



Photodynamic Therapy in Reconstructive Peri-implantitis Therapy



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Background & aims: Periopathogenic bacteria trigger the deleterious immunological reaction of the host tissue causing progressive surrounding bone loss, subsequently leading to peri-implantitis onset^{1,2}. Peri-implantitis therapy aims to completely eradicate bacteria from the implant surface by performing appropriate surface decontamination, resulting in implant survival and simultaneous reparation and regeneration of surrounding periimplant tissues. Various implant surface decontamination methods were proposed to eliminate pathogenic bacteria and prevent bacterial resistance development and surface damage. As an alternative method to antibiotics, **photodynamic therapy (PDT)** is proposed as a harmless physicochemical method of implant surface decontamination in peri-implantitis therapy³. Therefore, this randomised controlled clinical study aimed to evaluate 12- and 24-month clinical and immunological outcomes after implant surface decontamination by means of mechanical therapy combined with adjuvant PDT or 1% chlorhexidine gel (CHX) followed by reconstructive peri-implantitis surgical therapy.

Material & Methods

Forty patients (aged 58.8 ± 9.4) with diagnosed peri-implantitis (peri-implant probing depth (PPD) > 5 mm, marginal bone loss (mBL) > 2 mm and positive bleeding on probing (BOP)¹) were enrolled in the study. During the surgical procedure, after granular tissue removal and mechanical implant surface decontamination by titanium curettes and Ti-Brushes, randomly adjuvant implant surface decontamination was performed. Patients were assigned to either a test group in which PDT was conducted for implant surface decontamination or the control group in which 1% CHX was applied directly onto implant surface. Bone defects were reconstructed by means of bovine bone xenograft and collagen matrix. Clinical parameters including PPD, BOP, clinical attachment level (CAL), plaque index score (PI), and interleukins (IL) 1β and IL-6 concentrations were assessed and compared at baseline, 12, and 24 months postoperatively. All data were statistically analysed by SPSS. A p-value > 0.05 was considered significant.

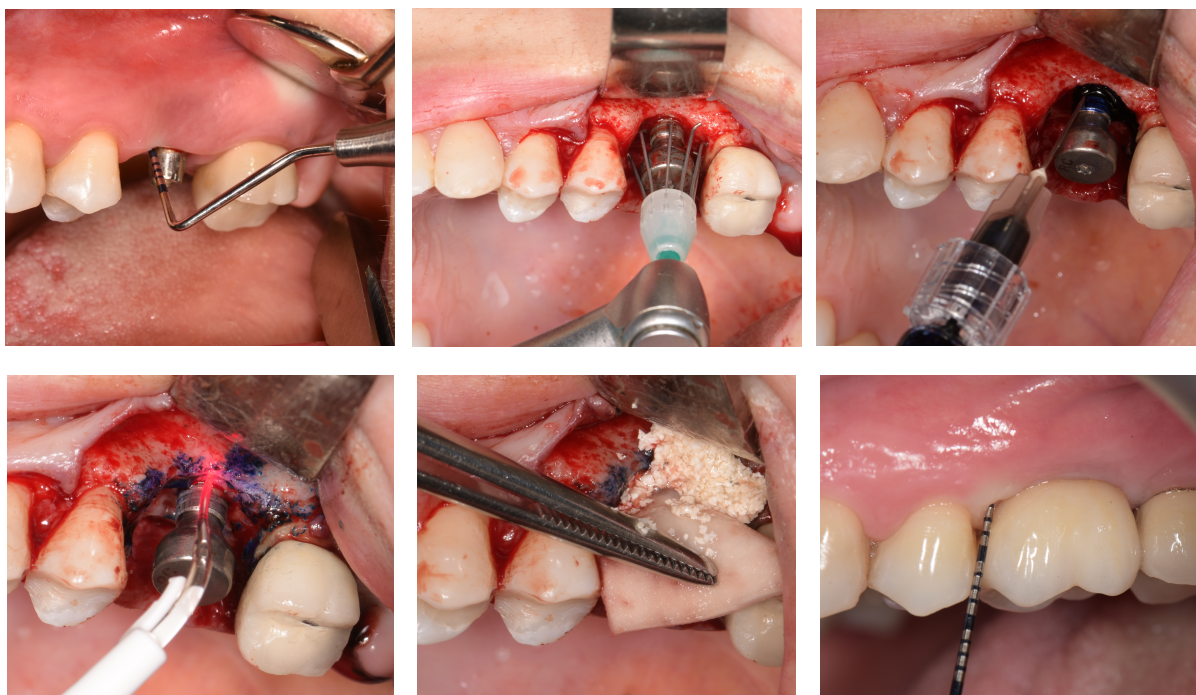
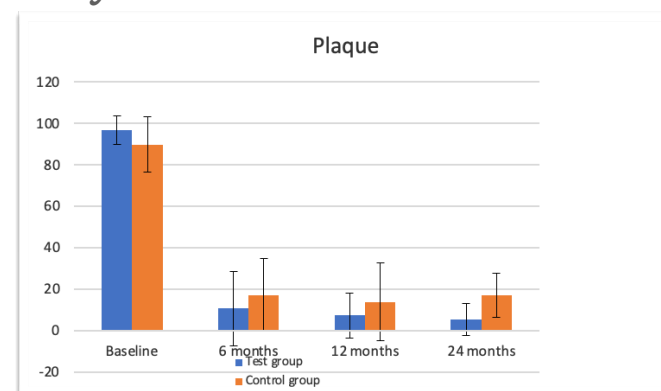


Figure 1. Peri-implantitis reconstructive treatment approach following implant surface decontamination by Ti-brushes and photodynamic therapy with outcome 24-month postoperatively.

Results

In total, 52 implants with diagnosed peri-implantitis (7 ± 3.5 years of implant loading) were completed 24 months postoperatively. All clinical parameters achieved improvement in both groups after follow-ups ($p < 0.05$). PPD, PI score, and BOP obtained statistically significant decreases in the test group compared to the control group at 12 and 24 months following the surgical procedure ($p = 0.039$, $p = 0.014$). Additionally, after implant surface decontamination by means of PDT, the concentrations IL- 1β , and IL-6 were statistically significantly decreased ($p < 0.001$, and $p = 0.006$) compared to 1% CHX at 24 months postoperatively.

		Test group	Control group
P P D , mean \pm SD	Baseline	5.38 ± 0.7	5.41 ± 1.15
	12 months	$2.50 \pm 0.55^*$	3.06 ± 1.16
	24 months	$2.32 \pm 0.42^*$	$3.01 \pm 1.03^*$
C A L , mean \pm SD	Baseline	5.17 ± 1.3	5.27 ± 1.24
	12 months	$2.52 \pm 0.97^*$	2.97 ± 1.12
	24 months	$2.43 \pm 0.91^*$	$2.95 \pm 1.2^*$
B O P , mean \pm SD	Baseline	86 ± 19	83.94 ± 26.3
	12 months	$0.67 \pm 3.33^*$	$6.17 \pm 15.4^*$
	24 months	$4.67 \pm 9.03^*$	$8.02 \pm 12.55^*$



Conclusion

Photodynamic therapy could be suggested as an effective supportive adjuvant treatment method for implant surface decontamination in peri-implantitis reconstructive surgical therapy.

1. Sanz, M., & Chapple, I. L. (2012). *J Clin Periodontol*, 39 Suppl 12, 202-206.
2. Novaes Jr et al. (2020). *Int J Periodontics Restorative Dent*, 6, 917-923.
3. Rakasevic D. & Gabric D. (2021). Current Concepts in Dental Implantology - From Science to Clinical Research. *IntechOpen*.