PRESENTATION:

Clinical Efficacy of Subgingival Debridement With Adjunctive Erbium:Yttrium-Aluminum-Garnet Laser Treatment in Patients With Chronic Periodontitis: A Randomized Clinical Trial

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IF=2.7

2015 Apr,86(4):527-35

J Periodontol • April 2015

Clinical Efficacy of Subgingival Debridement With Adjunctive Erbium: Yttrium-Aluminum-Garnet Laser Treatment in Patients With Chronic Periodontitis: A Randomized Clinical Trial

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Background: The efficacy of erbium:yttrium-aluminum-garnet (Er:YAG) laser application as an adjunct to subgingival debridement in the treatment of chronic periodontitis (CP) is controversial. This study assesses the efficacy of combining full-mouth subgingival debridement with Er:YAG laser application in the treatment of patients with CP.

Methods: In this 12-month, single-masked, parallel-group clinical trial, 40 patients with moderate CP were selected and randomly assigned to a test group (one session of full-mouth ultrasonic subgingival debridement followed 1 week later by Er:YAG application in sites with initial probing depths [PDs] of ≥4.5 mm) and a control group (two sessions of ultrasonic debridement within 1 week). The main outcome variable was change in PD; the secondary outcomes were change in clinical attachment level and proportion of sites with bleeding on probing. Outcomes were assessed at baseline and after 3, 6, and 12 months. Data were analyzed as intention to treat using analysis of variance to assess *inter*-group differences.

Results: Both treatments resulted in significant clinical improvements. The test group achieved, in comparison with the control, a significantly lower percentage of sites with PD ≥4.5 mm (17.44% versus 22.83%, respectively; *P* 0.004) and a tendency for a lower percentage of sites with PD ≥4.5 mm and bleeding on probing (9.78% versus 12.69%; *P* 0.052).

Conclusion: This limited added clinical effect may justify the use of a protocol combining full-mouth ultrasonic debridement with laser therapy in the treatment of initial moderate CP.
J Periodontol 2015;86:527-535.

KEY WORDS
Chronic periodontitis; dental scaling; lasers, solid-state; periodontal index; periodontal pocket; ultrasonics.

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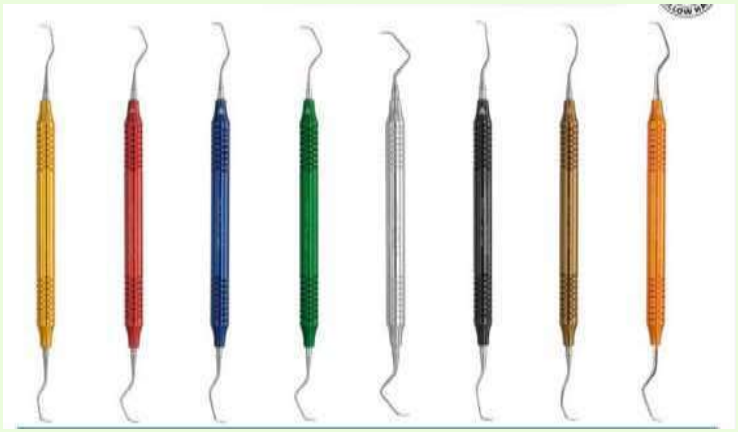
Periodontitis is a chronic inflammatory disease caused by a complex polymicrobial infection that, if untreated, may result in breakdown of the periodontal tissues in susceptible individuals.[1] Ample evidence from intervention studies shows that mechanical root debridement significantly improves periodontal health by halting the progression of periodontal tissue breakdown.[2-4] The standard mode of debridement, scaling and root planing (SRP), is carried out with curets, scalers, or ultrasonic instruments, which mechanically remove the subgingival biofilm and dislodge calculus from the affected roots. This therapy needs to be supplemented with the active patient's participation through strict oral hygiene measures. The efficacy of this therapy has been evaluated in various systematic reviews reporting significant reduction in probing depths (PDs) and gingival inflammation (bleeding on probing [BOP]), irrespective of the mode of instrumentation (manual or powered).[5-7]

Although SRP is usually rendered at different time intervals in different areas of the mouth (quadrants) with the aim of combining mechanical root debridement

doi: 10.1902/jop.2014.140239

Background

Traditional mode of periodontal treatment



Background

- specific characteristics depending on its wavelength and power of emission
- results in good absorption by both soft and hard tissues
- remove calculus even more efficiently than ultrasonic devices and does not damage the root surface

Background

Why do this trial?

the adjunctive use of Er:YAG lasers has never been studied when the laser application is staged after SRP and applied only to initially deep periodontal sites

Study Design

They tests the efficacy of a treatment protocol combining full-mouth ultrasonic subgingival debridement with the application 1 week later of Er:YAG laser only in initially deep periodontal sites, compared with conventional ultrasonic debridement the laser application.

Patients

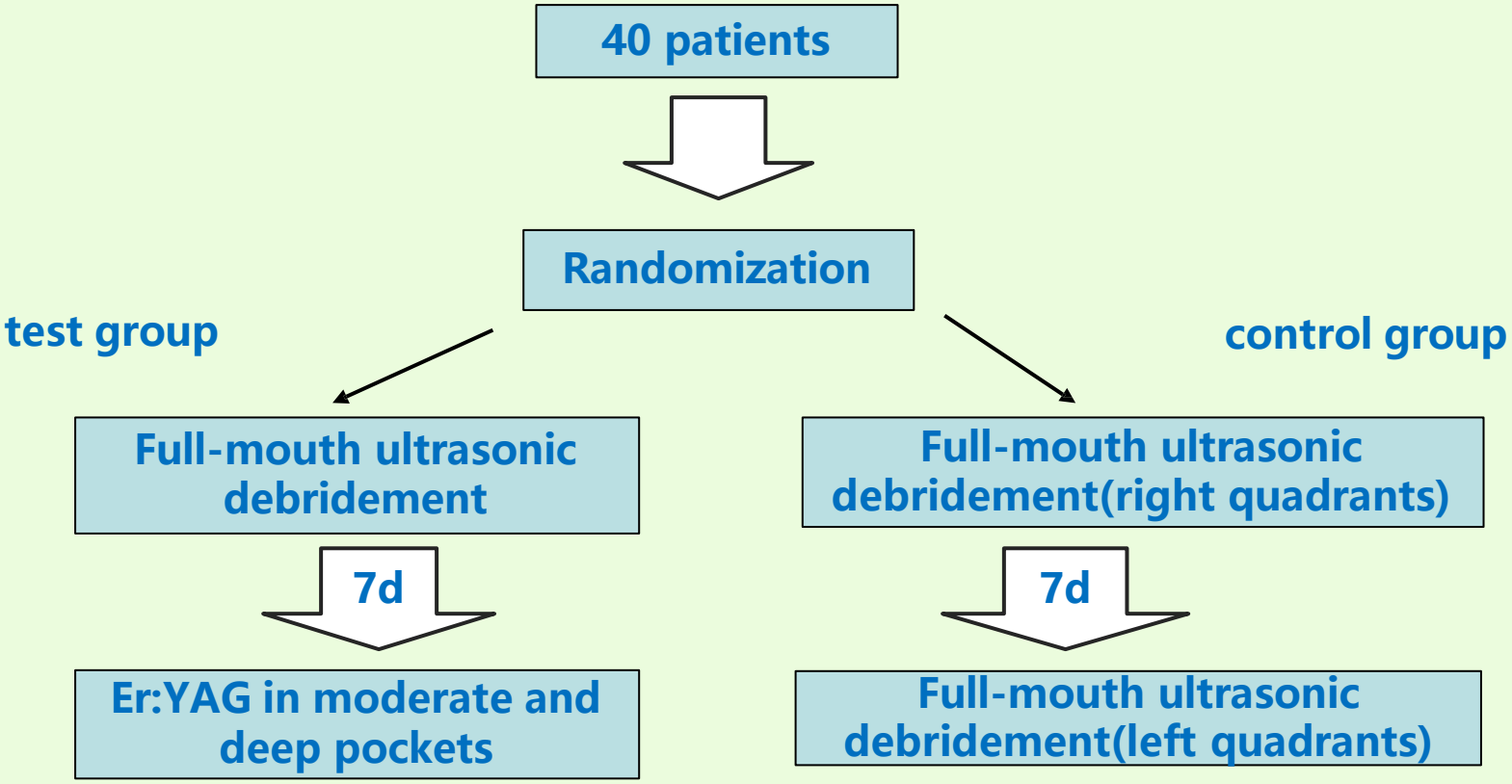
inclusion criteria:

- diagnosis of early-to-moderate CP based on the presence of: ≥4 teeth per quadrant with PD ≥ 4.5 mm ; 30% to 50% radiographic bone loss in >30% of teeth
- no systemic diseases requiring antibiotic prophylaxis or other systemic medication
- no periodontal treatment within the last 12 months or systemic antibiotic intake in the last 3 months.

e variables

- PD , shallow (1 to 4 mm), moderate (5 to 6 mm), and deep (≥ 7 mm)
- Gingival Recession
- CAL(clinical attachment level)
- BOP(bleeding on probing)
- Plaque

Treatment


40 patients
Randomization
test group
control group
Full-mouth ultrasonic debridement
7d
Er:YAG in moderate and deep pockets
Full-mouth ultrasonic debridement(right quadrants)
7d
Full-mouth ultrasonic debridement(left quadrants)

Data analyses

- shallow (PD <4.5 mm) and moderate-to-deep (PD ≥4.5 mm)
- open pockets were defined as sites with PD≥4.5 mm and BOP

Data analyses

- Kolmogorov-Smirnov test: checking normality
- ANOVA: compare between groups
- Mann–Whitney U test: differences in the mean proportions of moderate-to-deep and open pockets
- Significant level α=0.05； using two tails

Results

Table 1.

Demographic Characteristics of the Patient Sample at Baseline

Characteristic	Test Group	Control Group	Total
Patients at baseline (n)	19	21	40
Age in years [mean (minimum, maximum)]	48.5 (37, 71)*	56.8 (39, 71)*	52.8
Sex, males/females (n)	7/12	5/16	12/28
Smokers (n)	10	7	17
Teeth (n)	26.05	24.8	25.4

* Statistically significant difference between groups at baseline, $P < 0.027$.

Results

Table 2.

Mean Values and Changes [Δ, mean (SD)] for All Sites at Different Time Points for the Clinical Variables

	Baseline			3 Months				6 Months				12 Months			
	n	Mean	SD	n	Mean	SD	Δ	n	Mean	SD	Δ	n	Mean	SD	Δ
PD (mm)															
Test	19	3.07	0.31	19	2.62*	0.31	−0.5 (0.35)	19	2.57*	0.31	−0.54 (0.35)	17	2.48*	0.37	−0.52 (0.37)
Control	21	3.11	0.32	21	2.65*	0.32	−0.41 (0.32)	21	2.61*	0.32	−0.45 (0.37)	20	2.71	0.36	−0.36 (0.36)
CAL (mm)															
Test	19	3.8	0.74	19	3.41*	0.62	−0.43 (0.35)	19	3.46*	0.65	−0.36 (0.35)	17	3.44*	0.63	−0.28 (0.44)
Control	21	3.77	0.46	21	3.43*	0.58	−0.32 (0.32)	21	3.46*	0.53	−0.29 (0.37)	20	3.57*	0.58	−0.15 (0.41)
BOP (%)															
Test	19	64.41	13.8	19	38.74*	10.1	−24 (13)	19	32.8*	9.7	−30 (11)	17	28.57*	8.6	−31 (12)
Control	21	65.44	14.2	21	42.48*	10.9	−24 (12)	21	36.58*	9.6	−30 (11)	20	30.61*	9.1	−35 (11)
PI (%)															
Test	19	61.66	14.1	19	33.84*	9.8	−29 (10)	19	31.11*	8.5	−30 (9)	17	27.12*	7.8	−30 (9)
Control	21	60.53	14.2	21	37.38*	9.5	−22 (9)	21	29.2*	8.3	−32 (8)	20	24.62*	7.5	−38 (8)

* Statistically significant intragroup difference from baseline (ANOVA for PD and CAL; Mann–Whitney *U* Test for BOP and PI).