



BonEx kit™

03 Best combination for thin ridge

smarThor™
Thor & BonEx kit™



Thor smarThor™

Why Thor?

1. Simple & Strong

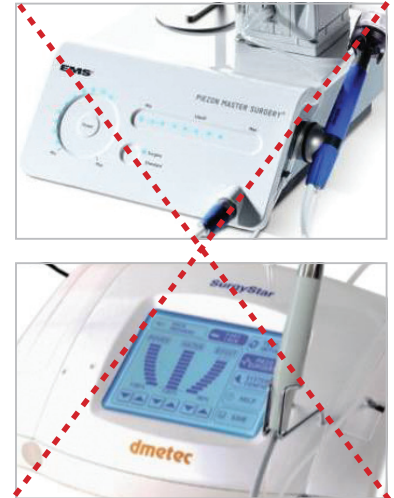
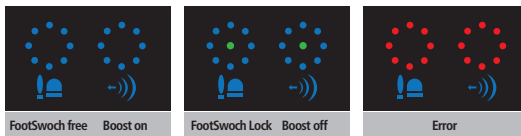
< Simple >



Thor

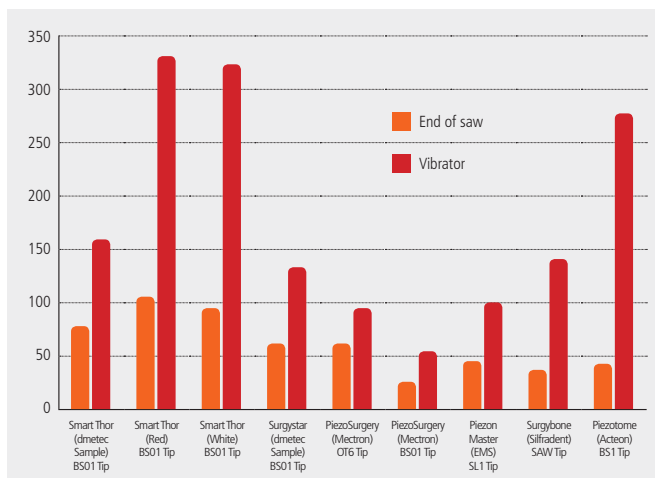
Only Three buttons!

: On & Off, Foot switch, Power Boost



Too many buttons & controllers

< Strong >



Measurements of vibration wave transmitted to the tips

Devices used	Measurements of Tip End
	Vibration Frequency
Thor	28.18 kHz
Dmetec	28.09 kHz
Mectron	27.14 kHz
EMS	27.94 kHz
Silfradent	28.33 kHz
Acteon	29.88 kHz

Measurement of vibration frequency at the end of saw

2. Saw specially Designed Saw for Ridge Splitting

Calibrations to see the depth of cut!
: 4, 6, 8 and 10 mm



Extremely Thin
: 0.36 mm only!
: allows sawing even in extremely thin bone

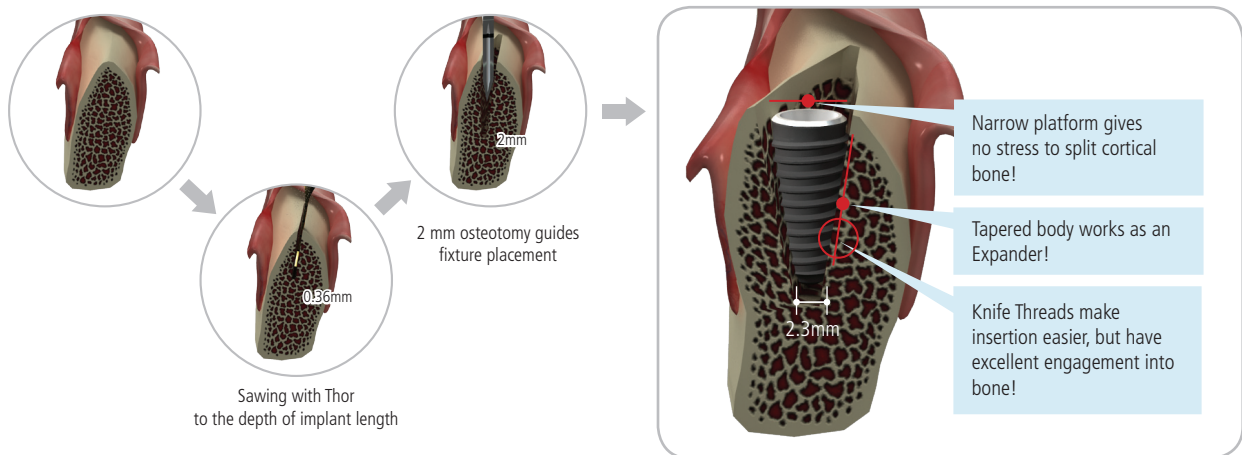


Brand	Thickness
Thor	0.36mm
Mectron	0.79mm
EMS	0.56mm
Piezo tome	0.61mm

Saw compatability with other piezo machines

Company	Product
Mectron	PiezoSurgery
Silfradent	Surgy Bone
ESACRO	Surgy Sonic
DIT	Sonic Surgeon300

3. Perfect match with AnyRidge Implants



Well tapered, Knife Threads, Narrow Platform make Ridge Splitting more effective!

AnyRidge, Thinking Man's Privilege

- Guarantee excellent initial stability always!
- Less reduction and better preservation of cortical bone
- Wider implant possible than the cortical width
- Strong body and greater surface surface area

• Knife(Deep) thread

The powerful self tapping thread provides incredible initial stability with increased resistance to compressive force while minimizing the generation of shear force.

• Tapered body

As the core is narrow & uniform, the implant can be placed into a horizontal bone incision during ridge splitting resulting in better initial stability and less stress to the bone.

• Less reduction and Better Preservation of cortical bone

AnyRidge macro shape helps maintain more buccal and lingual cortical bone than any other implant system in the market today. The unique shape of the implant with a narrow core and varying thread depths enables wider diameter implants to be placed into narrow ridges.

4. Economical

Only 'One' Ridge Splitting Case can cover the cost of a Thor!

BonEx kit™

Perfect for the exceptionally difficult cases

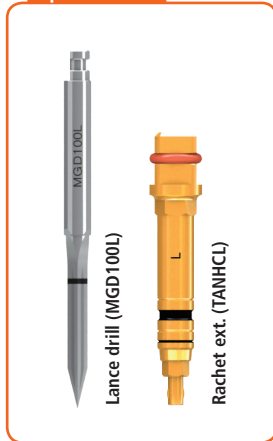
Expander



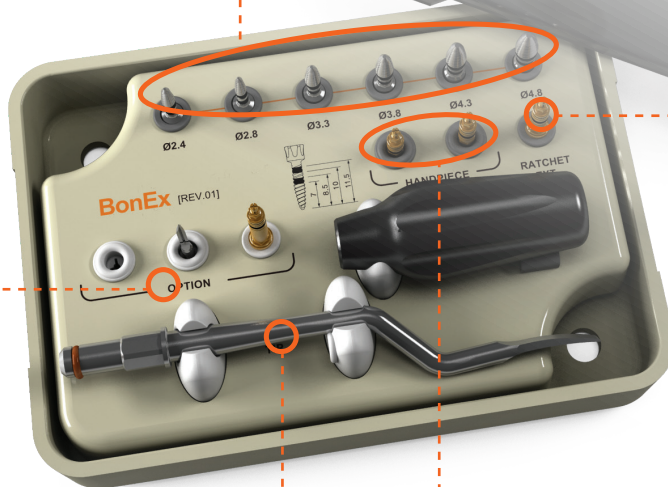
Ref. C	Diameter	Length(mm)	Marking line(mm)
TCMBE2413	Ø2.4	13	7 / 8.8 / 10 / 11.5
TCMBE2813	Ø2.8		
TCMBE3313	Ø3.3		
TCMBE3813	Ø3.8		
TCMBE4313	Ø4.3		
TCMBE4813	Ø4.8		

Step- by-step ridge expander can be placed with a handpiece & a ratchet extension matching with the core shape of AnyRidge

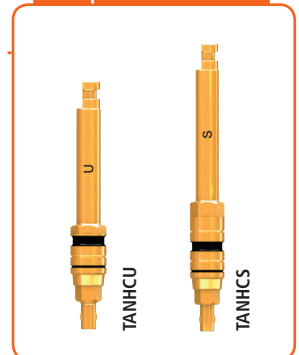
option



Ratchet ext.



Handpiece connector



Chisel and Handle



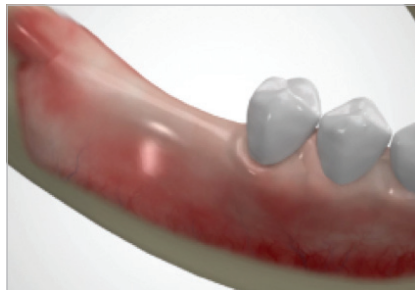
Useful in very narrow bone (<2mm)
Try before lance drilling and expanders to avoid bone defects due to drilling
Can be tapped on the end with a Mallet

Step by step

Procedures of Ridge Split Technique

Step 1.

Indications



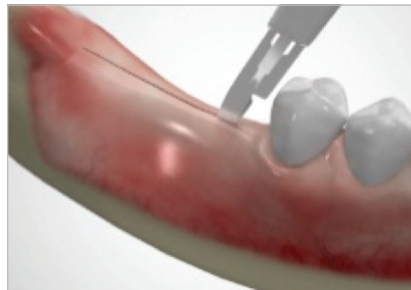
Ridge Splitting techniques may be used in any cases presenting a narrow ridge. Single implant or limited space cases however, offer less room for expansion.

If the narrow ridge consists solely of cortical bone, with no intervening cancellous bone, it will be difficult to achieve a good ridge split.

Caution is also advised in the maxillary anterior as ridge splitting may cause the labial cortical bone to move too labially, resulting in severe angulation of the implant.

Step 2

Incision

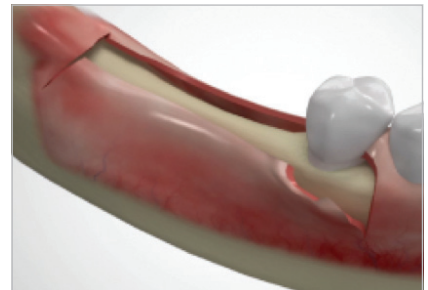


Incision line is recommended to be at the center of remaining keratinized tissue.

A longer horizontal incision is better to permit adequate sawing for ridge splitting. -- one tooth-size more, mesially and distally.

Step 3

Flap reflection

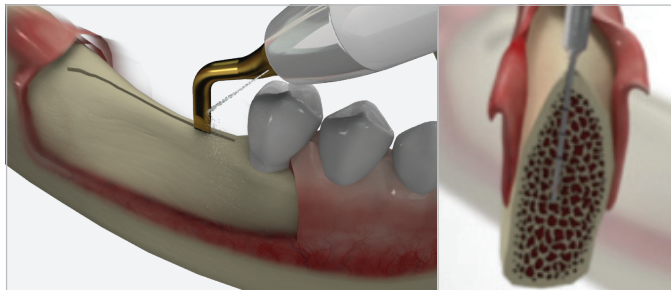


Full thickness or Full-to-partial thickness flap is recommended.

If the ridge crest is less than 2 mm, it is advisable to reduce the crestal bone until the width is at least 2mm.

Step 4

Sawing



Sawing starts from the center of ridge.

The ridge should be cut at a slightly buccal angulation, because resorption occurs on buccal bone. If the lingual bone is too thin after sawing, splitting may occur to the lingual side, making implant position too far lingual.

Thin ridged bone should be cut to the depth of implant length. For example, if the intended implant length is 8.5mm, the incision should be cut to 8.5mm.

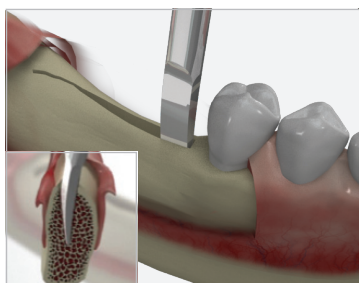
In most cases, vertical bone cutting is not necessary when you place AnyRidge implant. Only small offsets at the ends of horizontal bone cutting are enough to guide the direction of ridge expansion, if needed.

Try to maintain lingual bone thicker than buccal to expand thin ridge buccally

Slightly angulated cutting is recommended.

Step 4-1

Chiseling (optional)



If the crest is less than 2 mm, it's better to expand with a chisel first.

It is to avoid bone defects which can be made with drilling on the thin ridge.

Light tapping with a mallet will be enough.

Step 5

Drilling

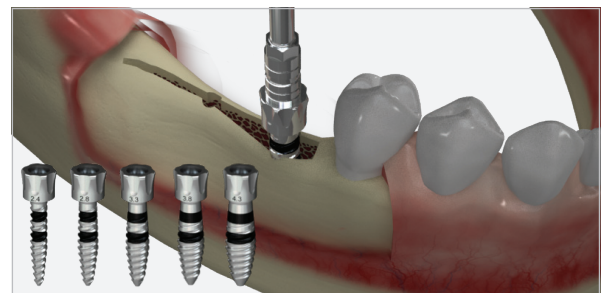


Now drill the desired position and axis of implant.

In ridge expansion technique, lance and 2mm drilling is enough in most cases. It's only to guide the implant path. If a flat-bottomed implant was planned, drilling should be extended to the diameter recommended by the manufacturer.

Step 5-1

Expanding with BonEx kit (optional)

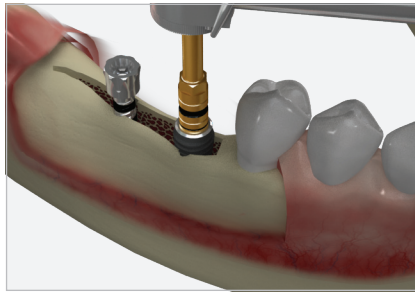


When the wider inside, slow expansion with BonEx kit is recommended.

The Expanders can be engaged easily with bone by a handpiece(50 Ncm). If it stops before the depth of osteotomy, use a hand wrench and a ratchet extension. Same procedure can be repeated with wider diameter of BonEx Expander.

Step 6

Implant placement



When the ridge is expanded adequately or has enough flexibility, place the implants.

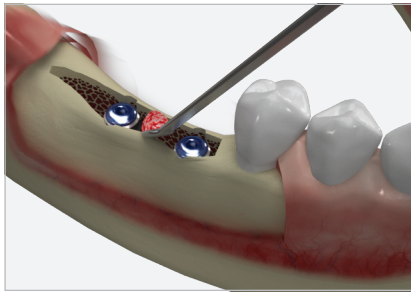
If you use BonEx Expanders, it's better to leave an Expander during placement of the first implant to keep the ridge expanded.

Torque force up to 60-70 Ncm will be fine to place an implant.



Step 7

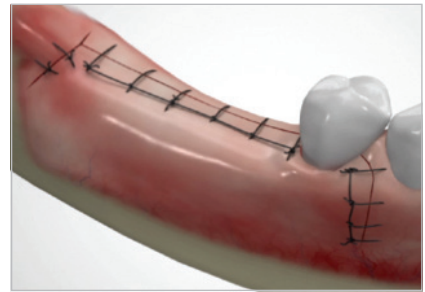
Bone graft & Membrane



The remaining bone defects can be filled with any kind of bone graft material. Resorbable membrane is recommendable for better bone filling.

Step 8

Closing flap



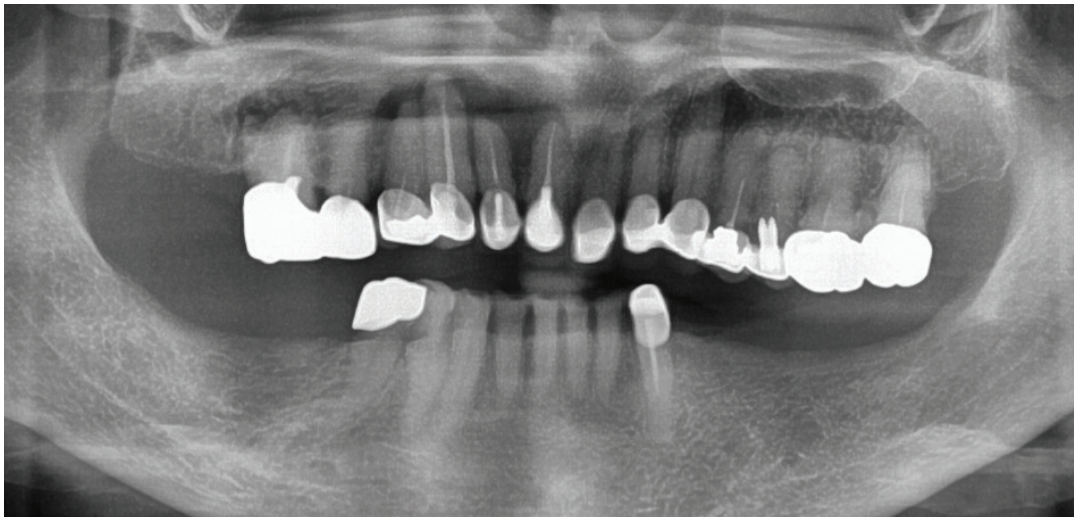
One stage or two stage approach can be chosen according to the conditions, but it is recommended to finish several cases with successful result before trying one stage surgical approach.

Adequate periosteal releasing incision is needed if primary closure is planned.

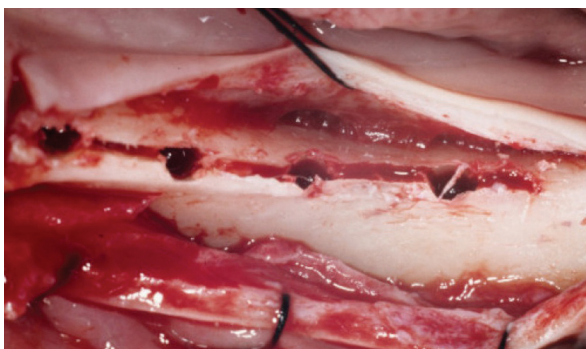
Clinical case

Case I. Mandibular Posterior

A 79 year-old female patient visited with a chief complaint of chewing difficulty on the mandibular molar area. She had been using a denture for more than 30 years. The ridge was atrophic, which needs ridge augmentation. She was physically healthy. Considering her age, the ridge split technic was decided to do.



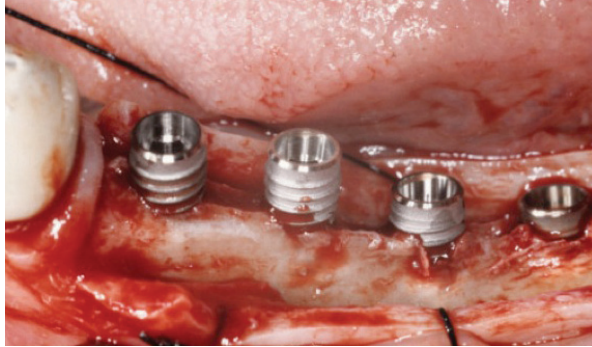
Preoperative panoramic radiograph



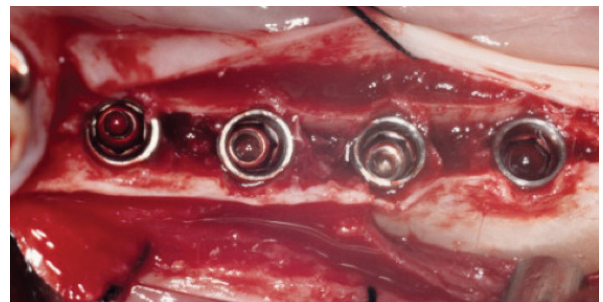
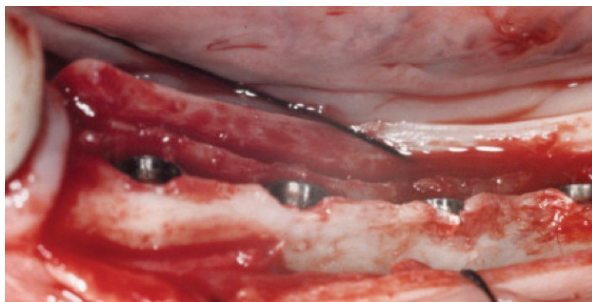
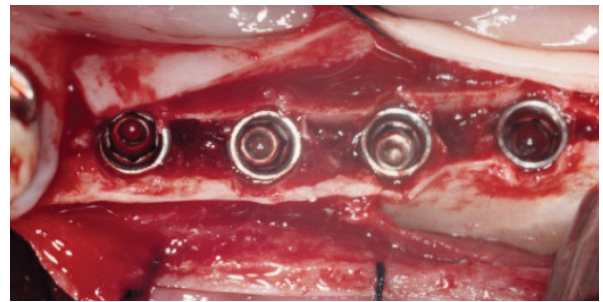
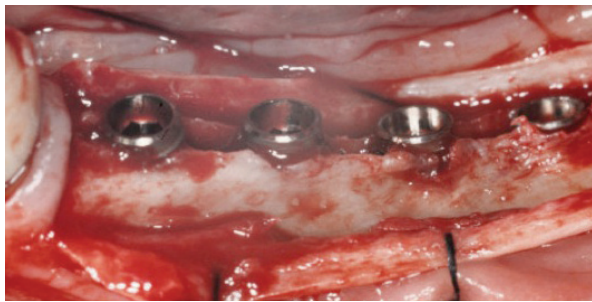
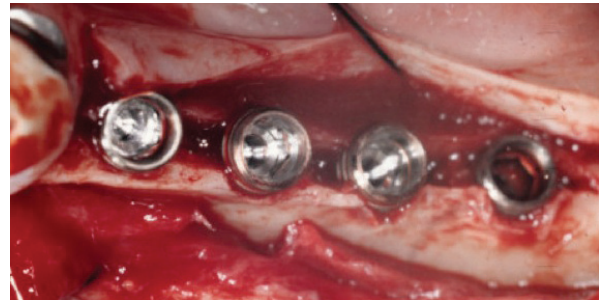
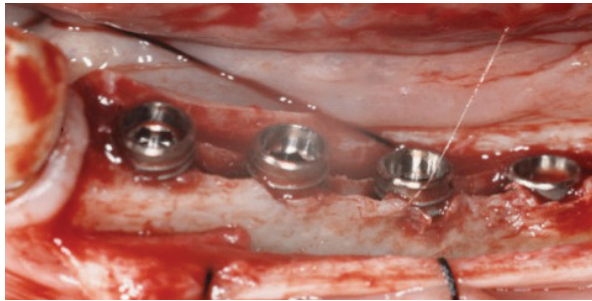
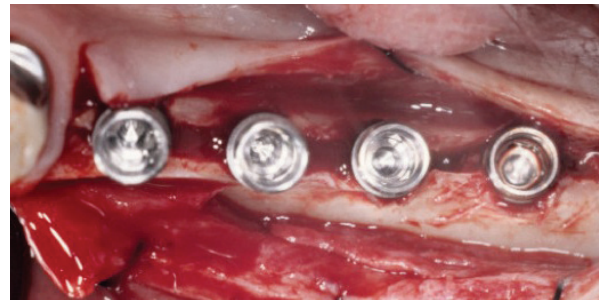
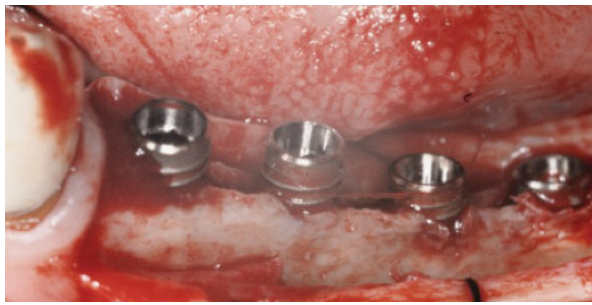
The ridge width was about 3mm on the crest.

The ridge was splitted with a thin saw only horizontally to the depth of implant length (11.5, 10, 8.5 and 7mm from front to back, respectively), then 2mm lance drilling was done. Compare the drilling site with ridge width.

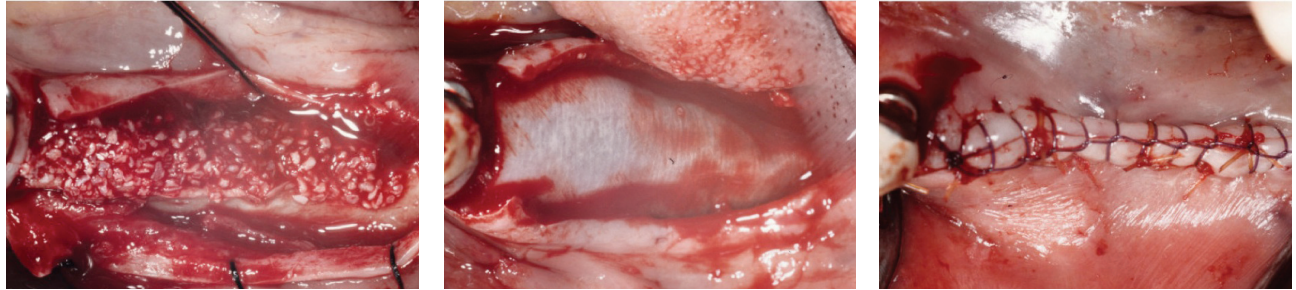




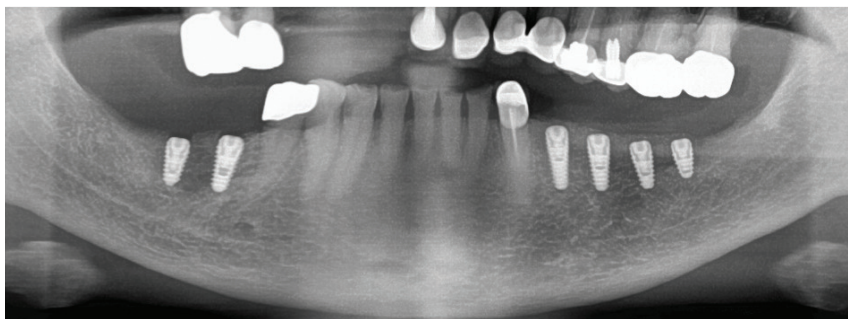
Fixtures were placed with a handpiece which was set on 40 Ncm torque force. Each fixture stopped at the level shown on the picture. Then the fixtures were screwed down with a torque wrench, one full turn on each fixture sequentially.



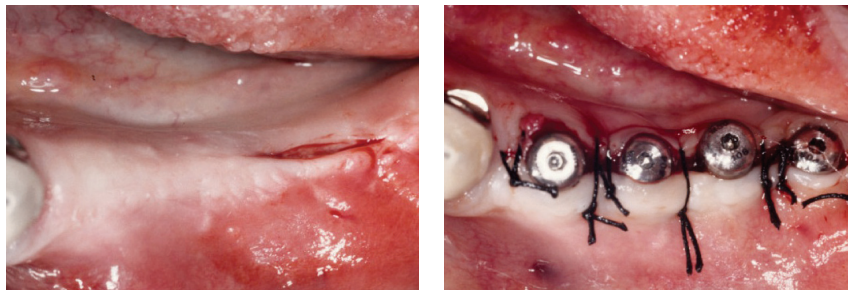
All the fixtures were placed completely, 1 mm under the crest in consideration of bone remodeling. The crestal bone was split enough to make ideal width.



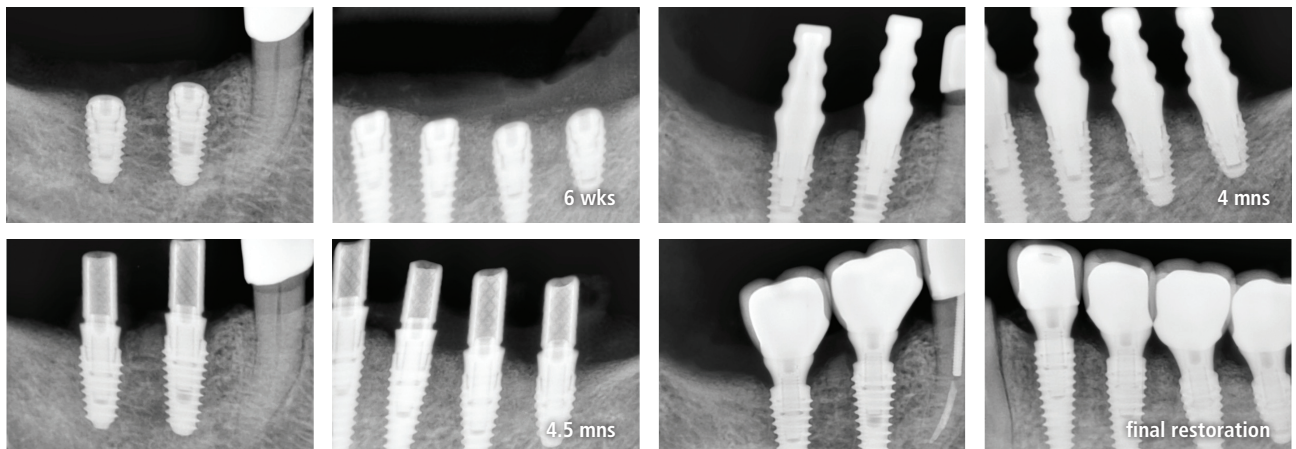
The gap defect was filled with Mega-Oss allograft and covered with a collagen membrane. Then primary closure was made.



Postoperative panoramic radiograph. The other side was done with same procedure of ridge splitting.



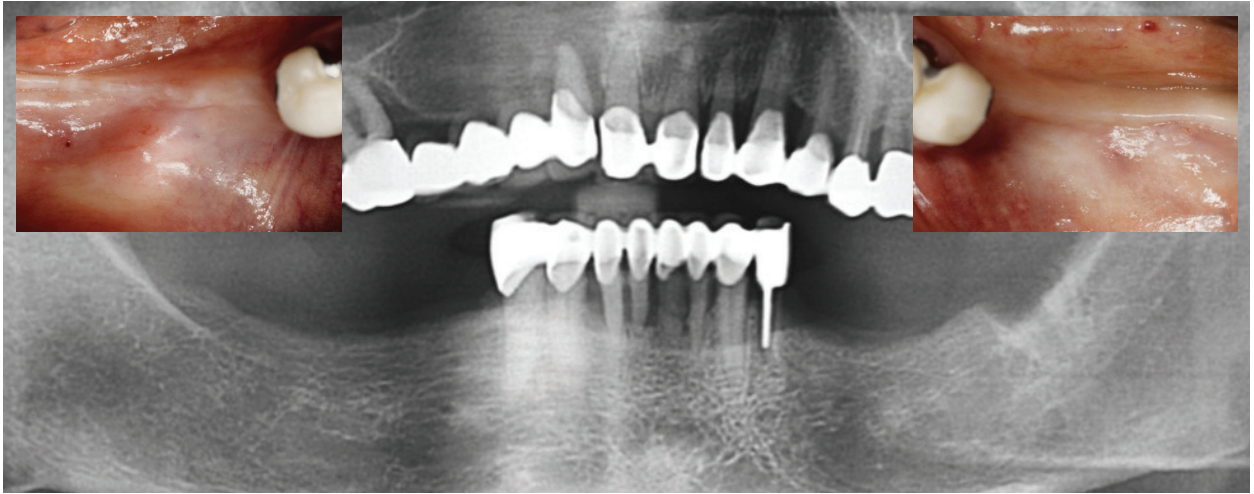
The healing was uneventful, and the second stage surgery was done with simple incision in 3 months.



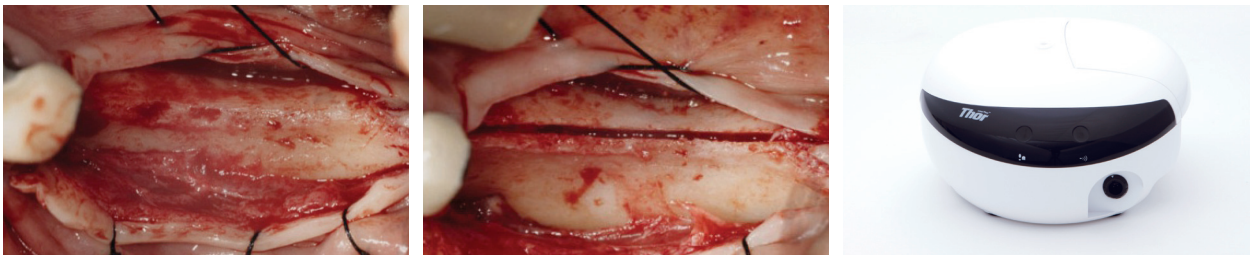
Intraoral radiographs taken at the following procedures. The crestal bone was well maintained with excellent bone regeneration following the ridge split technique.

Case II. Mandibular Posterior

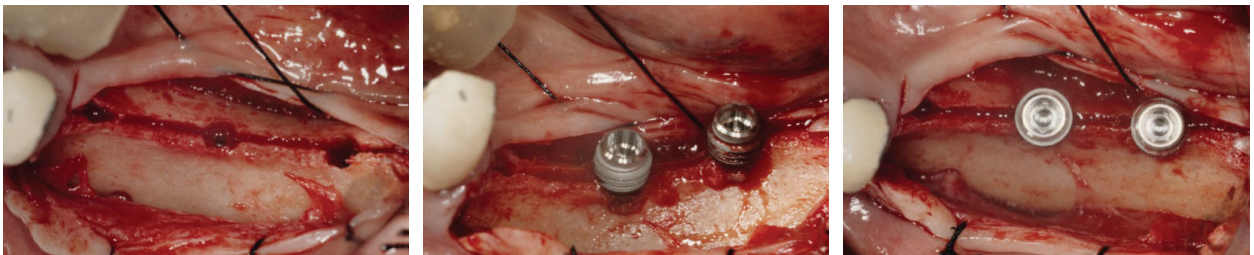
A 74 year-old female patient visited with chief complaints of denture discomfort and chewing difficulty on the mandible. On the intraoral and radiographic examinations, she showed problems on many teeth, but she wanted to treat edentulous area first. Both mandibular molar area showed thin ridges which needed to be augmented for implant placement.



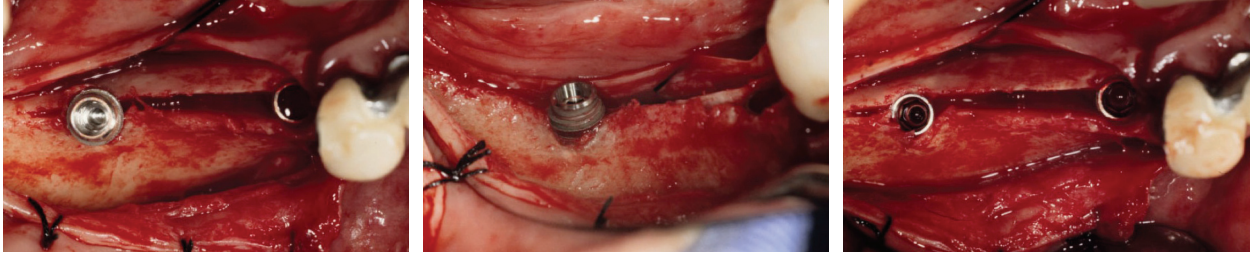
Preoperative panoramic radiograph and intraoral views.



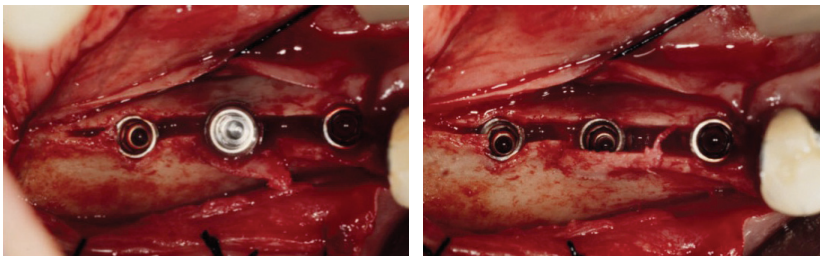
When the flap was reflected on the right side, the ridge width was less than 3mm. The ridge was saw with a Thor horizontally to the depth of 10 mm.



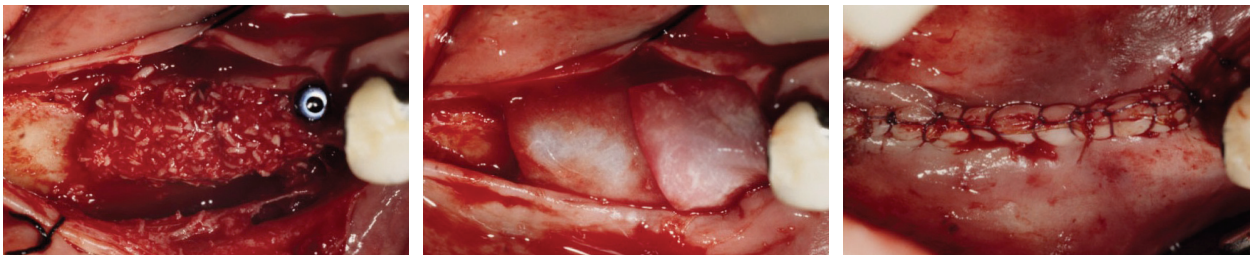
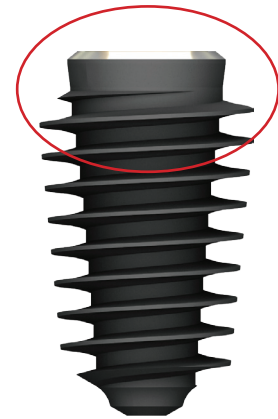
Only a lance drilling (2mm in diameter) was made on the anterior two implant sites, and 2.9mm drilling was done on the second molar area. Then 4.5 x 10 mm AnyRidge implant were placed for the two molars. The 50Ncm-set handpiece stopped at the level shown at the center picture. Compare the ridge width and the size of AnyRidge fixtures on the right.



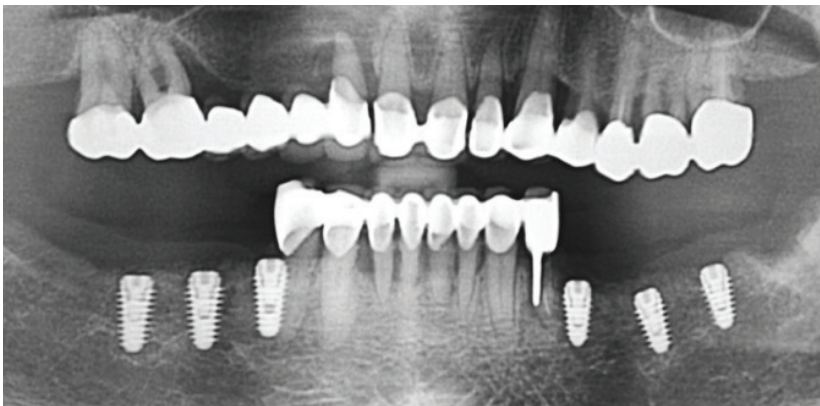
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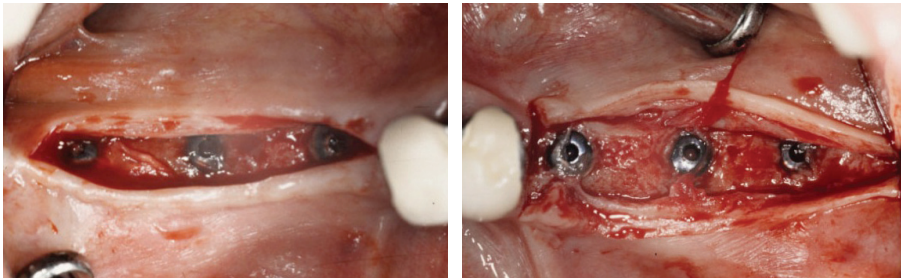
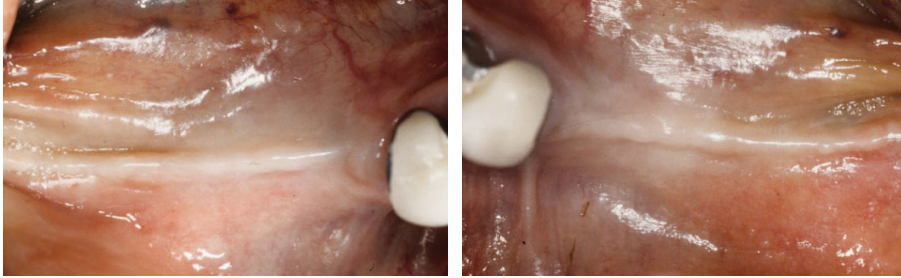
The first molar implant was placed. Due to the special structure of the AnyRidge Implant system, the cortical bone on the top showed green-stick fracture during placement, but when the implant was placed completely under the crest, the fractured bone came back to the original position.



Small amount of Mega-Oss allograft and collagen membrane were placed to enhance regeneration, and primary closure was made.

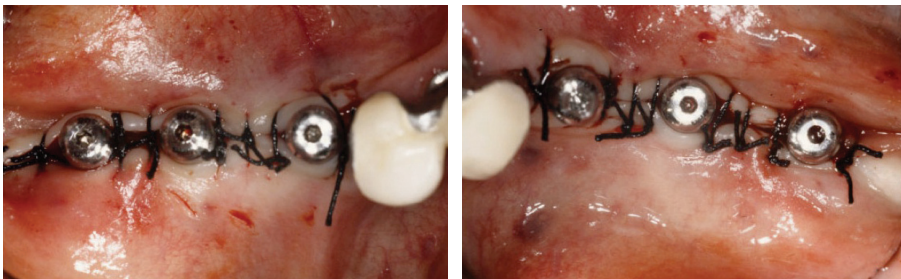


Postoperative panoramic radiograph.



3 months after the ridge split and implant placement, the second stage surgery was made with simple incision and flap, just by splitting the remaining keratinized tissue into two, despite its being limited. The bone was regenerated excellently.

4mm diameter healing abutments



were connected. Smaller diameter healing abutments are recommended in the case of limited keratinized tissue in order to help preserve the tissue.

Final restorations were delivered following routine procedure. All implant prosthetics were made as

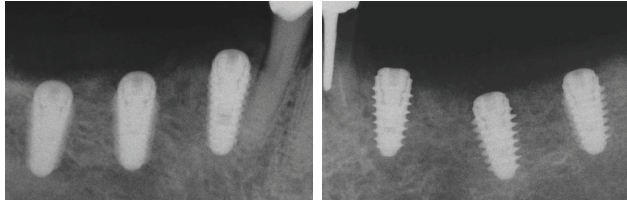


single crowns.

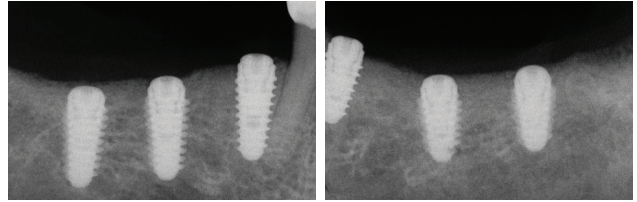
At the first follow-up visit after 3 months from final restoration delivery, the gingival condition had



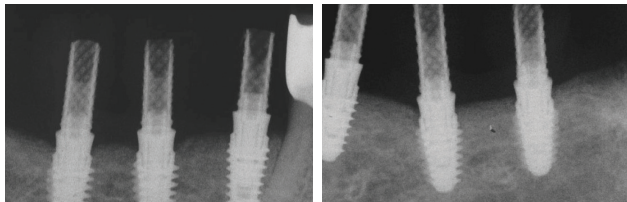
improved. The patient was very satisfied with the result, and wanted to have more implants for other teeth.



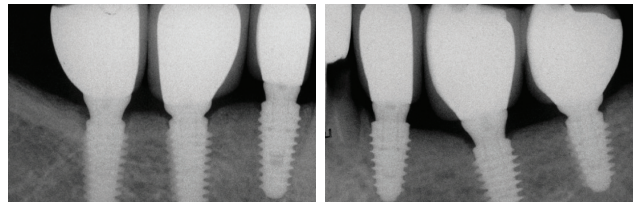
1 mn postop



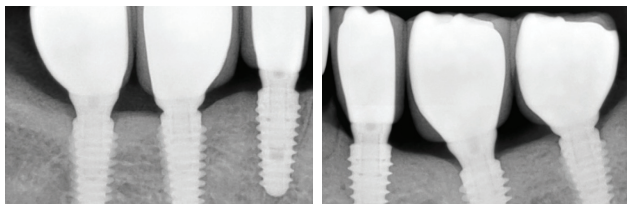
4 mns postop- before second stage surgery



Provisional restorations



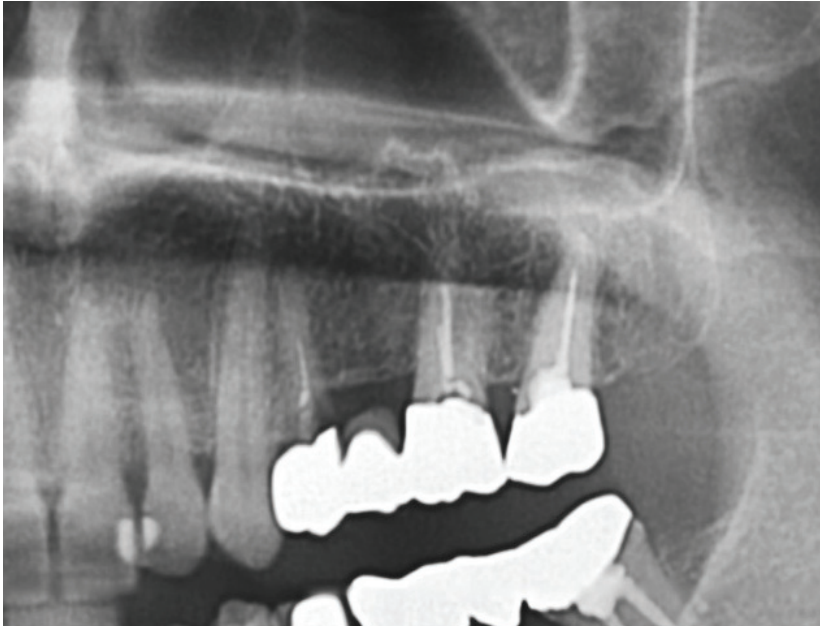
Final restorations



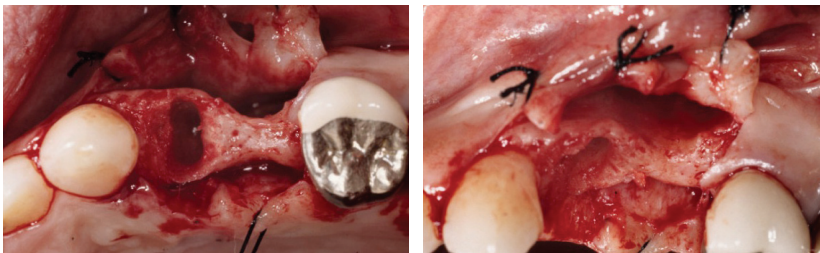
6 months after final restorations

Intraoral radiographs with clinical procedures and follow-up. All the implants were restored as a single crown. The crestal bone showed excellent response at all implants.

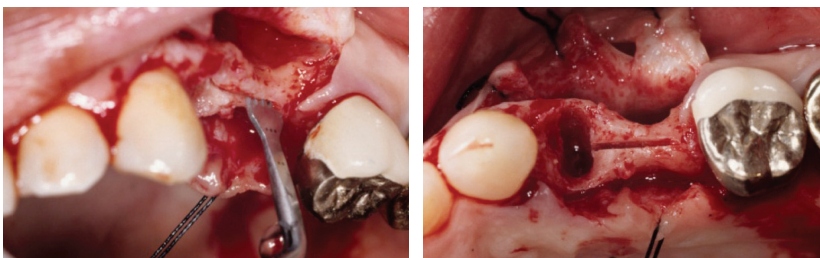
Case III. Maxillary premolar



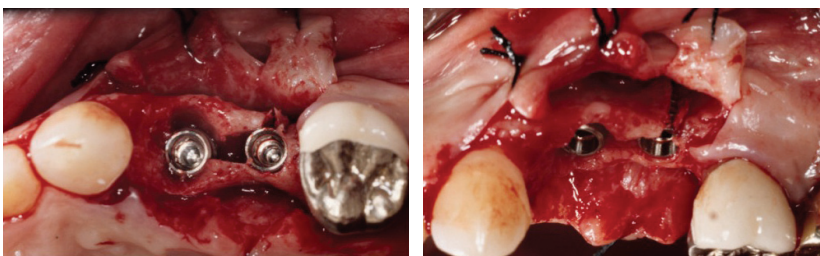
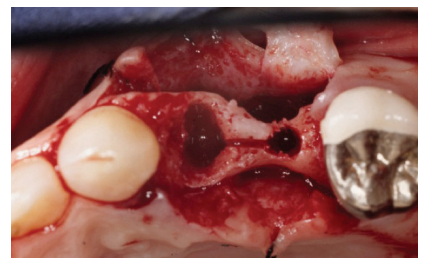
A 53 year-old female patient visited with chief complaints of discomfort during chewing on the maxillary left posterior. On the clinical and radiographic examination, the first premolar which was an abutment of three unit bridge revealed subgingival decay under the crown. So it was decided to extract it and place two implants on the premolars.



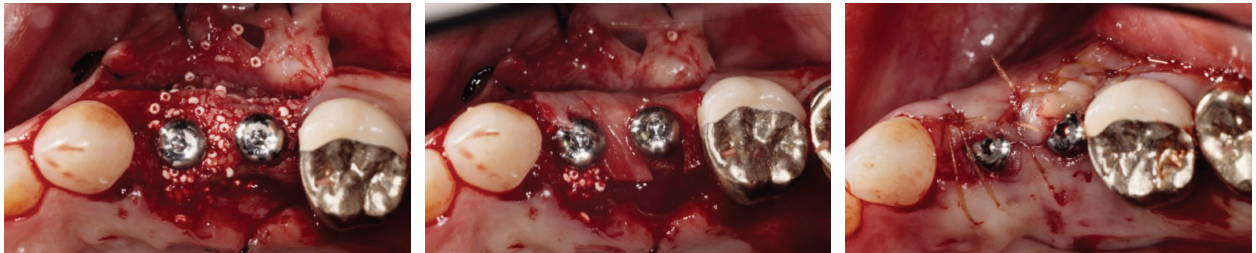
Upon extraction and flap reflection, the ridge on the second premolar showed thin ridge.



Thin ridge was splitted with a Thor, and drillings up to 2.9mm were made.



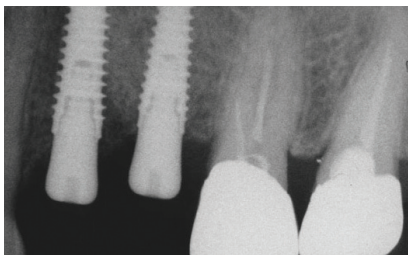
Two 3.5mm implants were placed with excellent stability. During placement, green stick fracture was made on the second premolar area.



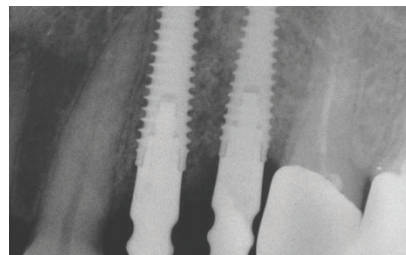
Mega-Oss (Allograft) and Bone Plus (Synthetic, BCP) were mixed and grafted around the bone defect, and a collagen membrane was placed following healing abutment connection. Simple interrupted suture was made for close adaptation of flaps.



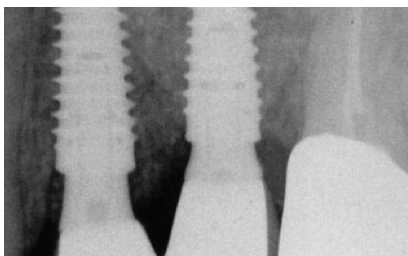
Postoperative panoramic radiograph.



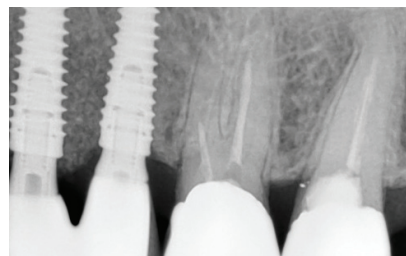
1 month after surgery



3 months after surgery



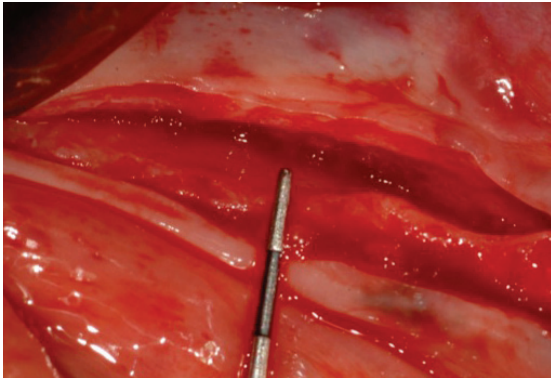
Final restoration



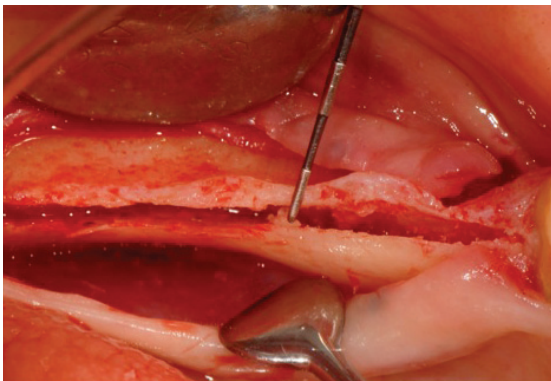
1.5 yr after final restoration

Intraoral radiographs showing excellent bone response after ridge split procedure.

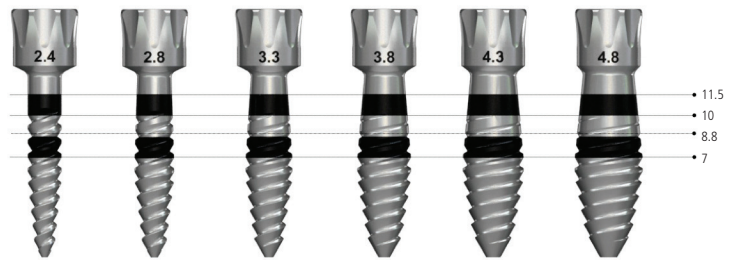
Case IV. Extremely thin mandibular posterior



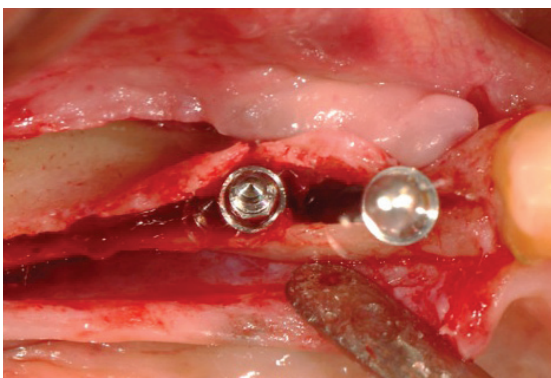
This patient showed extremely thin ridge on the mandibular posterior. The ridge width was less than one mm on the crest. In a case like this, the alveolar process is mainly composed with cortical bone without cancellous bone inside. It needs careful splitting to prevent total fracture of the cortical plate.



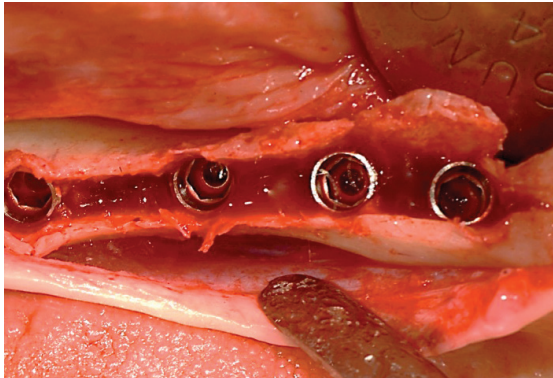
A specially designed Thor's saw can start splitting even on this narrow ridge without reduction of the sharp edge. The horizontal cut went down to the depth of implant fixture, but no vertical incisions were done.



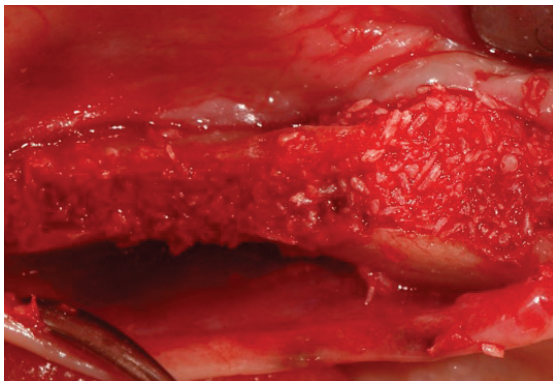
The Ridge Expander kit was used to expand the thin ridge slowly.



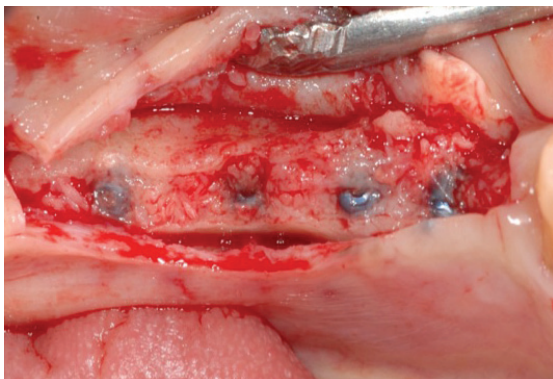
After 2 mm drilling to guide the path of bone expanders, three expanders from 2.4 to 3.3 were used. The first implant was placed while an expander was in position to keep the expanded ridge.



Four implants were placed completely with excellent initial stability. A green stick fracture was made on the mesial of first premolar.



Mega-Oss allograft was grafted into the bone defects between implants.



Three months after ridge split and implant placement, a simple second stage surgery was made. The alveolar bone around implant was regenerated fabulously with enough width. Compare with the initial photo.

Case V. Maxillary lateral incisor case



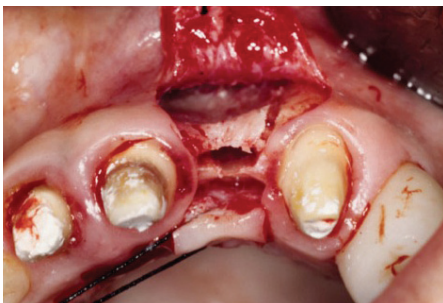
A 52 year-old gentleman wanted to exchange his old PFM bridge on the maxillary anteriors. During treatment, he wanted to place an implant on the missing area of lateral incisor to make single crowns on each teeth.



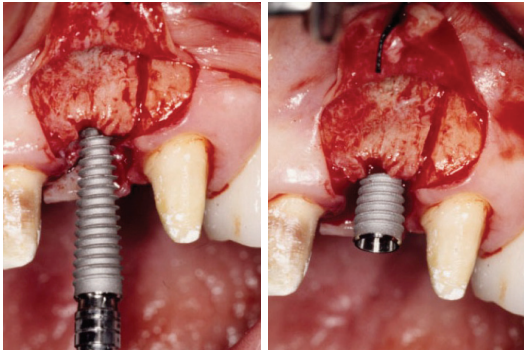
The ridge was thin due to resorption with a big undercut on the labial plate.



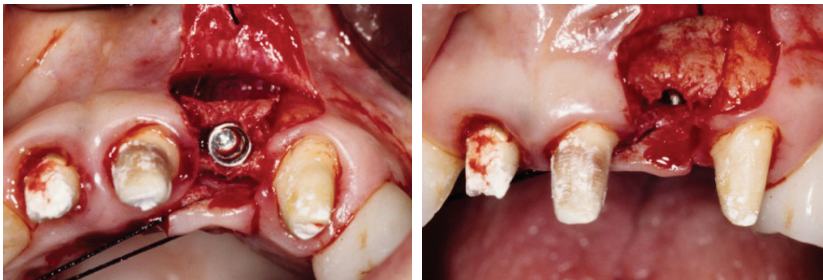
The thin ridge was splitted with a Thor. In this case, due to limited space, a vertical bony cut was made on the mesiolabial margin of canine. The vertical cut was oblique in the bone not to make damage on the root of canine.



A 2mm diameter of drill was used to guide the path of an implant.



A 3.5x15mm AnyRidge implant was partially inserted into the socket, and the 40Ncm set handpiece stopped the fixture at the level on the right photo.



The implant was completely placed with a hand wrench. During placement, a small green stick fracture was made on the mesial side.



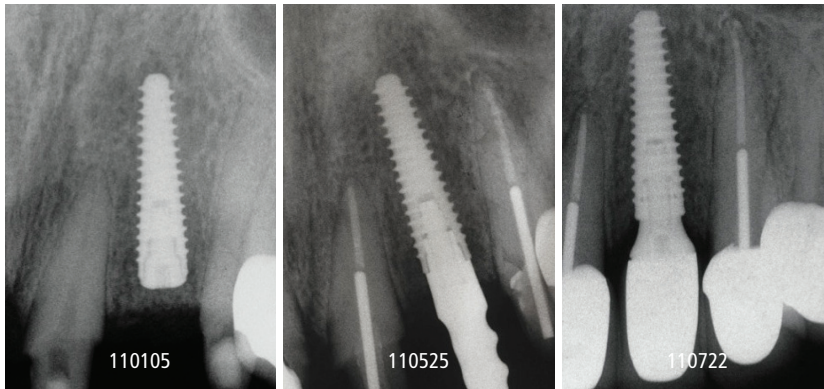
Mega-Oss allograft and a collagen membrane was placed to cover the defect.



Primary closure was made and the healing was uneventful.



Second stage surgery was made with simple 3 corner flap. And final restoration was delivered following routine procedures.



Intraoral radiographs taken at 1month after surgery, during impression taking, after final restoration.