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Vertical ridge augmentation (VRA) for mandibular defect using ti-Reinforced PTFE Mesh (RPM) and pericardium collagen membrane

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Introduction

The posterior regions of the jaw are a complex area to be treated through osseointegrated implantology. In order to guarantee effective and predictable prosthetic-implant rehabilitation in this region, scientific research has led to the development of the surgical techniques which facilitate the insertion of standard implants while reaching high success rates without altering the structural integrity and function of the IAN. GBR is a surgical technique which facilitates the formation of new bone in anatomical areas that present vertical, horizontal or combined bone defects. This is achieved by restoring sufficient bone volume suitable for the placement of osseointegrated implants according to the esthetic and functional canons that have codified the concept of "prosthetically guided implantology". GBR with ePTFE membranes have always been at the center of debate due to the low success rate of the results obtained, as it is considered highly operator dependant. A new type of non-resorbable membrane was introduced at the beginning of 2019 which is a perforated ti-reinforced PTFE membrane; this should allow a better perfusion and revascularization of the crestal bone, giving a better formation and maturation of newly-formed bone. The aim of this report is to show how to treat a vertical mandibular defect using a ti-Reinforced PTFE Mesh (RPM) covered by a a collagen membrane.

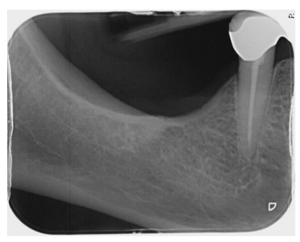
Case description

A 68-year-old ASA 1 female patient with partial mandibular edentulism with vertical bone defect was treated in March 2019 at the Unit of oral and maxillofacial surgery, University of Bologna, Italy.
After administering anesthesia and performing a trapezoidal incision, a full-thickness flap was delicately elevated buccally and lingually in order to avoid flap laceration or perforation. Next, the mental nerve was gently isolated and the two flaps were passivated and released. The cortex was then perforated in order to increase the vascular supply at the surgical site; 50% autogenous bone was harvested from the external oblique ridge of the mandibular ramus using a bone scraper (Safescraper, Meta; De Ore srl, Verona, Italy), it was mixed with 50% high porosity porcine xenograft (Z-core, Osteogenics Biomedical, USA; De Ore srl, Verona, Italy) and with peripheral venous blood of the patient. Finally, a reinforced PTFE mesh (RPM, Osteogenics Biomedical, De Ore srl, Verona, Italy),was manually modelled and packed with the mix described above; it was fixed by titanium tacks (Trinon System, De Ore srl, Verona, Italy) and titanium mini-screws (Profix System, Osteogenics Biomedical, USA; De Ore srl, Verona, Italy) and covered with a resorbable pericardium collagen membrane (Vitala, Osteogenics Biomedical, USA; De Ore srl, Verona, Italy). After having evidence that the surgical flaps could advance coronally without tension while covering the augmented area, a double suture (Cytoplast, Osteogenics Biomedical, USA, De Ore srl, Verona, Italy; Serafast, Serag-Wiessner, De Ore srl, Verona, Italy) was performed to ensure primary closure of the surgical wound. Horizontal mattress sutures were used for flap overlapping, whereas multiple interrupted sutures were used for hermetic closure of the flaps.
After approximately 6 months, an orthopantomography and a CBCT were taken and the implant-prosthetic planning was performed on a CBCT. A surgical template (Navibox, Biomax, Vicenza, Italy) was designed for guided implant placement in order to avoid injury to the inferior alveolar nerve. Therefore, the surgical site was reopened, implant sites were prepared according to the manufacturer's protocol and two threaded tapered implants (T3 implants; Biomet 3i - Zimmer; Biomax, Vicenza, Italy) were inserted in position 46 and 47, respectively with a torque of 65 and 75 Nmc and both submerged by 1 mm. The VRA measured 6 mm in the mesial and 5 mm in the distal site.
Pseudoperiosteum was not formed and bone quality was evaluated as D3 by the clinician.

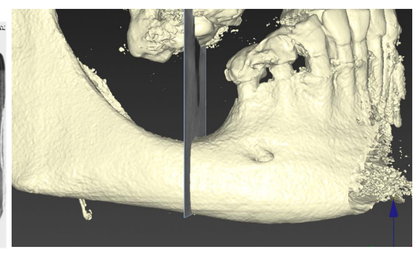
Results and Conclusions

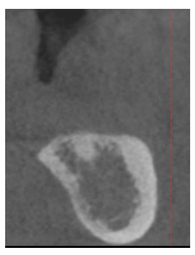
Thanks to GBR, it was possible to satisfy the patient's request for a fixed prosthesis and allow the clinician to position the implants in an ideal prosthetically guided implant position, as confirmed by postoperative radiographs.
This case report suggests that bone augmentation using a ti-Reinforced PTFE Mesh (RPM) covered by a a collagen membrane could be suitable for restoration of vertical bone defects in the posterior mandible.

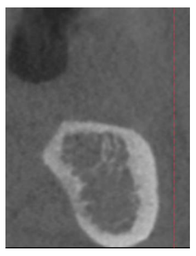
Pre-operative two-dimensional evaluation



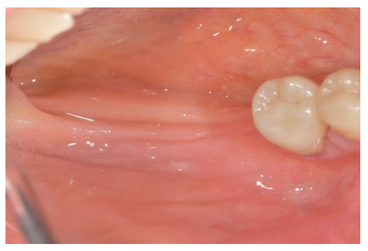
Pre-operative three-dimensional evaluation



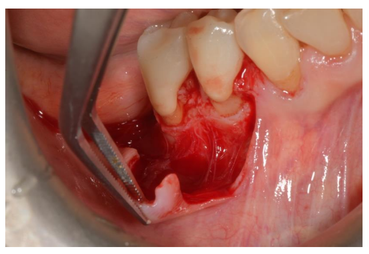


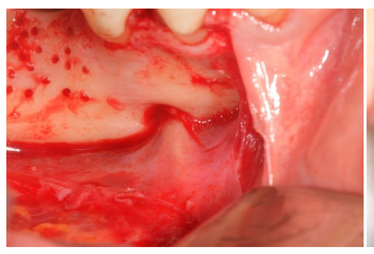


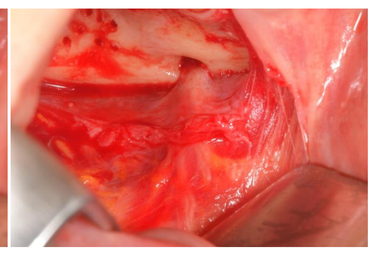
Pre-operative clinical conditions



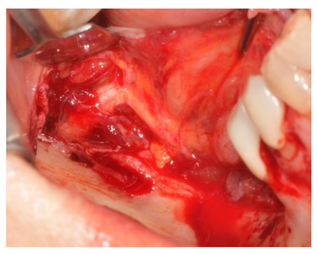
Passivation and release of the buccal flap

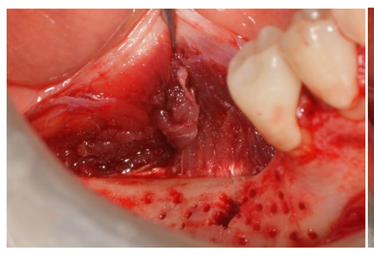


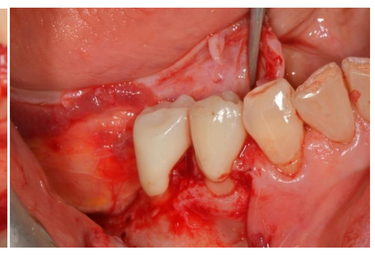


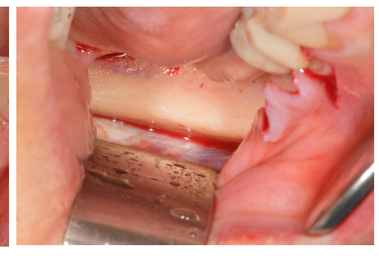


Passivation and release of the lingual flap

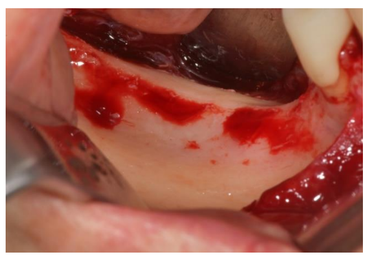


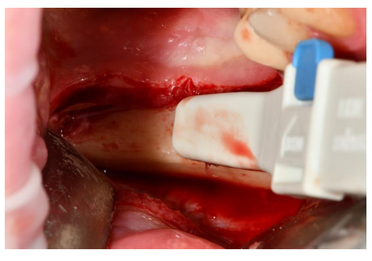




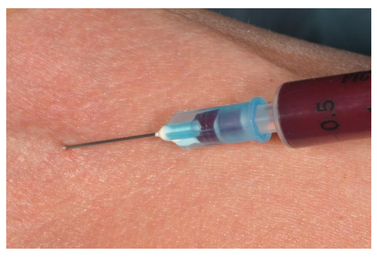


Bone harvesting

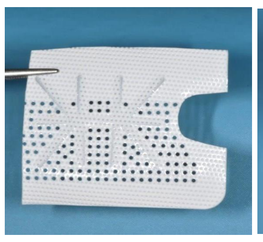


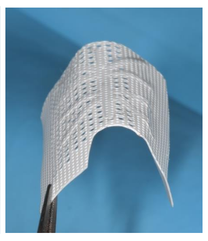


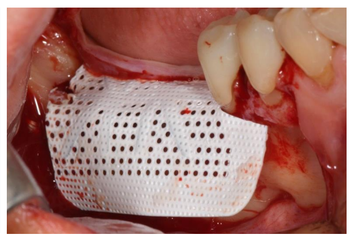
Preparation on 50:50 mixture of xenograft : autogenous bone with peripheral venous blood

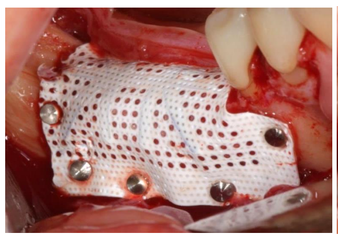


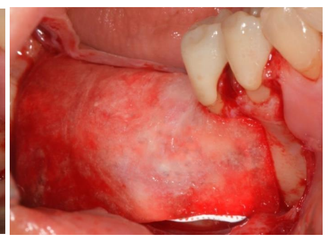
Fixation of Ti-reinforced PTFE mesh and pericardium collagen membrane



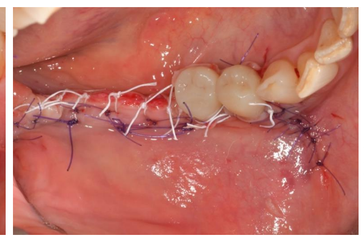


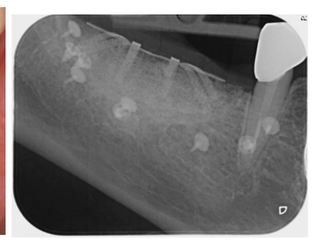




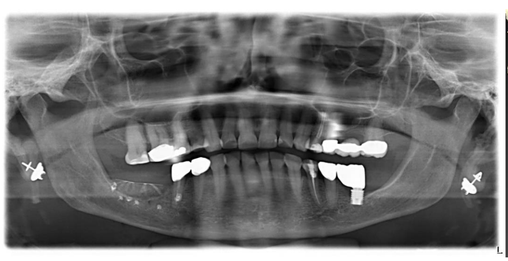


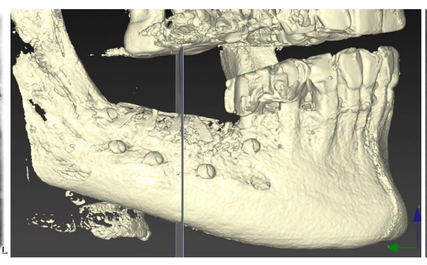
Primary closure

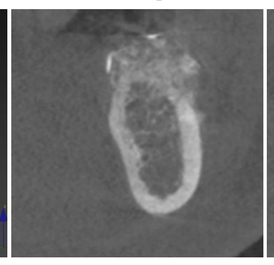


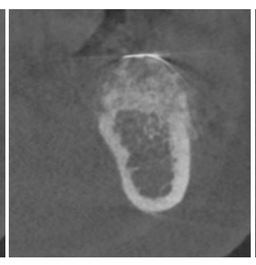


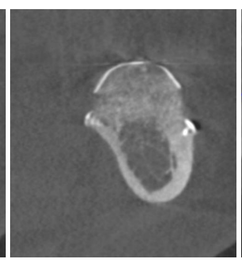
OPG and CBCT after 6 months of healing



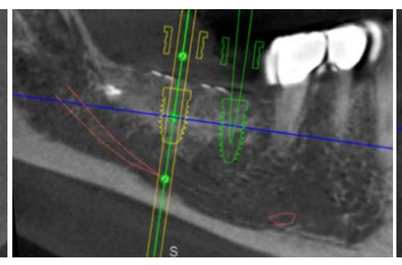


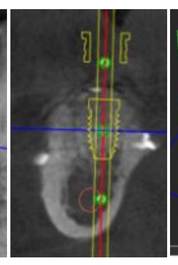


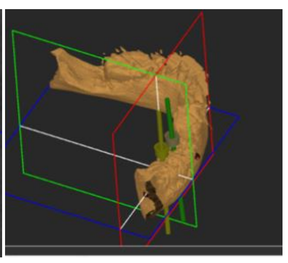




Digital implant planning







Membrane removal and bone evaluation

Implant placement with 3D printed template