Critical-sized marginal defects around implants in the rabbit mandible.

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BACKGROUND

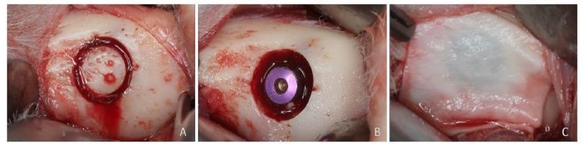
The mandible of the rabbit is considered a reliable model to be used to study bone regeneration in defects.

AIM

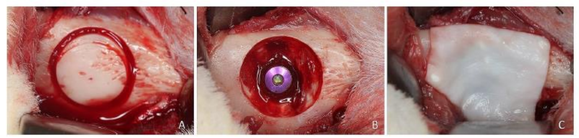
The aim of the present study was to evaluate the formation of new bone around implants installed in defects of either 5 or 10 mm in the mandible of rabbits.

MATERIALS&METHODS

In 12 rabbits, 3 mm deep circumferential defect, either 5 or 10 mm in diameter, were prepared bilaterally and an implant was placed in the center. A collagen membrane was placed to close the entrance. After 10 weeks, biopsies were taken, histological slides were prepared, and different regions of the defects were analyzed.



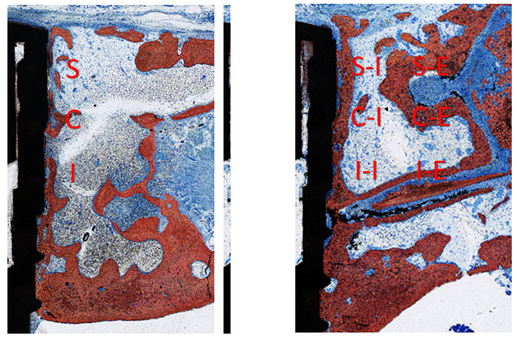
Preparation of a 5 mm defect. A, preparation of the recipient site; B, implant installed in the center of the defect, C, collagen membrane on the top of the sites



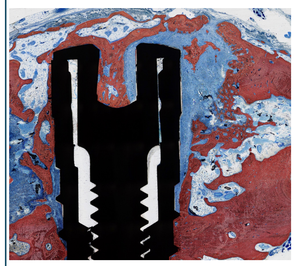
Preparation of a 10 mm defect. A, preparation of the recipient site; B, implant installed in the center of the defect; C, collagen membrane on the top of the sites

RESULTS

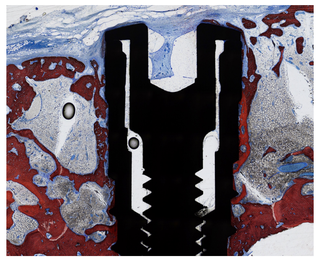
Similar amounts of new bone were found in both defects. However, most of the 5 mm defects were filled with new bone. New bone was observed closing the entrance of the defect and laid onto the implant surface. Only in few cases the healing was incomplete. Despite a similar percentage of new bone found within the 10 mm defects, the healing was incomplete in most of the cases, presenting a low rate of bone formation onto the implant surface within the defect. Only one case presented a closure of the entrance.



Regions evaluated within the (A) 5 mm, and (B) 10 mm defects. S, superior; C, central; I, inferior; S-I, superior-internal; C-I, central-internal; I-I, inferior- internal; S-E, superior-external; C-E, central- external; I-E, inferior- external

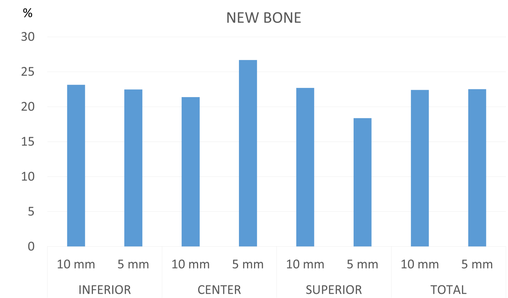


Photomicrograph illustrating a 5 mm defect. Defect presenting an optimal healing. Stevenel's blue and alizarine red stain



Photomicrograph illustrating a 10 mm defect. Defect presenting an optimal healing. Stevenel's blue and alizarine red stain

Graph representing the percentage of new bone formed within 5 and 10 mm wide defects in the various regions evaluated.



Morphometric percentages of the tissues contained in the various regions evaluated.

		New bone	Soft tissues	Vessels	Infiltrate	Osteoclasts
INFERIOR	10 mm	23.1 [17.1, 29.2]	72.7 [67.4, 78.1]	2.6 [1.3, 4.8]	0.5 [-0.1, 1.0]	1.0 [0.1, 1.9]
	5 mm	22.5 [10.9, 34.1]	74.6 [62.4, 86.7]	1.9 [0.6, 3.1]	0.3 [-0.2, 0.8]	0.8 [0.1, 1.6]
CENTER	10 mm	21.4 [15.0, 27.7]	74.1 [67.5,80.6]	2.8 [1.1, 4.4]	0.7 [-0.1, 1.4]	1.1 [0.0, 2.2]
	5 mm	26.7 [18.0, 35.4]	70.5 [61.1, 79.8]	2.2 [0.9, 3.5]	0.3 [-0.2, 0.8]	0.4 [0.1, 0.6]
SUPERIOR	10 mm	22.7 [15.2, 30.2]	72.9 [65.3, 80.5]	2.3 [0.8, 3.8]	0.9 [-0.1, 1.8]	1.3 [0.1, 2.4]
	5 mm	18.4 [11.7, 25.0]	78.4 [72.6, 85.1]	2.6 [0.8, 4.4]	0.2 [-0.2, 0.6]	0.5 [0.1, 0.8]
TOTAL	10 mm	22.4 [17.0, 27.8]	73.2 [67.9, 78.6]	2.6 [1.2, 3.9]	0.7 [0.0, 1.3]	1.1 [0.1, 2.1]
	5 mm	22.5 [14.7, 30.4]	74.5 [66.2, 82.7]	2.2 [0.9, 3.6]	0.2 [0.0, 0.5]	0.5 [0.2, 0.9]

CONCLUSIONS

The healing of the 10 mm defects was mostly incomplete so that a circumferential marginal defect of 10 mm around an implant in the mandible body might be considered a critical-sized defect. The presence of the implant and of residues of teeth might have strongly influenced the healing.

No disclosure of interest in this study.