Effectiveness of Bone Augmentation with Autogenous Bone Block for Lateral Bone Defects after Implant Placement at Mandibular Molar Area

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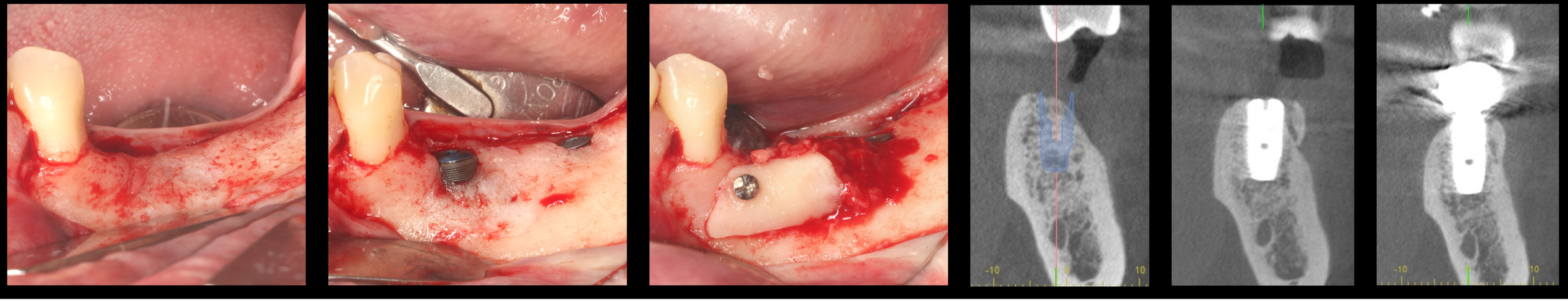
Academy of Osseointegration



Introduction

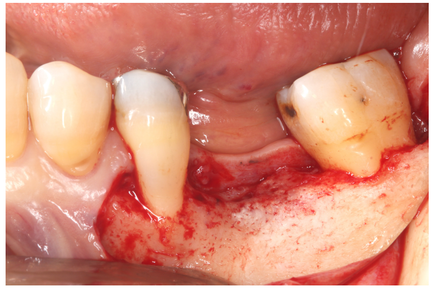
It is crucial to maintain a sufficient amount of alveolar bone around the entire implant for successful long-term dental implant rehabilitation.
In our daily clinical practice, we often encounter lateral bone defects after placing the ideal length and diameter of implants. Such defects require bone augmentation procedures. Over time, various bone augmentation procedures have been reported, among which Guided Bone Regeneration (GBR) has been widely recognized as a highly promising approach. [1)]Nonetheless, in the case of external bone augmentation, there are cases in which grafted bone tips don't maintain their morphology, and a resorptive process is observed in some cases.
We report obtaining a good outcome, which is autogenous bone block grafting for lateral bone defects simultaneously implant placement at the mandibular molar area.

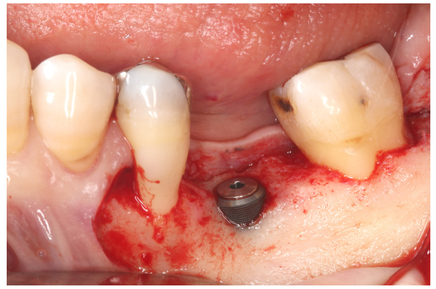
Cases（Material and Method）

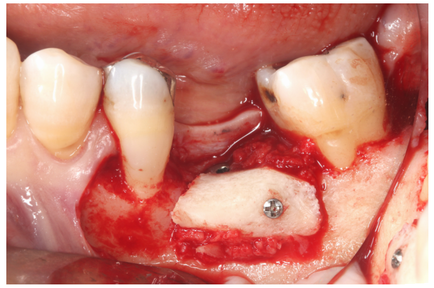
Eight patients were included in the study, consisting of two males and six females with an average age of 48 years old. All patients were healthy and non-smokers. All nine cases involved mandibular molars.

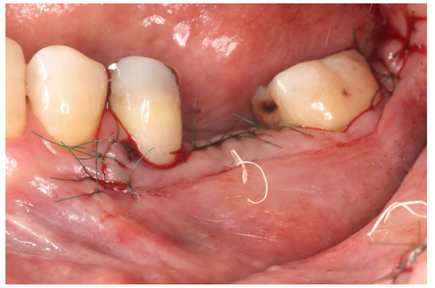
Autogenous bone block was used for lateral bone defects after implant placement

Pre-operative

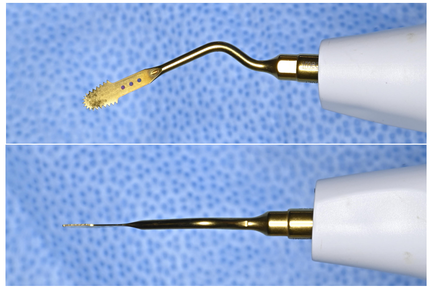

Mucoperiosteal flap reflection

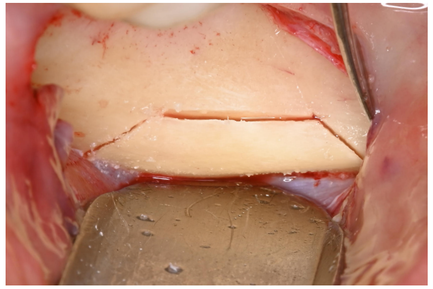

Implant placement

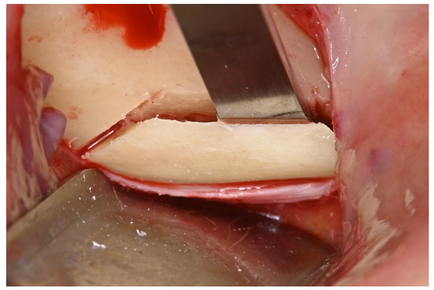

Block bone is fixed and particle bone tips is filled between the residual bone and the block bone

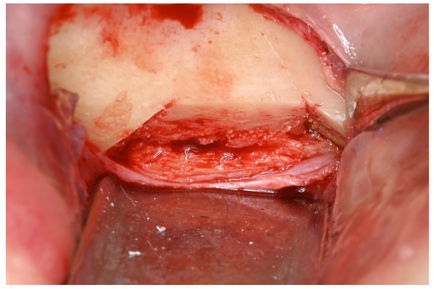

After suturing

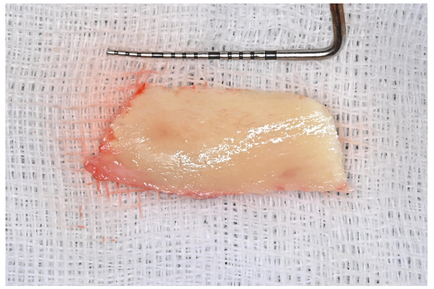
Autogenous bone block was harvested from mandibular rams using Piezo Surgery®


Tip of Piezo Surgery®

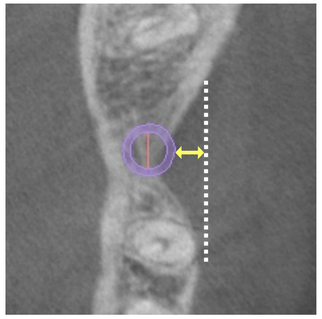

Outline of block bone

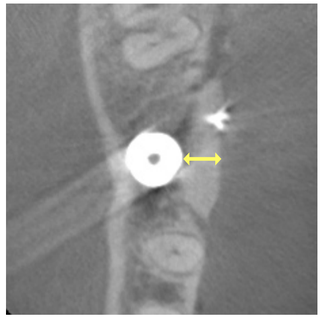

Bock bone is separated using bone chisel

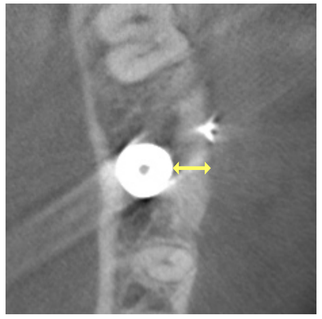

Condition After harvesting block bone


Harvested block bone

Bone width around implant was evaluated by CBCT after the operation


Pre-operative


Post-operative


6 months Postoperatively

①

The distance between the alveolar bone margin connecting adjacent teeth and the implant fixture was the extent of horizontal bone defect.

②

The width of block bone is measured postoperatively, the amount of change in bone width was evaluated at 6 months postoperatively.

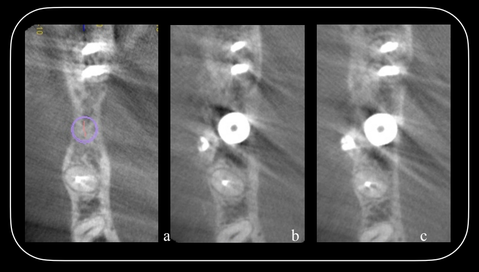
Surgical complications were evaluated

- Hypoesthesia
- Wound rupture
- Exposure of block bone
- Disintegration of block bone

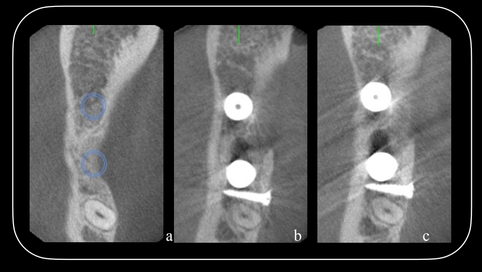
The postoperative checked-up at 1 week.,2 weeks,4 weeks, and then the progress was followed every month.

Result

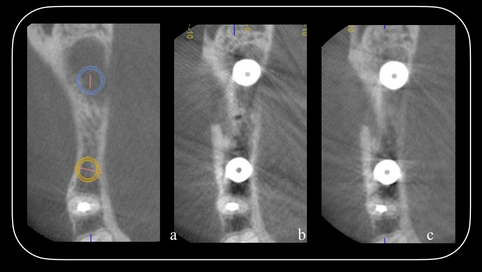
Case1 （#46）



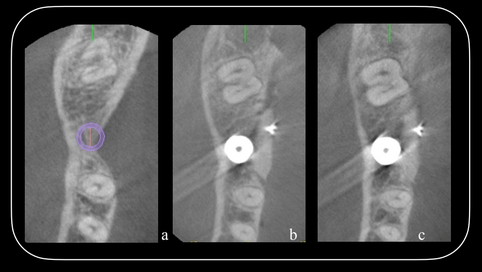
Case2 （#36）



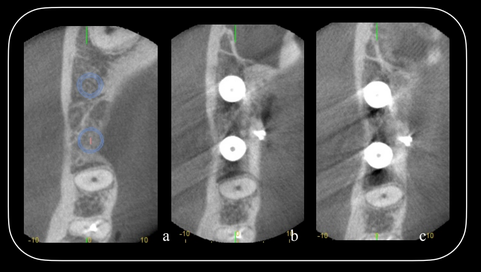
Case3 （#45）



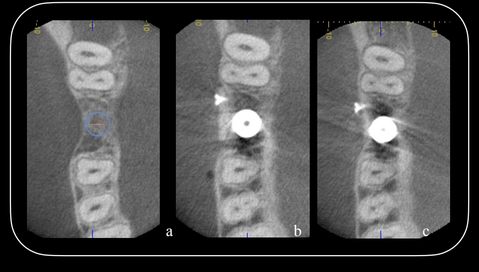
Case4 （#36）



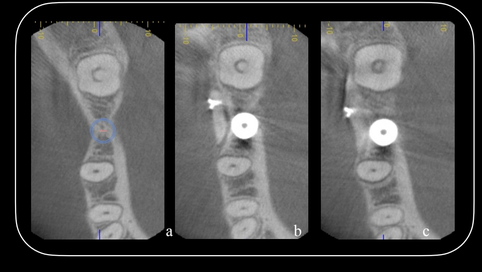
Case5 （#36）



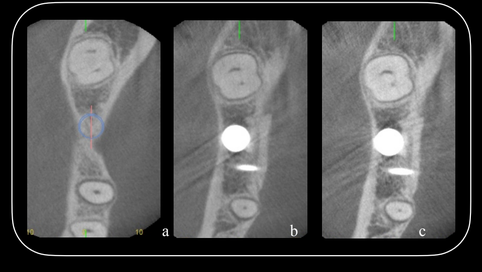
Case6 （#46）



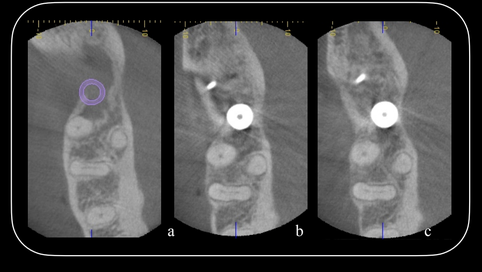
Case7 （#46）



Case8 （#36）



Case9 （#47）



a : Pre-operative
b : Post-operative
c : 6 months Post-operative

	Pre-operative（Horizontal bone defect）	Post-operative（Block bone width）	6m Post-operative（Grafted Bone width）	Amount of bone change
Case1	1,78mm	2,99mm	2,44mm	-0.55mm
Case2	3,33mm	3,46mm	3,33mm	-0.13mm
Case3	1,77mm	1,78mm	1,68mm	-0.10mm
Case4	2,00mm	2,55mm	2,44mm	-0.11mm
Case5	2,45mm	2,55mm	2,44mm	-0.11mm
Case6	2,55mm	2,33mm	1,78mm	-0.45mm
Case7	2,45mm	2,77mm	2,55mm	-0.22mm
Case8	2,33mm	2,66mm	2,66mm	0.00mm
Case9	3,33mm	3,11mm	3,11mm	0.00mm
				Mean：-0.18mm

	Hypoesthesia	Wound rupture	Exposure of block bone	Disintegration of block bone
Case1	-	-	-	-
Case2	-	-	-	-
Case3	-	-	-	-
Case4	-	-	-	-
Case5	-	-	-	-
Case6	-	-	-	-
Case7	-	-	-	-
Case8	-	-	-	-
Case9	-	-	-	-

Discussion

In the case of GBR by particulate bone for external bone defects after implant placement, the bone morphology is maintained by mixing autogenous bone tips. Still, the amount of bone augmentation is reported to be significant to compensate for postoperative resorption.[2)] When block bones are grafted simultaneously with implant placement, only a minimal amount of bone augmentation is sufficient, which minimizes releasing incisions and reduces the risk of postoperative pain and bleeding in the patient. In the case of mandibular molars, another advantage is that an autogenous bone block can be harvested from the same operative site. And then, there was almost no born resorption.

The grafted bone block was maintained in all cases, and bone width around the implant was achieved. We considered these results to be worked osteogenic, osteoconductive, and osteoinductive abilities of the autogenous bone due to the secure fixation of the autogenous bone block and the use of autogenous bone tips for the gap.

Conclusions

We believe that using the autogenous bone block obtained from the external oblique line of the mandibular ramus is the best option for lateral bone defect after implant placement at the mandibular molar area. This is due to the high reproducibility, ability to obtain autogenous bone from the same operative site, and low complication rate.

References

1) Jung RE, Brügger LV, Bienz SP, Hüsler J, Hämmerle CHF, Zitzmann NU. Clin Oral Implants Res. Clinical and radiographical performance of implants placed with simultaneous guided bone regeneration using resorbable and nonresorbable membranes after 22-24 years, a prospective, controlled clinical trial.2021 Dec;32(12):1455-1465.

2) Elnayef B, Porta C, Suárez-López Del Amo F, Mordini L, Gargallo-Albiol J, Hernández-Alfaro F. The Fate of Lateral Ridge Augmentation: A Systematic Review and Meta-Analysis.Int J Oral Maxillofac Implants. 2018 May/Jun;33(3):622-635.