Clinical Case

Before Surgery

A 54-year-old male patient visited with a chief complaint of chewing difficulty on the mandibular molar area.

At the first radiograph and clinical examination, the tooth #44 is suffering from chronic periapical infection, with a large bone inflammatory tissue surrounding the root. The extraction of tooth #44 was planned, with delayed implant placement.

The rehabilitation of the 4th quadrant was discussed with patient, the prosthetic solution was to replace the missing teeth #44-45-47 with PFM bridge, supported by 3 AnyRidge fixtures placed in position 44-46 and 47.

Biomechanical Analysis

The first premolar was extracted due to severe periodontitis, and the socket was degranulated thoroughly. Due to the inflammation around that tooth, the implant surgery was delayed almost 3 months.

After a healing period of 3 months post-extraction of #44, a cone Beam CT scan was realized to evaluate the implant sites. A careful examination showed a very narrow residual ridge regarding the two premolars. The available bone height and width in 1st and 2d molars allow to place two implants with no special care.

Specially in the lateral mandibular implant sites, the bone resoprtion doesn’t allow usually to place the fixture in the ideal 3D position regarding the prosthetic corridor. Some solutions can resolve this problem:

1- To place a narrow diameter implant inside the available bone housing, with exaggerated bucco-lingual incline, usually to avoid also the mandibular canal. This leads to the automatic use of an angled or customized abutment to correct the path of the implant tilt and to find the prosthetic corridor of the crown. The use of narrow diameter implants in the posterior mandibular areas presents a mechancial risk of complications (implant fracture)
Biomechanical Analysis

2- To reduce the vertical height of the available narrow ridge until getting a wide plateau allowing to place an adequate fixture diameter with a remaining bone thickness buccally and lingually of 2mm. Usually, it is necessary after the vertical osteoplasty to place a short implant to avoid damaging the mandibular canal.
In posterior sites, we have to assess the risk of bone loss around dental implants and the consequences of using short implants. Bone loss of 3 mm is a high risk for implants with only 6 mm length but not for an implant of 10 mm length or more in a grafting site.
In addition, the implant/crown length ratio in this situation is not perfect, with an ugly long crown.

3- To undergo a Grafting procedure: Onlay grafting / Titanium mesh / Space maintainer with particulate bone and membrane...
The best option for this kind of situation seems to be the reconstractive alternative: the aim of any used technique is to rebuild an adequate facial/incisal line angle for optimal 3D implant placement comparing to the prosthetic corridor of the crown to be replaced. The implant axis can be aligned with the ideal one of the crown.
In the era of minimal invasive implantology, the use of customized pre-formed shape membranes in conjunction with implant placement and particulate allogenic bone grafting seems to be an effective way to reconstruct the bone loss. It helps shorten the time needed to restore prosthetically the missing tooth/teeth, and avoid to harvest autogenous bone from a second site.
Patients understand this argument very well and accept about one week of discomfort after minimal invasive grafting procedure to receive lifelong stable, functional, esthetic and biomimetic prosthetics.
**Clinical Case**

**Surgery: Guided bone regeneration technique using i-Gen membrane**

Incision line is recommended to be at the center of remaining keratinized tissue. A short distal releasing incision allows better access to the boney implant sites. A full thickness flap was than elevated. The implant #44 was placed in an ideal 3D and operated with special GBR technique.

The implant bed was prepared using just lance and 2mm drilling, it's only to guide the implant path. The unique shape of the implant with a narrow core and varying thread depths enables wider diameter implants to be placed into narrow ridges. 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 relatively to the original position.

A flat abutment, 1 mm cuff height, was connected with the fixture. A 1.6mm hex driver is needed to place a flat abutment, which is included in the kit.

Autogenous bone chips obtained during drilling procedure was placed as a first layer over the exposed implant threads. A second layer of allogenic bone (MegaOss) mixed with the patient blood collected during flap elevation. The amount of graft material should be enough to fill the space between i-Gen and the fixture.

An adapted i-Gen membrane was selected according to the architecture, the size and shape of bone defect, an i-Gen can be chosen from 12 different i-Gens.

The hole of i-Gen is matched with the screw hole of the flat abutment.

A healing abutment was connected on the Flat abutment to fix the i-Gen for one stage surgical approach. Choosing a healing abutment or cover screw to fix i-Gen membrane depends on the need of one or two stage surgery.

Watch the horizontal extension of i-Gen.

The implant #46 and #47 were placed fellowing a classic implant site preparation technique for dense bone.

PRF membrane was used to protect to cover the i-Gen membrane, the use of PRF in our experience seems to accelerate soft tissue healing and avoid future perforations.

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

Simple suture was made to adapt the buccal flap against the healing abutment, and tight adaptation of soft tissue flap is recommended.

**GBR using i-Gen Protocol**

Fig. 9. **A:** Implant placement / **B:** Flat abutment connection / **C:** Bone grafting / **D:** i-Gen placement / **E:** Healing abutment connection / **F:** Sutures / **G:** Retro-aveolar Radiograph
4 Months after the implant / GBR Surgery

The excellent primary stability of AnyRidge implants due to the special macro and micro-geometry of the fixture allow us to achieve in the majority of the cases one step surgery, with immediate connection of the healing abutment. The selection of the corresponding diameter of the healing abutment is in relation of the with the desired emergence profile of the final crown (#44: Ø 5mm, #46: Ø 6 mm, 47: Ø 7 mm).

3 months after surgery, the gingival healing was excellent. Usually flap opening is not necessary to remove i-Gen, but in this case the flap was elevated to check the bone regeneration. The i-Gen was maintained very stable in the tissue, and it was easily removed with a hemostat.

After a healing period of 6 weeks following i-Gen removal, the impression phase is started. A closed tray impression technique is used, the impression coping (transfer type) are connected to the implants. An addition curing silicone (Heavy Body S1 and Light Body S4 Suhy, BISICO™-Germany) is used for the final impressions.

Impressions & Master Cast Fabrication

The final impressions are powdred with a Type 4 extra hard resin reinforced dental die stone.
Start of loading

The selection of the final titanium EZ Post abutment is guided by the desired emergence profil diameter of the final crown. For the #44, #46 and 47, an EZ Post Ø 4.0 mm, Ø 6.0 mm and Ø 7.0 are respectively chosen. The excellent design of the EZ Post and the large gingival height cuff available allow the lab technician to select the required abutment without further adjustments.

Framework Fabrication & Trying

A classic metal framework is realized, using a Chrome-Cobalt alloy. The patient is called for a trying session and bite registration. The passive fit and the perfect emrof the metallic framework and the perfect margin are checked.

Fig 17-. Cr-Co Alloy Framework trying and validation

Fig 18-. Cr-Co details of the final PFM Bridge
Start of loading

After the validation of the biscuit trying of the final bridge, the EZ Posts are screwed using a hand ratchet. The final torque of the retention screw is 35 N/cm. The access hole is protected by using EZ Seal and blue light cured temporary resin.

![Fig 19. Final EZ Posts / Occlusal view](image)

3.5 months after the implant placement, the final restoration: porcelain fused to metal bridge is cemented. A special attention is given to the final functional occlusal adjustment, a key factor for the long term success and stability of the final result.

![Fig 20. Final PFM bridge / EZ Posts](image)

After Loading

After radiographic examinations. The prosthetics are in good harmony with the surrounding teeth. Also the fixture placement and stability are great.

![Fig. 22. 6 months later, Panoramic radiograph](image)