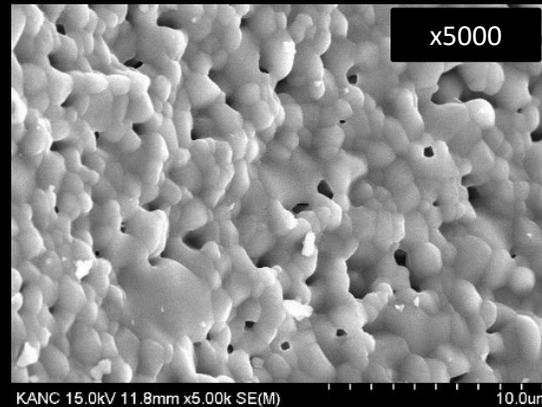
- ✓ Anterior bone resorption



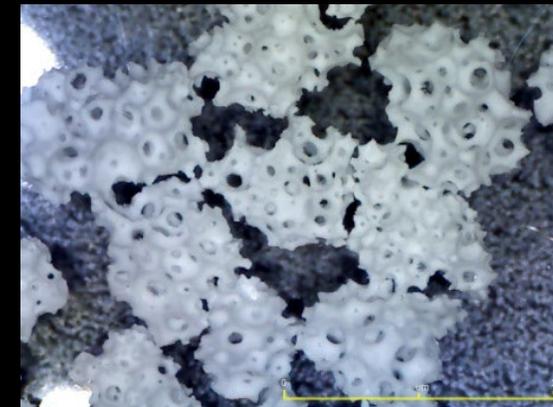
- Osteoconductive **synthetic** bone graft
(non-immunogenic, non-metastatic)
- HA 60% + β -TCP 40% (Biphasic calcium phosphate)
- Wider surface area and higher porosity than OSTEON I and II
(Highly inter-connected structure between macro/micro pores)
- **Easy handling and excellent wettability**
- Type: vial, syringe



Macropores



Micropores

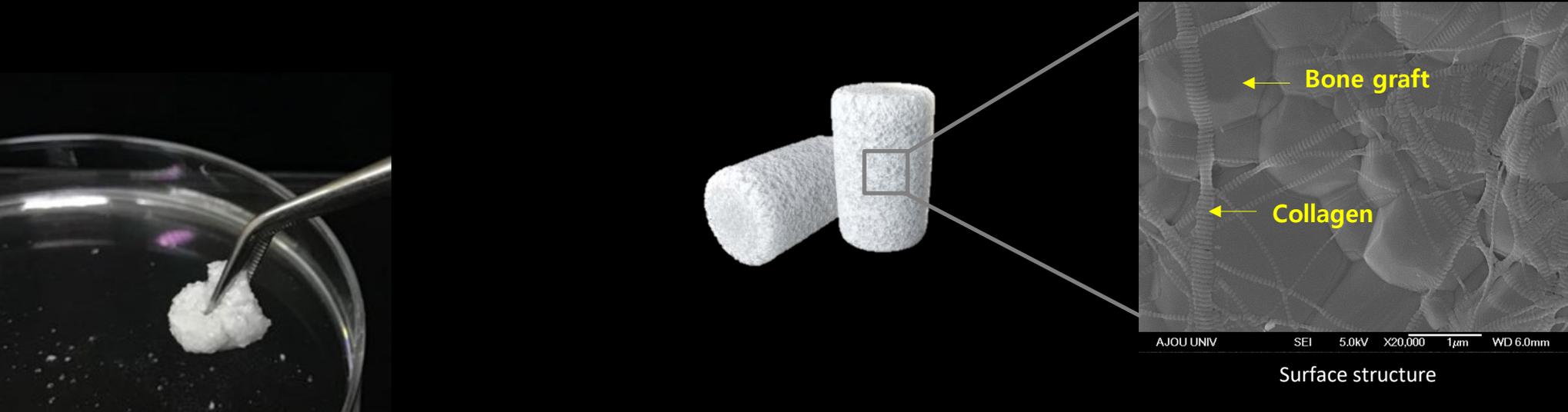


Particle size: 0.5-1.0mm

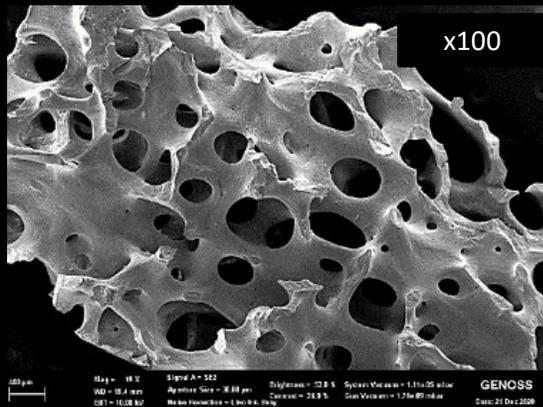
OSTEON™ 3 Collagen

Dentium

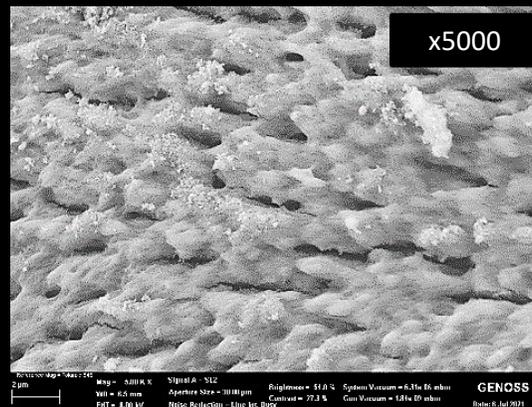
- **Synthetic bone graft with collagen**
- Easy handling, malleable → (Chair time ↓)
- Excellent **volume maintenance**
- Collagen provides treatment convenience (absorbed within 1~2 weeks)
- Applications: Sinus Lifting, Alveolar ridge preservation, Extraction socket management



- Osteoconductive **natural bovine bone** substitute (similar to human bone)
- Highly interconnected macro/micro-pores
- Excellent Osteoconductivity
- **Easy handling and excellent wettability**
- Complete removal of organic substances
- Type: vial, block



Macropores



Micropores

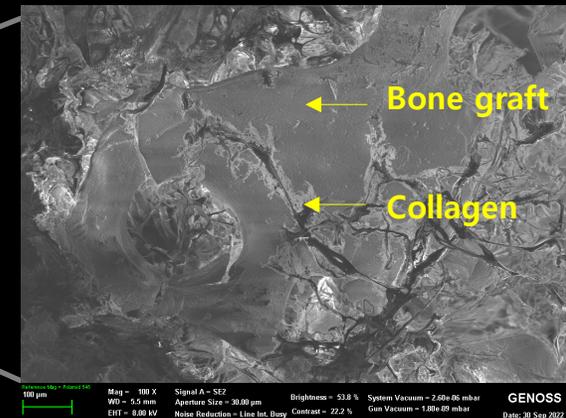


Particle size: 0.2-1.0mm

OSTEON™ Xeno Collagen

Dentium

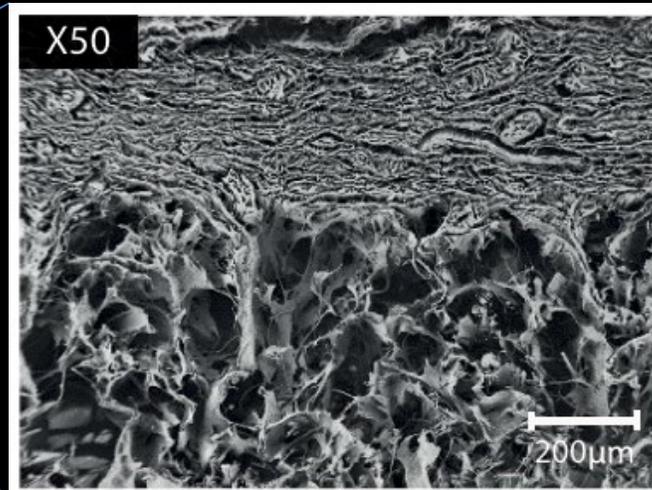
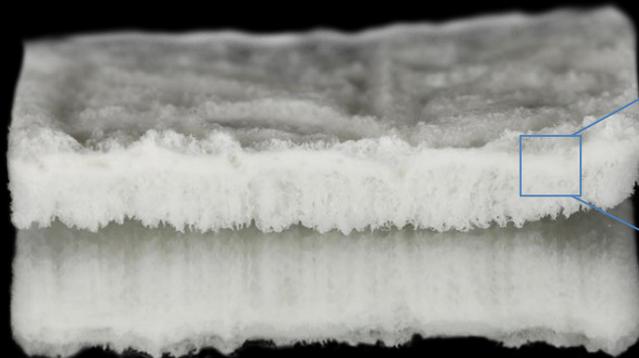
- **Natural bovine bone substitute with collagen**
- **Easy handling, malleable** → (Chair time ↓)
- Excellent Osteoconductivity
- Collagen provides treatment convenience (absorbed within 1~2 weeks)
- Applications: GBR, Contour augmentation, Alveolar ridge preservation, Sinus lift



Surface structure

Collagen Graft x1D

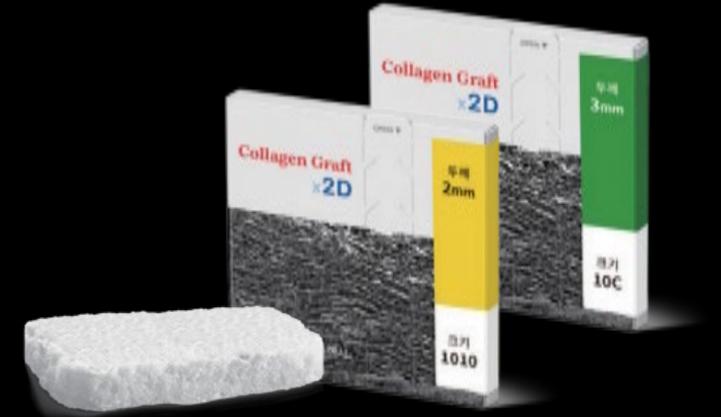
- **Absorbable Matrix**
- Highly pure Type I Collagen (from porcine tendon)
- **Bilayer structure: Dense & porous layers**
- **Fast soft tissue healing** by epithelialization (absorbed within 1 months)
- Applications: Ridge Preservation, Keratinized tissue augmentation, Root coverage, FGG alternative, etc.



Top
(Dense)

Bottom
(Porous)

- **Absorbable Matrix**
- Highly pure Type I Collagen (from porcine)
- Bilayer structure: **x2 Dense** & porous layers
- Promoting epithelialization via accelerated angiogenesis
- Applications: Ridge Preservation, Keratinized tissue augmentation, Root coverage, Recovery of keratinized mucosa, FGG alternative, etc.



Collagen Membrane **Hard**

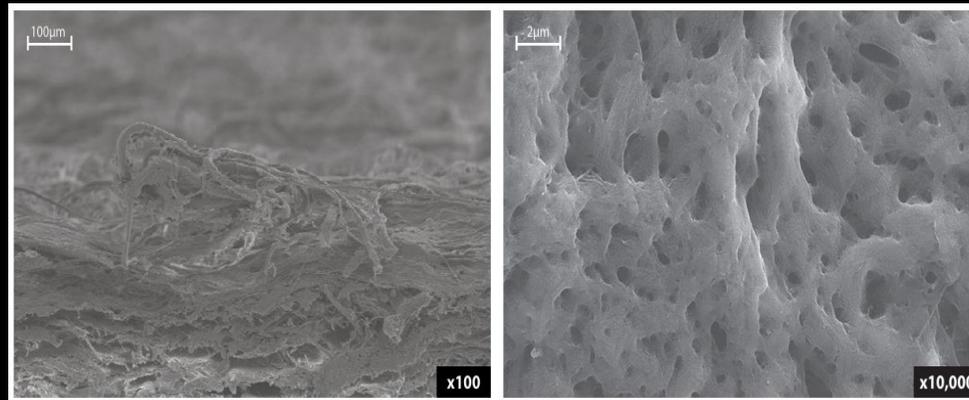
- **Absorbable Barrier Membranes**
- Protect bone grafting material and prevent graft material displacement
- Highly pure Type I Collagen (from bovine tendon)
- **Excellent space maintenance** (hard type)
- Barrier function lasting for **6 months**
- Both sides usable



Collagen Membrane **Soft**

Dentium

- **Absorbable Barrier Membranes**
- Protect bone grafting material and prevent graft material displacement
- Highly pure Type I Collagen (from bovine pericardium)
- **Easy handling and pinning** (Soft type)
- Barrier function lasting for **4 months**
- Both sides usable



Microstructure

Section 1

- **Vertical** Augmentation
- **Horizontal** Augmentation
- **Socket** preservation

Section 2

- If avoid, **avoid**
- If not avoid, **minimize**
- If to do, must do **well**

Vertical Augmentation

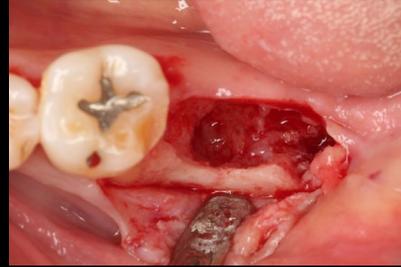
- **To Restore Sufficient Bone Height for Implant Stability**
Adequate vertical bone height is essential to achieve **primary stability** and long-term **osseointegration**.
- **To Position the Implant at the Prosthetically Correct Height**
Severe vertical bone loss often forces implant placement **too apically** or **too coronally**, resulting in:
 - Poor emergence profile
 - Long clinical crowns
 - Esthetic failure, especially in the anterior zoneVertical bone augmentation enables placement of the implant in a position that supports the final prosthesis both esthetically and functionally.
- **To Support Peri-Implant Soft Tissues**
Vertical augmentation provides the **bony scaffold necessary for proper soft tissue contour**, including papilla formation and gingival margin stability.
Especially in the esthetic zone, a lack of vertical bone can result in **soft tissue collapse**, **black triangles**, and **gingival asymmetry**.
- **To Avoid Anatomical Complications**
In the posterior mandible, vertical bone loss may bring the **inferior alveolar nerve** dangerously close to the crest, increasing the risk of nerve injury.
In the posterior maxilla, it may leave insufficient bone below the **maxillary sinus**, necessitating both **vertical ridge augmentation and/or sinus elevation**.
- **To Improve Long-Term Implant Prognosis**
Several studies show that **implants placed in vertically augmented bone**—when done with proper technique—have **comparable survival rates** to those in native bone.
Proper vertical reconstruction creates an environment that supports **stable marginal bone levels** and **favorable biomechanics**.

Vertical Augmentation

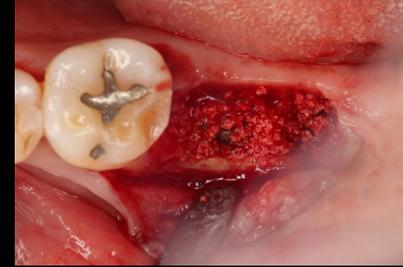


Pre-op / PA

Vertical bone resorption is evident

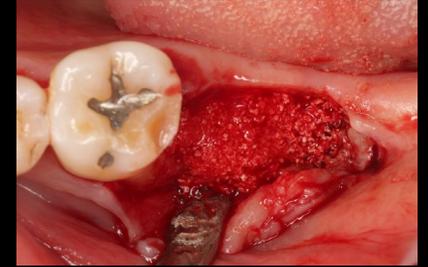


Bone defect



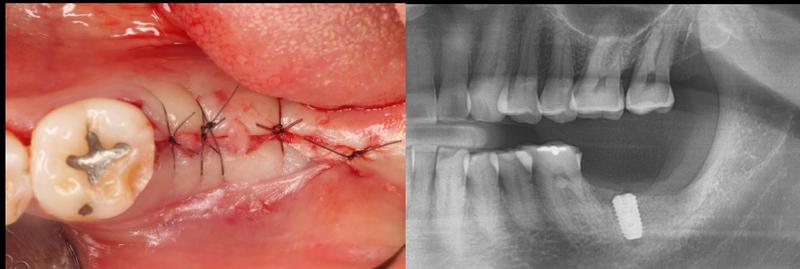
OSTEON™ 3

is applied to the defect site and around implant fixture for reliable bone regeneration



OSTEON™ 3 Collagen

is layered over the OSTEON™ 3 to enhance soft tissue healing



Post-op / PA

The wound is tightly sutured

Implant fixture is well positioned



Provisional restoration

is delivered 3 months after surgery

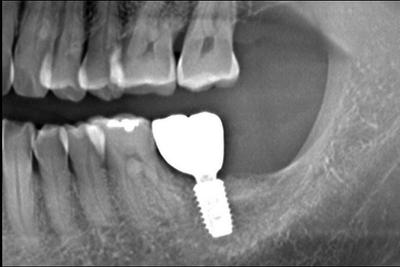


Final prosthesis / PA

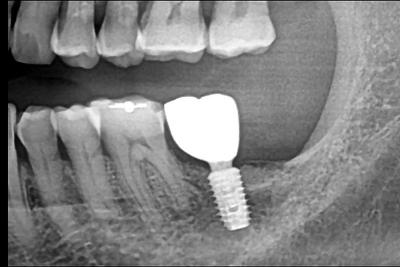
is delivered 5 months after surgery

Sufficient vertical bone formation was achieved

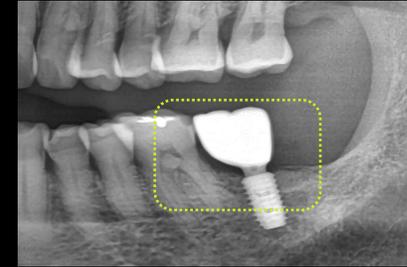
Vertical Augmentation



Follow up :
2 years 7 months



Follow up :
5 years 1 month



Follow up :
6 years 1 month

Vertical bone is well preserved even
after 6 years

- **To Prevent Implant Surface Exposure**

In cases of narrow alveolar ridges, placing an implant without sufficient buccolingual bone width increases the risk of **thread exposure** or **dehiscence**. Horizontal augmentation is essential to achieve full bony coverage and ensure the implant is properly embedded within native or augmented bone.

- **To Enable Prosthetically Driven Implant Placement**

When the ridge width is inadequate, clinicians are often forced to place implants in **compromised positions**—either too buccally or lingually—resulting in improper load distribution, poor emergence profile, and potential esthetic or functional failure. Horizontal grafting allows for ideal **three-dimensional positioning** of the implant in harmony with the final prosthesis.

- **To Achieve and Maintain Adequate Buccal Bone Thickness**

A **minimum 2 mm of buccal bone** is considered critical to maintain peri-implant health and prevent marginal bone loss. Horizontal augmentation increases buccal bone thickness, reducing the risk of **future bone resorption** and **soft tissue collapse**, especially in esthetically sensitive areas.

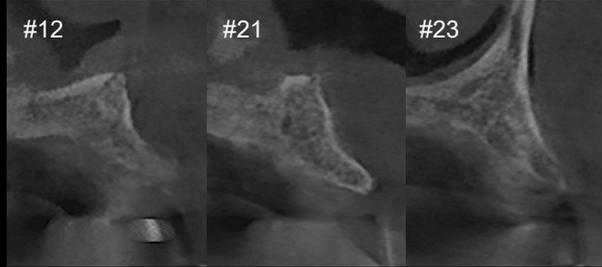
- **To Improve Soft Tissue Support and Esthetic Outcomes**

Horizontal bone grafting not only restores hard tissue volume but also provides a **stable scaffold for soft tissue support**. This is especially important in the anterior maxilla where soft tissue contours contribute significantly to the final esthetic result. Augmentation enhances **gingival architecture**, supports papilla formation, and prevents mucosal recession.

- **To Reduce the Risk of Peri-implant Disease**

Insufficient ridge width compromises the **biologic width** and makes hygiene maintenance more difficult. This can lead to **plaque accumulation, inflammation**, and ultimately **peri-implant mucositis or peri-implantitis**. Horizontal grafting creates an environment that supports long-term peri-implant tissue health and facilitates maintenance.

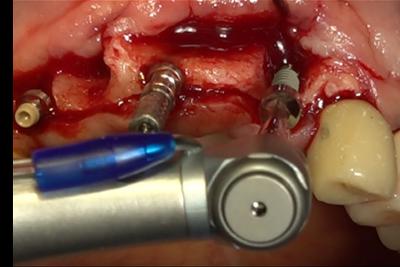
Horizontal Augmentation



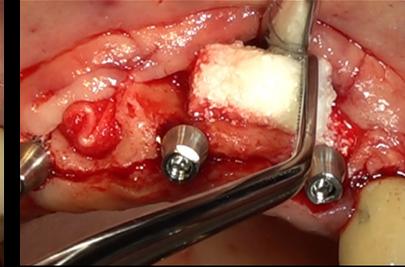
Pre-op CT



Pre-op



bright TL (Ø2.5 X 11.0)



OSTEON™ Xeno Collagen



Collagen Graft x1D



Post-op CT



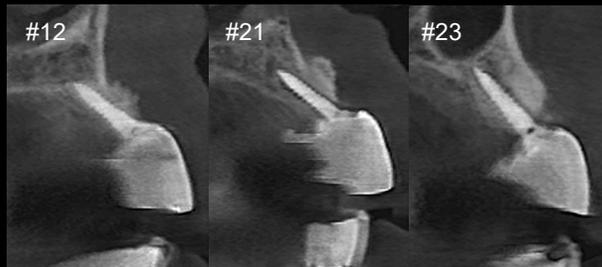
Post-op



Healing : 3 weeks



Final impression



Follow up CT : 10 months



Final prosthesis

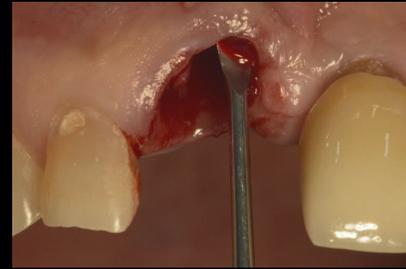
Socket Preservation

- Following tooth extraction, the alveolar bone undergoes a natural resorptive process, resulting in a progressive **reduction in ridge width and height** that can complicate subsequent implant placement or prosthetic rehabilitation.
- Socket preservation is a surgical procedure performed immediately after extraction, typically involving the placement of bone grafting materials and/or barrier membranes, with the objective of minimizing alveolar ridge resorption.

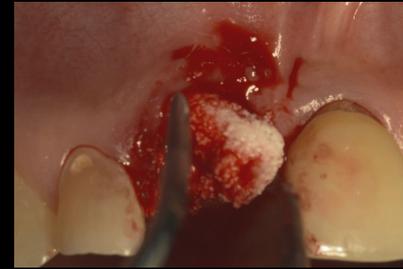


Pre-op / PA

Panoramic view shows bone resorption with tooth mobility, indicating the need for extraction

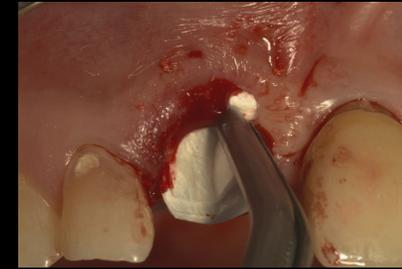


Granulation tissue removal



OSTEON™ 3 Collagen

is first placed into the extraction socket for reliable bone regeneration



Collagen graft

is placed over the bone graft for additional support.



Collagen membrane

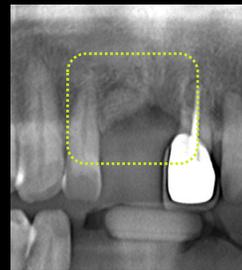
Collagen membrane is placed over the graft to provide barrier protection



Healing : 2 weeks



Healing : 1 month



Healing : 5 months PA

at 5 months shows favorable bone formation in the extraction socket



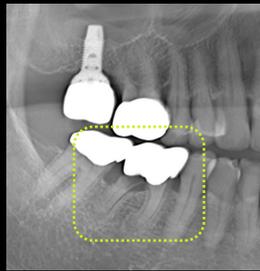
Healing : 6 months



Healing : 10 months

Socket Preservation (Immediate implantation)

- Simultaneous socket preservation and implant placement offers several clinical advantages. It minimizes post-extraction alveolar ridge resorption, promotes favorable bone remodeling around the implant, and enhances primary stability, thereby supporting predictable osseointegration.
- Performing both procedures concurrently reduces overall treatment time.
- In esthetically critical regions, this approach also facilitates the preservation of soft tissue contours and emergence profiles, resulting in superior functional and esthetic outcomes.



Pre-op PA / Standard x-ray

Severe secondary caries beneath the crown led to extraction



SuperLine III (Ø5.0X 10.0)

Implant fixture placed into the inter-radicular septum



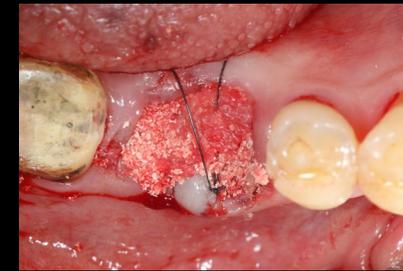
OSTEON™ 3

was placed around the fixture for reliable ossification



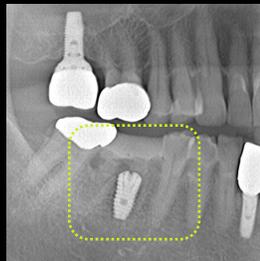
OSTEON™ 3 Collagen

was placed over the O3, facilitating soft tissue healing



Collagen Graft

was applied on top to hold the bone graft in place



Post-op PA



Healing : 2 weeks



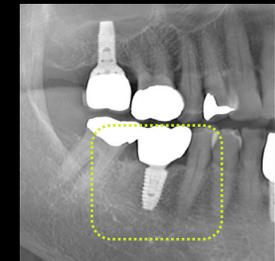
Healing : 3 months / 2nd Surgery

Secondary surgery was performed at 3 months post-surgery



Final prosthesis

was delivered at 5 months.



Follow up : 2 years
6 months PA

How should **Bone Grafting** be performed?

If avoidable, **avoid** it

If unavoidable, **minimize** it

If necessary, do it **properly**

If possible, **avoid it** (if avoid, avoid)

During implant placement, minimizing or avoiding bone grafting is often preferable because grafting procedures carry a higher risk of complications such as infection, graft exposure, and soft tissue dehiscence. They may also prolong healing time and delay predictable osseointegration.

From a clinical standpoint, reliance on native bone provides more favorable long-term outcomes, while also reducing surgical morbidity, treatment time, and overall cost burden for the patient.

Selection of **short or narrow implants** represents one possible approach to avoid bone grafting.



Pre-op

Narrow alveolar ridge



Pin guide

Flapless drilling using a pin guide



bright TL (Ø2.5 X 11.0)

Narrow implant chosen for use in a reduced ridge width



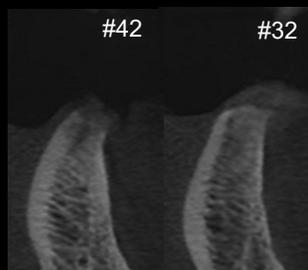
Post-op

No incision, therefore no sutures are required.



Final prosthesis

A narrow implant placed in the limited ridge width resulted in a stable and functional final restoration.



Pre-op CT



Post-op CT

The implant was perfectly seated in the narrow ridge without bone grafting

If possible, **avoid it** (if avoid, avoid)

During implant placement, minimizing or avoiding bone grafting is often preferable because grafting procedures carry a higher risk of complications such as infection, graft exposure, and soft tissue dehiscence. They may also prolong healing time and delay predictable osseointegration.

From a clinical standpoint, reliance on native bone provides more favorable long-term outcomes, while also reducing surgical morbidity, treatment time, and overall cost burden for the patient.

Depending on the contour shape, **flap design** may also be an option.



Pre-op

Instead of bone grafting or soft tissue augmentation for the non-ideal soft tissue contour, the limitation was overcome with a simple incision design.



Simple incision

A small trapezoidal incision is made at the implant site



bright TL (Ø4.0 X 7.0)

Flap reflection created the gingival contour



Healing : 2 weeks

At 2 weeks, soft tissue healing formed a natural contour without additional augmentation



Final prosthesis

In the anterior zone, soft tissue grafting may be indicated for esthetics; however, in #45, an acceptable contour was obtained with a simple incision



If unavoidable, **minimize** it (If not avoid, minimize)

In cases where bone grafting is considered **unavoidable**, the procedure should be kept to a **minimum**

Choosing **short and narrow implants** is essential to minimize invasive grafting in cases of limited bone height or width.



Initial drill

Immediate implant placement after extraction



OSTEON™ Xeno Collagen

A minimal amount of bone graft was used to support initial osseointegration



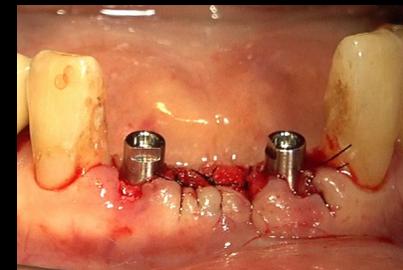
bright premier TL (Ø2.5 X 11.0)

Placement of a narrow implant requires only a minimal amount of bone graft



Collagen Graft x1D

was placed over the site to stabilize the underlying bone graft and support soft tissue healing



Post-op

The procedure was completed simply and easily

If unavoidable, **minimize** it (If not avoid, minimize)

In cases where bone grafting is considered **unavoidable**, the procedure should be kept to a **minimum**

Choosing **short and narrow implants** is essential to minimize invasive grafting in cases of limited bone height or width.



Provisional restoration

Provisional tooth delivered the day after surgery



Healing : 1 week

Soft tissue healing is observed beneath the provisional tooth



Healing : 5 months

Five months after healing, tissue volume is preserved and stable



Final prosthesis

placed 6 months after surgery. Even with a simple bone graft, an esthetic result was achieved



Less Bone graft

Less Effort

Better Result

If unavoidable, minimize it (If not avoid, minimize)



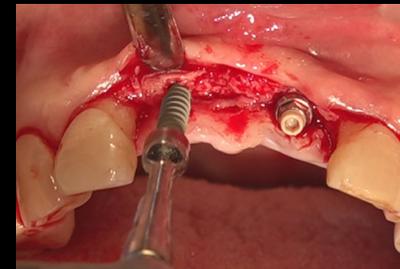
Pre-op PA / CT

CT shows a severely narrowed alveolar ridge



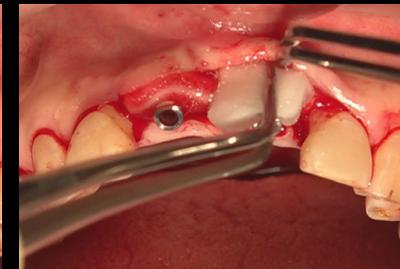
Pre-op

Narrow ridge with bone resorption



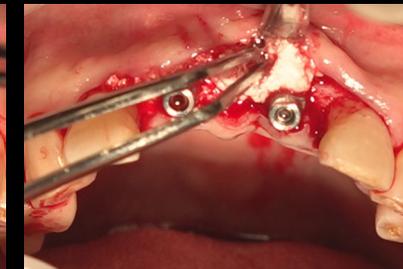
bright TL (Ø2.5 X 11.0)

After incision, two narrow implant fixtures were placed first



Collagen Graft x1D

was placed between the labial flap and alveolar ridge to enhance soft tissue healing and serve as a barrier



OSTEON™ 3 Collagen

Bone graft material is placed to augment the thin alveolar ridge



Post-op PA

Post-op CT



Post-op



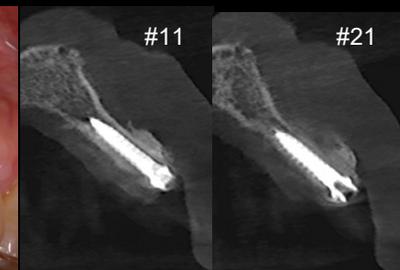
Healing : 1 week

Healing is progressing well



Healing : 2 months / CT

At 2 months follow-up, the graft material remains well maintained



If unavoidable, **minimize** it (If not avoid, minimize)



Final prosthesis / PA

delivered at 4 months



Follow up : 1 year 4 months

At 1-year 4 months follow-up, the implant shows stable maintenance without peri-implant bone loss



Follow up : 2 years 5 months

Maintained without gingival recession

Less Bone graft

Less Effort

Better Result

Severe alveolar bone resorption presents a significant challenge during dental implant placement. In such cases, bone grafting is **not optional—it is essential** to ensure predictable outcomes in terms of osseointegration, biomechanical stability, and long-term implant success.

- **Ensures Primary Stability**
Lack of bone volume impairs initial implant fixation, increasing micromovement and risk of failed osseointegration.
- **Enables Ideal Implant Positioning**
Sufficient bone allows for prosthetically driven placement, avoiding buccal or angled positioning that compromises function and esthetics.
- **Prevents Peri-Implantitis**
Thin or absent buccal bone is associated with soft tissue instability and higher susceptibility to peri-implant disease.
- **Supports Soft Tissue and Esthetics**
Bone grafting improves tissue contours, prevents recession, and enhances esthetic outcomes—especially critical in the anterior zone.
- **Improves Long-Term Survival**
Evidence shows grafted implants have significantly higher long-term success rates and better peri-implant health.

Once bone augmentation is deemed necessary, the use of a **GBR plate** is strongly recommended to ensure space maintenance and predictable regenerative outcomes.

- **Space Maintenance**

GBR plates (e.g., titanium mesh, reinforced membranes) provide rigidity, prevent soft tissue collapse, and secure the space needed for predictable bone regeneration. "No space, no bone."

- **Graft Stability**

Unlike resorbable membranes, GBR plates resist soft tissue pressure, preventing graft displacement and maintaining the desired ridge shape.

- **Protection of the Graft During Healing**

Rigid barriers shield the graft from tongue, muscle, and masticatory forces—especially important in vertical and large horizontal augmentations..

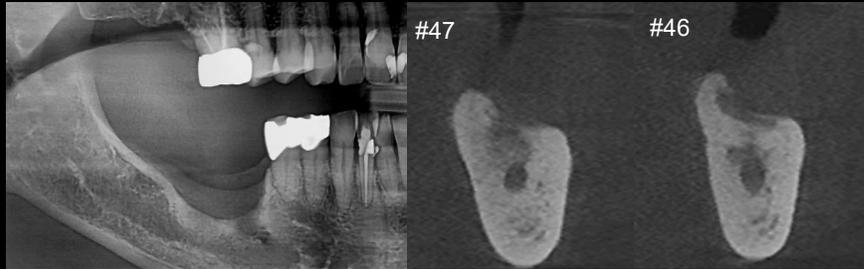
- **Customized Bone Contour Restoration**

Titanium meshes or 3D-printed plates can be contoured to restore ridge anatomy precisely, supporting esthetic and functional outcomes.

- **Clinically Proven Effectiveness**

Studies confirm GBR plates achieve greater vertical and horizontal bone gain with stable long-term results compared to resorbable membranes.

If necessary, do it **well** (If to do, must do well)



Pre-op PA / CT

Osteoporotic patient with severe vertical defect; implant placement carefully planned due to proximity to the inferior alveolar nerve. Secondary bone graft scheduled at second-stage surgery



Pre-op CT

Severe defect visible clinically, making implant placement difficult without GBR



GBR plate & OSTEON™ Xeno

After GBR plate fixation, OSTEON™ Xeno is packed through the holes



OSTEON™ 3 Collagen

placed over the OSTEON™ Xeno.



Collagen Membrane soft

The bone graft material is covered with a collagen membrane for stabilization and protection



Post-op PA / CT

The bone graft was well maintained in position by secure stabilization with the GBR plate



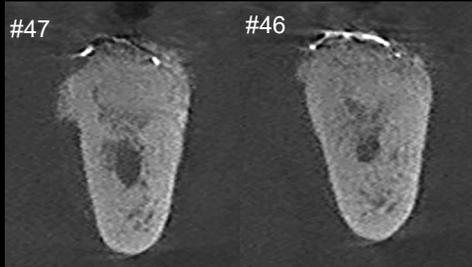
Healing : 1 week



Healing : 1 month

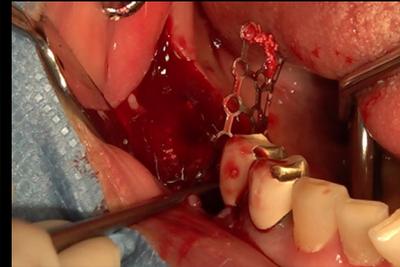
Soft tissue healing is progressing well, but slight GBR plate exposure is observed.

If necessary, do it **well** (If to do, must do well)

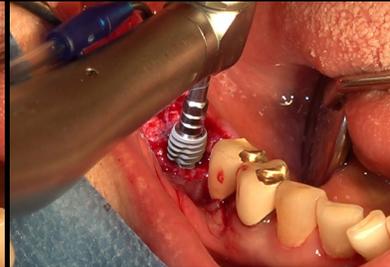


Healing : 6 months

Previously exposed GBR plate is now well covered by soft tissue, and CT shows good bone formation beneath the plate

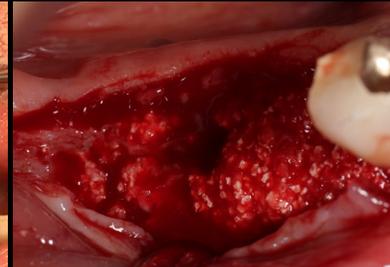


After 6M, GBR plate removal



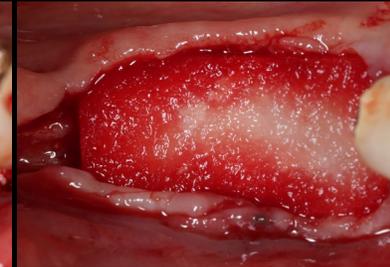
bright BL (Ø4.5 X 7.0)

Placement of a short implant because of limited vertical bone height



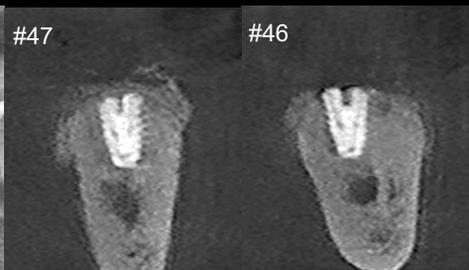
OSTEON™ 3 Collagen

additional bone graft to ensure vertical augmentation



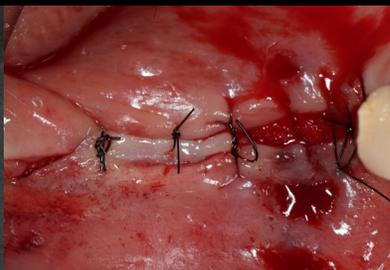
Collagen Graft x1D

applied to cover the OSTEON™ 3 Collagen



S.S.S. Post-op PA / CT

bright implant BL was successfully placed. Short implant placement ensured safety from the inferior alveolar nerve



S.S.S. Post-op



Healing : 1 week

At 1-week healing, after stitch out, minor opening of the surgical site noted; collagen graft x1D maintains barrier function



Healing : 3 months



Final prosthesis

8 months after second-stage surgery, adequate bone grafting allowed delivery of the final restoration in the ideal position

Thank you 😊