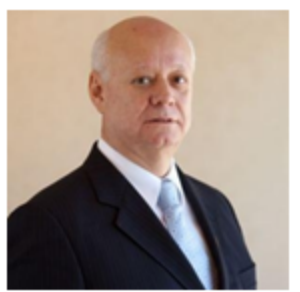


# Antimicrobial photodynamic therapy as substitute for systemic antibiotics in immediate implant placement following ligature-induced periodontitis



PD012

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## ABSTRACT

**Objectives:** The aim of the present study was to evaluate the possible effect of the aPDT in the decontamination of periodontally infected post-extraction sockets previously to immediate implant placement.

**Material and Methods:** In the first surgical phase, the mandibular premolars of 8 beagle dogs were submitted to ligature-induced periodontal disease. After 3 months, the mandibular premolars were extracted and immediate implants were placed in the periodontally infected post-extraction sockets previously decontaminated by mechanical debridement associated with saline solution irrigation (control group) or mechanical debridement and saline solution irrigation associated with aPDT (test group). Following a healing period of 12 weeks, the dogs were euthanized and the specimens were separated and prepared for bucco-lingual analysis of the periimplant tissues through computed microtomography and histomorphometry by light microscopy by microtomographic and histomorphometric analyses.

**Results:** Two- and Three-dimensional analysis demonstrated significantly better results for the immediate implants placed in infected post-extraction socket previously decontaminated by debridement and saline solution irrigation associated to aPDT.

**Conclusion:** The immediate implants placed in periodontally infected postextraction sockets previously treated with antimicrobial photodynamic therapy showed significantly better bone quality and quantity when compared to postextraction sockets treated by debridement associated to saline solution irrigation. It can be concluded that previously contaminated alveoli treated with aPDT effectively lead to better bone formation around immediately placed implants than mechanical treatment alone.

Figure 2. Histologic images of the test sites: A – Implants well integrated into the surrounding bone tissue with the buccal plate (B) positioned coronally to the lingual bone plate (L) (Magnification 2,5x); B – The presence of the two types of bone tissue: parent lamellar bone (PLB) representing the “old bone” and newly formed bone (NB). Note the red line separating the “old” and “new” structures (Magnification 10x); C – In the polarized light, the area occupied by the different bone types is highlighted by the orientation of the collagen fibers (Magnification 10x). The white line separates the parent lamellar bone (PLB) from the newly formed bone (NB). Alizarin red stain.

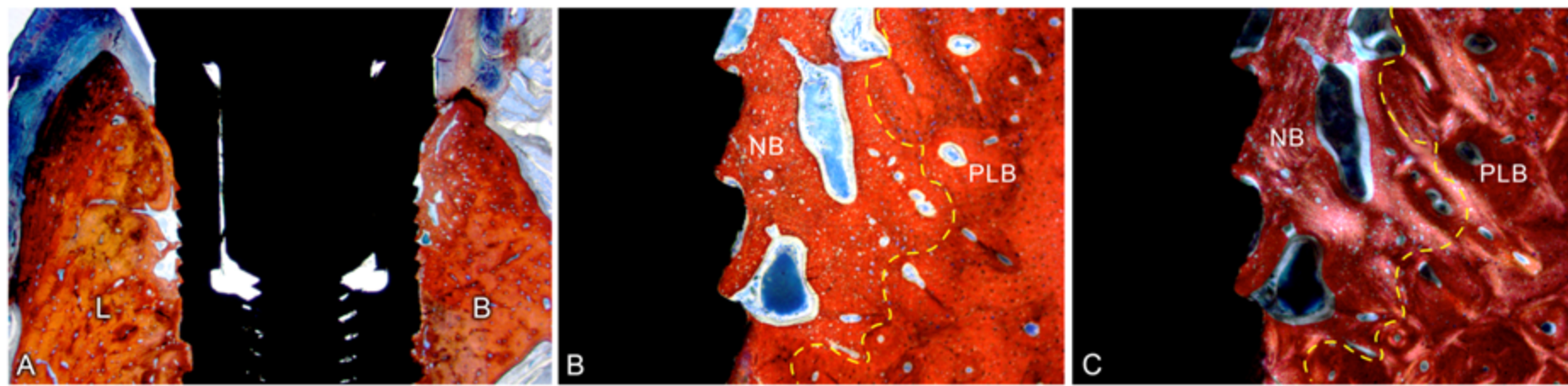


Table 1. Three-dimensional microtomographic analysis between the groups

		TG	CG	p value
Bone Volume - BV (mm <sup>3</sup> )	Mean	7,68*	1,18*	0,02*
	SD	3,99	1,11	
	Median	8,54	0,79	
Percent Bone - BV/TV (%)	Mean	39,39*	6,8*	0,02*
	SD	22,44	6,76	
	Median	41,47	4,48	
Bone Surface Density - BS/TV (1/mm)	Mean	14,77*	2,95*	0,02*
	SD	6,59	2,54	
	Median	16,01	2,19	
Trabecular Thickness - Tb.Th (mm)	Mean	0,21*	0,09*	0,02*
	SD	0,31	0,11	
	Median	0,08	0,05	
Trabecular Separation - Tb.SP (mm)	Mean	0,18*	0,34*	0,02*
	SD	0,83	0,22	
	Median	0,17	0,35	
Trabecular Number - Tb.N (1/mm)	Mean	4,86*	0,84*	0,02*
	SD	2,48	0,8	
	Median	5,32	0,05	

Wilcoxon match pairs test; SD: Standard Deviation; TG: Test Group; CG: Control Group; p<0,05

Table 2. Two-dimensional microtomographic analysis between the groups

		TG	CG	p value
Percent intersection surface i.S/TS (%)	Mean	38,97*	4,53*	0,02*
	SD	20,96	5,88	
	Median	44,85	2,3	
VBBR (mm)	Mean	1,9*	5,71*	0,02*
	SD	1,38	1,33	
	Median	1,19	6,06	

Wilcoxon match pairs test; SD: Standard Deviation; TG: Test Group; CG: Control Group; p<0,05

Figure 1. A – Initial aspect of the mucosa and teeth; B – Mucoperiosteal flap elevation and hemisection of the bicuspids; C – Socket after tooth extraction; D – Alveoli debridement with thoroughly curettage and rinsing with sterile saline solution in the control group; E – Antimicrobial photodynamic therapy applied before immediate implant placement in the test group; F – Immediate implants; G – Transfers in position; H – Sutured wound; I – Prosthetic connections and temporary metallic prostheses in position.

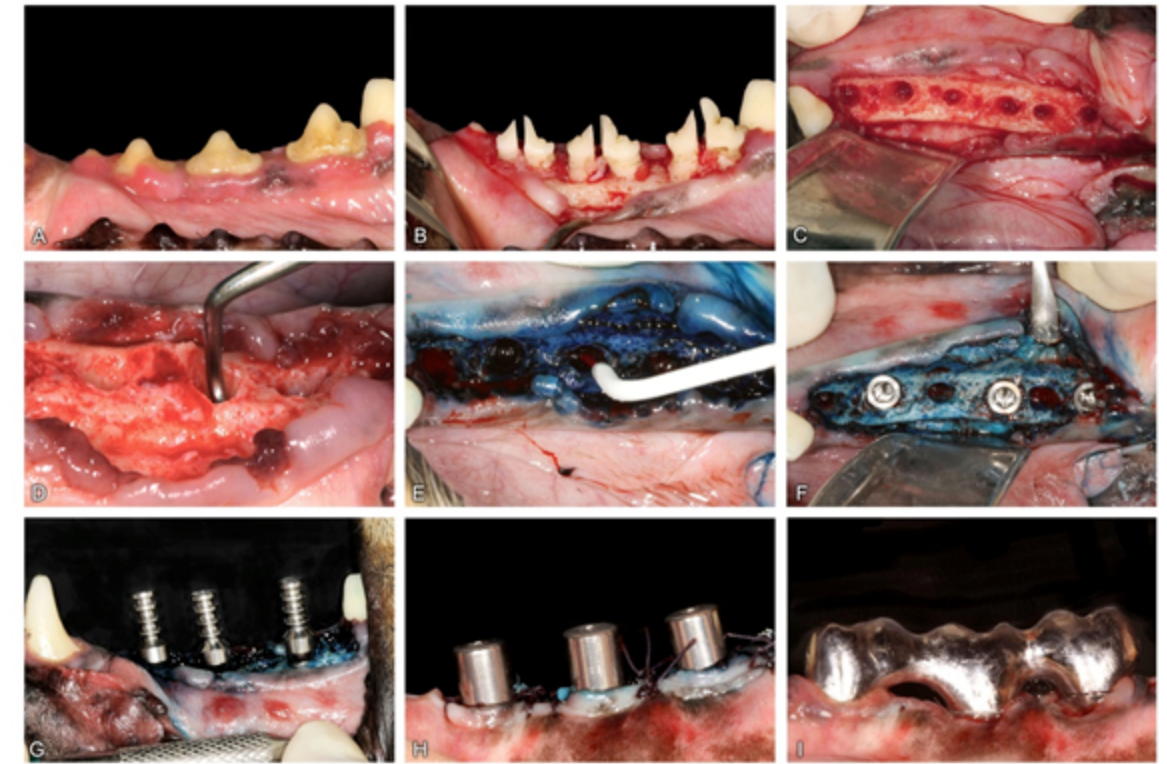


Figure 3. Histologic images of the control sites: A – Compromised integration of the implant (Magnification 2,5x); B – Presence of the two types of bone tissue: parent lamellar bone (PLB) representing the “old bone” and newly formed bone (NB), paved with osteoclasts (arrow) (Magnification 10x). \* Represents the inflammatory infiltrate; C – Circumscribed red area in a higher magnification. PLB representing the old bone, paved with osteoclasts (Magnification 20x); D – Circumscribed yellow area in a higher magnification. Note the presence of an osteoclastic cell within the Howship’s lacunae on the surface of the newly formed bone (Magnification 20x). Alizarin red stain.

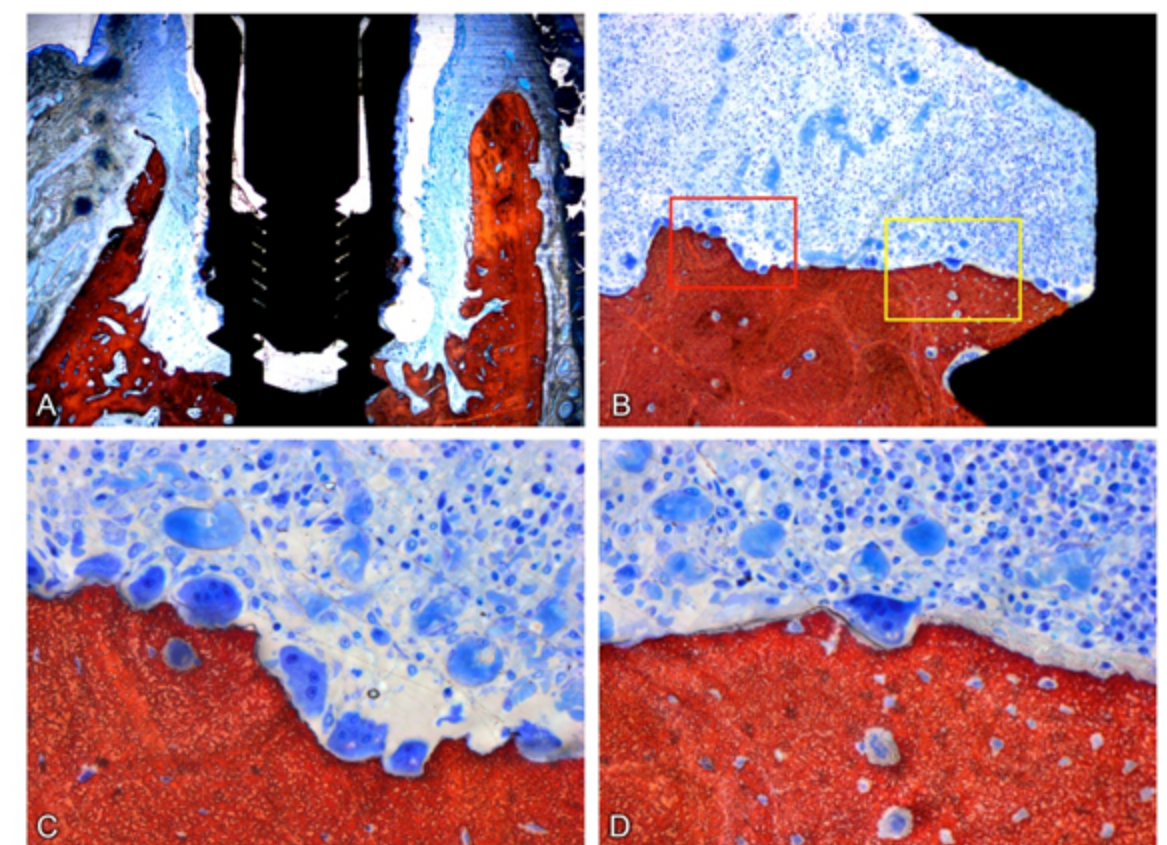


Figure 4. Microcomputed tomographic image of an immediate implant of the test group – TG (A) and of an immediate implant of the control group – CG (B).

		TG	CG	p value
BBR (mm)	Mean	2,03*	5,84*	0,03*
	SD	1,76	1,44	
	Median	1,26	5,96	
BIC (%)	Mean	56,74*	33,91*	0,05*
	SD	18,02	12,6	
	Median	61,94	39,06	
BD (%)	Mean	70,57	58,37	0,12
	SD	8,49	9,55	
	Median	73,05	56,79	

Wilcoxon match pairs test; SD: Standard Deviation; TG: Test Group; CG: Control Group; p<0,05