

SUPPLEMENTARY DATA

Effect of Er:YAG Laser-Activated Irrigation with Side-Firing Spiral Endo Tip on Dentin Mineral Composition of Tooth Root Canals

Sharonit Sahar-Helft, Adi Farber, Nathanyel Sebbane, Coral Helft, Roni Dakar, Vitaly Gutkin, Ronit Vogt Sionov, Doron Steinberg

Following the initial ANOVA test that revealed significant differences for each mineral across all tested groups and canal areas (coronal, middle, and apical), post hoc analyses were conducted to identify specific group-wise and region-wise differences, providing a comprehensive statistical assessment of mineral distribution throughout the root canal space.

Supplementary Table S1. Percentage of average mineral content in the teeth after each treatment. Average of data from 10 teeth in each group.

Group	Mineral	Mean	SD
A	Ca	23.039	5.597
	O	35.373	3.586
	P	17.057	2.967
B	Ca	8.978	6.423
	O	35.225	3.324
	P	10.013	4.087
C	Ca	11.516	7.445
	O	31.903	4.246
	P	12.249	3.976
D	Ca	26.480	5.397
	O	38.529	5.686
	P	19.834	3.268
E	Ca	21.037	6.570
	O	38.251	4.219
	P	16.378	3.966
F	Ca	26.038	3.927
	O	37.445	3.080
	P	21.678	1.282

(A) Control; (B) Er:YAG laser with 17% EDTA continuous irrigation for 60 sec; (C) Er:YAG laser with 15 sec × 4 intermittent 17% EDTA irrigation; (D) Er:YAG laser with 17% EDTA continuous irrigation for 60 sec followed by 2.5% NaOCl; (E) Er:YAG laser with 15×4 intermittent 17% EDTA irrigation followed by 2.5% NaOCl; and (F) Er:YAG laser with 60 sec continuous 2.5% NaOCl irrigation.

Supplementary Table S2: Post hoc comparisons of oxygen (O) content between tooth areas of each treatment.

Post Hoc Comparisons - Treatment group × Tooth area for Oxygen (O)					
Treatment Groups		Mean Difference	SE	t	<i>p</i> _{tukey} Significance
Apical A	Coronal A	-0.361	1.875	-0.193	1
	Middle A	-0.877	1.875	-0.468	1
	Apical F	-3.693	2.48	-1.489	0.990
	Coronal F	-3.435	2.48	-1.385	0.996
	Middle F	-0.328	2.48	-0.132	1
	Apical C	2.399	1.875	1.28	0.998
	Coronal C	4.635	1.875	2.473	0.555
	Middle Control	2.137	1.875	1.14	1
	Apical E	-5.576	1.875	-2.975	0.227
	Coronal E	-0.883	1.875	-0.471	1
	Middle E	-3.415	1.875	-1.822	0.934
	Apical B	-1.643	1.875	-0.876	1
	Coronal B	-0.199	1.875	-0.106	1
	Middle B	1.046	1.875	0.558	1
	Apical D	-4.657	1.875	-2.484	0.546
	Coronal D	-3.744	1.875	-1.997	0.866
	Middle D	-2.305	1.875	-1.23	0.999
Coronal A	Middle A	-0.516	1.875	-0.275	1
	Apical F	-3.332	2.48	-1.343	0.997
	Coronal F	-3.074	2.48	-1.24	0.999
	Middle F	0.033	2.48	0.014	1
	Apical C	2.76	1.875	1.472	0.991
	Coronal C	4.996	1.875	2.665	0.414
	Middle C	2.498	1.875	1.333	0.997
	Apical E	-5.215	1.875	-2.782	0.336
	Coronal E	-0.522	1.875	-0.278	1
	Middle E	-3.054	1.875	-1.629	0.976
	Apical B	-1.282	1.875	-0.684	1
	Coronal B	0.162	1.875	0.086	1
	Middle B	1.407	1.875	0.751	1

	Apical D	-4.296	1.875	-2.292	0.688
	Coronal D	-3.383	1.875	-1.805	0.939
	Middle D	-1.944	1.875	-1.037	1
Middle A	Apical F	-2.816	2.48	-1.135	1
	Coronal F	-2.558	2.48	-1.032	1
	Middle F	0.549	2.48	0.222	1
	Apical C	3.276	1.875	1.748	0.953
	Coronal C	5.512	1.875	2.94	0.244
	Middle C	3.014	1.875	1.608	0.979
	Apical E	-4.699	1.875	-2.507	0.529
	Coronal E	-0.006	1.875	-0.003	1
	Middle E	-2.538	1.875	-1.354	0.997
	Apical B	-0.766	1.875	-0.409	1
	Coronal B	0.678	1.875	0.362	1
	Middle B	1.923	1.875	1.026	1
	Apical D	-3.78	1.875	-2.016	0.856
	Coronal D	-2.867	1.875	-1.529	0.987
	Middle D	-1.428	1.875	-0.762	1
Apical F	Coronal F	0.257	2.964	0.087	1
	Middle F	3.365	2.964	1.135	1
	Apical C	6.092	2.48	2.456	0.567
	Coronal C	8.328	2.48	3.358	0.088
	Middle C	5.83	2.48	2.351	0.645
	Apical E	-1.883	2.48	-0.76	1
	Coronal E	2.81	2.48	1.133	1
	Middle E	0.278	2.48	0.112	1
	Apical B	2.05	2.48	0.826	1
	Coronal B	3.494	2.48	1.409	0.995
	Middle B	4.739	2.48	1.911	0.903
	Apical D	-0.964	2.48	-0.389	1
	Coronal D	-0.051	2.48	-0.021	1
	Middle D	1.388	2.48	0.56	1
Coronal F	Middle F	3.108	2.964	1.048	1
	Apical C	5.834	2.48	2.353	0.644

	Coronal C	8.07	2.48	3.254	0.116	
	Middle C	5.572	2.48	2.247	0.719	
	Apical E	-2.141	2.48	-0.863	1	
	Coronal E	2.552	2.48	1.029	1	
	Middle E	0.02	2.48	0.008	1	
	Apical B	1.792	2.48	0.723	1	
	Coronal B	3.236	2.48	1.305	0.998	
	Middle B	4.481	2.48	1.807	0.938	
	Apical D	-1.222	2.48	-0.493	1	
	Coronal D	-0.309	2.48	-0.125	1	
	Middle D	1.13	2.48	0.456	1	
Middle F	Apical C	2.727	2.48	1.099	1	
	Coronal C	4.963	2.48	2.001	0.864	
	Middle C	2.465	2.48	0.994	1	
	Apical E	-5.248	2.48	-2.116	0.802	
	Coronal E	-0.555	2.48	-0.224	1	
	Middle E	-3.087	2.48	-1.245	0.999	
	Apical B	-1.315	2.48	-0.53	1	
	Coronal B	0.129	2.48	0.052	1	
	Middle B	1.374	2.48	0.554	1	
	Apical D	-4.329	2.48	-1.746	0.954	
	Coronal D	-3.416	2.48	-1.378	0.996	
	Middle D	-1.977	2.48	-0.797	1	
Apical C	Coronal C	2.236	1.875	1.193	0.999	
	Middle C	-0.262	1.875	-0.14	1	
	Apical E	-7.975	1.875	-4.254	0.005	
	Coronal E	-3.282	1.875	-1.751	0.953	
	Middle E	-5.814	1.875	-3.101	0.17	
	Apical B	-4.042	1.875	-2.156	0.778	
	Coronal B	-2.598	1.875	-1.386	0.996	
	Middle B	-1.353	1.875	-0.722	1	
	Apical D	-7.056	1.875	-3.764	0.026	*
	Coronal D	-6.143	1.875	-3.277	0.109	
	Middle D	-4.704	1.875	-2.509	0.527	

Coronal C	Middle C	-2.498	1.875	-1.333	0.997	
	Apical E	-10.211	1.875	-5.447	< 0.001	***
	Coronal E	-5.518	1.875	-2.944	0.243	
	Middle E	-8.05	1.875	-4.294	0.004	**
	Apical B	-6.278	1.875	-3.349	0.09	
	Coronal B	-4.834	1.875	-2.579	0.476	
	Middle B	-3.589	1.875	-1.915	0.902	
	Apical D	-9.292	1.875	-4.957	< 0.001	***
	Coronal D	-8.379	1.875	-4.47	0.002	**
	Middle D	-6.94	1.875	-3.702	0.032	*
Middle C	Apical E	-7.713	1.875	-4.115	0.008	**
	Coronal E	-3.02	1.875	-1.611	0.978	
	Middle E	-5.552	1.875	-2.962	0.233	
	Apical B	-3.78	1.875	-2.016	0.856	
	Coronal B	-2.336	1.875	-1.246	0.999	
	Middle B	-1.091	1.875	-0.582	1	
	Apical D	-6.794	1.875	-3.624	0.04	*
	Coronal D	-5.881	1.875	-3.137	0.156	
	Middle D	-4.442	1.875	-2.37	0.631	
Apical E	Coronal E	4.693	1.875	2.503	0.532	
	Middle E	2.161	1.875	1.153	1	
	Apical B	3.933	1.875	2.098	0.813	
	Coronal B	5.377	1.875	2.868	0.284	
	Middle B	6.622	1.875	3.533	0.053	
	Apical D	0.919	1.875	0.49	1	
	Coronal D	1.832	1.875	0.977	1	
	Middle D	3.271	1.875	1.745	0.954	
Coronal E	Middle E	-2.532	1.875	-1.351	0.997	
	Apical B	-0.76	1.875	-0.405	1	
	Coronal B	0.684	1.875	0.365	1	
	Middle B	1.929	1.875	1.029	1	
	Apical D	-3.774	1.875	-2.013	0.858	
	Coronal D	-2.861	1.875	-1.526	0.987	
	Middle D	-1.422	1.875	-0.759	1	

Middle E	Apical B	1.772	1.875	0.945	1
	Coronal B	3.216	1.875	1.716	0.961
	Middle B	4.461	1.875	2.38	0.624
	Apical D	-1.242	1.875	-0.663	1
	Coronal D	-0.329	1.875	-0.176	1
	Middle D	1.11	1.875	0.592	1
Apical B	Coronal B	1.444	1.875	0.77	1
	Middle B	2.689	1.875	1.434	0.993
	Apical D	-3.014	1.875	-1.608	0.979
	Coronal D	-2.101	1.875	-1.121	1
	Middle D	-0.662	1.875	-0.353	1
Coronal B	Middle B	1.245	1.875	0.664	1
	Apical D	-4.458	1.875	-2.378	0.625
	Coronal D	-3.545	1.875	-1.891	0.910
	Middle D	-2.106	1.875	-1.123	1
Middle B	Apical D	-5.703	1.875	-3.042	0.195
	Coronal D	-4.79	1.875	-2.555	0.493
	Middle D	-3.351	1.875	-1.788	0.943
Apical D	Coronal D	0.913	1.875	0.487	1
	Middle D	2.352	1.875	1.255	0.999
Coronal D	Middle D	1.439	1.875	0.768	1

(A) Control; (B) Er:YAG laser with 17% EDTA continuous irrigation for 60 sec; (C) Er:YAG laser with 15 sec \times 4 intermittent 17% EDTA irrigation; (D) Er:YAG laser with 17% EDTA continuous irrigation for 60 sec followed by 2.5% NaOCl; (E) Er:YAG laser with 15 \times 4 intermittent 17% EDTA irrigation followed by 2.5% NaOCl; and (F) Er:YAG laser with 60 sec continuous 2.5% NaOCl irrigation. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Supplementary Table S3. Post hoc comparisons and p_{tukey} for phosphate (P) content between treatment groups and tooth areas.

Post Hoc Comparisons – Treatment Group × Tooth Area for Phosphate (P)						
Groups		Mean Difference	SE	t	p _{tukey}	Significance
Apical A	Coronal A	0.08	0.119	0.675	1	
	Middle A	0.317	0.09	3.518	0.056	
	Apical F	0.016	0.09	0.178	1	
	Coronal F	0.33	0.09	3.662	0.036	*
	Middle F	-0.003	0.09	-0.033	1	
	Apical C	-0.151	0.09	-1.676	0.968	
	Coronal C	-0.022	0.119	-0.185	1	
	Middle Control	0.274	0.09	3.04	0.196	
	Apical E	0.249	0.09	2.763	0.348	
	Coronal E	0.446	0.09	4.949	< 0.001	***
	Middle E	-0.02	0.09	-0.222	1	
	Apical B	0.072	0.09	0.799	1	
	Coronal B	-0.21	0.119	-1.757	0.951	
	Middle B	0.295	0.09	3.274	0.11	
	Apical D	0.029	0.09	0.322	1	
	Coronal D	0.422	0.09	4.683	< 0.001	***
	Middle D	-0.166	0.09	-1.842	0.927	
Coronal A	Middle A	0.237	0.119	1.984	0.872	
	Apical F	-0.064	0.119	-0.541	1	
	Coronal F	0.25	0.119	2.093	0.816	
	Middle F	-0.083	0.119	-0.7	1	
	Apical C	-0.231	0.119	-1.942	0.89	
	Coronal C	-0.102	0.142	-0.719	1	
	Middle C	0.194	0.119	1.623	0.976	
	Apical E	0.169	0.119	1.413	0.994	
	Coronal E	0.365	0.119	3.066	0.184	
	Middle E	-0.1	0.119	-0.843	1	
	Apical B	-0.008	0.119	-0.071	1	

	Coronal B	-0.29	0.142	-2.035	0.847	
	Middle B	0.215	0.119	1.799	0.94	
	Apical D	-0.051	0.119	-0.432	1	
	Coronal D	0.341	0.119	2.865	0.286	
	Middle D	-0.246	0.119	-2.068	0.83	
Middle A	Apical F	-0.301	0.09	-3.34	0.092	
	Coronal F	0.013	0.09	0.144	1	
	Middle F	-0.32	0.09	-3.551	0.05	*
	Apical C	-0.468	0.09	-5.193	< 0.001	***
	Coronal C	-0.339	0.119	-2.844	0.298	
	Middle C	-0.043	0.09	-0.477	1	
	Apical E	-0.068	0.09	-0.755	1	
	Coronal E	0.129	0.09	1.431	0.994	
	Middle E	-0.337	0.09	-3.74	0.028	*
	Apical B	-0.245	0.09	-2.719	0.378	
	Coronal B	-0.527	0.119	-4.416	0.003	**
	Middle B	-0.022	0.09	-0.244	1	
	Apical D	-0.288	0.09	-3.196	0.134	
	Coronal D	0.105	0.09	1.165	0.999	
	Middle D	-0.483	0.09	-5.36	< 0.001	***
Apical F	Coronal F	0.314	0.09	3.484	0.061	
	Middle F	-0.019	0.09	-0.211	1	
	Apical C	-0.167	0.09	-1.853	0.924	
	Coronal C	-0.038	0.119	-0.319	1	
	Middle C	0.258	0.09	2.863	0.287	
	Apical E	0.233	0.09	2.586	0.471	
	Coronal E	0.43	0.09	4.772	< 0.001	***
	Middle E	-0.036	0.09	-0.399	1	
	Apical B	0.056	0.09	0.621	1	
	Coronal B	-0.226	0.119	-1.892	0.91	
	Middle B	0.279	0.09	3.096	0.172	
	Apical D	0.013	0.09	0.144	1	
	Coronal D	0.406	0.09	4.505	0.002	**
	Middle D	-0.182	0.09	-2.02	0.855	

Coronal F	Middle F	-0.333	0.09	-3.695	0.032	*
	Apical C	-0.481	0.09	-5.337	< 0.001	***
	Coronal C	-0.352	0.119	-2.953	0.238	
	Middle C	-0.056	0.09	-0.621	1	
	Apical E	-0.081	0.09	-0.899	1	
	Coronal E	0.116	0.09	1.287	0.998	
	Middle E	-0.35	0.09	-3.884	0.017	*
	Apical B	-0.258	0.09	-2.863	0.287	
	Coronal B	-0.539	0.119	-4.525	0.002	**
	Middle B	-0.035	0.09	-0.388	1	
	Apical D	-0.301	0.09	-3.34	0.092	
	Coronal D	0.092	0.09	1.021	1	
	Middle D	-0.496	0.09	-5.504	< 0.001	***
Middle F	Apical C	-0.148	0.09	-1.642	0.974	
	Coronal C	-0.019	0.119	-0.159	1	
	Middle C	0.277	0.09	3.074	0.181	
	Apical E	0.252	0.09	2.796	0.327	
	Coronal E	0.449	0.09	4.982	< 0.001	***
	Middle E	-0.017	0.09	-0.189	1	
	Apical B	0.075	0.09	0.832	1	
	Coronal B	-0.206	0.119	-1.732	0.957	
	Middle B	0.298	0.09	3.307	0.101	
	Apical D	0.032	0.09	0.355	1	
	Coronal D	0.425	0.09	4.716	< 0.001	***
	Middle D	-0.163	0.09	-1.809	0.938	
Apical C	Coronal C	0.129	0.119	1.082	1	
	Middle C	0.425	0.09	4.716	< 0.001	***
	Apical E	0.4	0.09	4.439	0.002	**
	Coronal E	0.597	0.09	6.625	< 0.001	***
	Middle E	0.131	0.09	1.454	0.992	
	Apical B	0.223	0.09	2.475	0.553	
	Coronal B	-0.059	0.119	-0.491	1	
	Middle B	0.446	0.09	4.949	< 0.001	***
	Apical D	0.18	0.09	1.997	0.866	
	Coronal D	0.573	0.09	6.358	< 0.001	***

	Middle D	-0.015	0.09	-0.166	1	
Coronal C	Middle C	0.296	0.119	2.483	0.547	
	Apical E	0.271	0.119	2.273	0.701	
	Coronal E	0.468	0.119	3.926	0.015	*
	Middle E	0.002	0.119	0.017	1	
	Apical B	0.094	0.119	0.788	1	
	Coronal B	-0.188	0.142	-1.316	0.998	
	Middle B	0.317	0.119	2.659	0.419	
	Apical D	0.051	0.119	0.428	1	
	Coronal D	0.444	0.119	3.724	0.029	*
	Middle D	-0.144	0.119	-1.208	0.999	
Middle C	Apical E	-0.025	0.09	-0.277	1	
	Coronal E	0.172	0.09	1.909	0.904	
	Middle E	-0.294	0.09	-3.262	0.113	
	Apical B	-0.202	0.09	-2.242	0.723	
	Coronal B	-0.484	0.119	-4.056	0.01	**
	Middle B	0.021	0.09	0.233	1	
	Apical D	-0.245	0.09	-2.719	0.378	
	Coronal D	0.148	0.09	1.642	0.974	
	Middle D	-0.44	0.09	-4.883	< 0.001	***
Apical E	Coronal E	0.197	0.09	2.186	0.759	
	Middle E	-0.269	0.09	-2.985	0.222	
	Apical B	-0.177	0.09	-1.964	0.881	
	Coronal B	-0.459	0.119	-3.846	0.02	*
	Middle B	0.046	0.09	0.51	1	
	Apical D	-0.22	0.09	-2.441	0.578	
	Coronal D	0.173	0.09	1.92	0.899	
	Middle D	-0.415	0.09	-4.605	0.001	**
Coronal E	Middle E	-0.466	0.09	-5.171	< 0.001	***
	Apical B	-0.374	0.09	-4.15	0.007	**
	Coronal B	-0.655	0.119	-5.499	< 0.001	***
	Middle B	-0.151	0.09	-1.676	0.968	
	Apical D	-0.417	0.09	-4.627	0.001	**
	Coronal D	-0.024	0.09	-0.266	1	

	Middle D	-0.612	0.09	-6.791	< 0.001	***
Middle E	Apical B	0.092	0.09	1.021	1	
	Coronal B	-0.189	0.119	-1.590	0.981	
	Middle B	0.315	0.09	3.495	0.059	
	Apical D	0.049	0.09	0.544	1	
	Coronal D	0.442	0.09	4.905	< 0.001	***
	Middle D	-0.146	0.09	-1.620	0.977	
Apical B	Coronal B	-0.282	0.119	-2.361	0.638	
	Middle B	0.223	0.09	2.475	0.553	
	Apical D	-0.043	0.09	-0.477	1	
	Coronal D	0.35	0.09	3.884	0.017	
	Middle D	-0.238	0.09	-2.641	0.431	
Coronal B	Middle B	0.505	0.119	4.232	0.005	**
	Apical D	0.239	0.119	2.001	0.864	
	Coronal D	0.631	0.119	5.297	< 0.001	***
	Middle D	0.043	0.119	0.365	1	
Middle B	Apical D	-0.266	0.09	-2.952	0.238	
	Coronal D	0.127	0.09	1.409	0.995	
	Middle D	-0.461	0.09	-5.116	< 0.001	***
Apical D	Coronal D	0.393	0.09	4.361	0.003	**
	Middle D	-0.195	0.09	-2.164	0.773	
Coronal D	Middle D	-0.588	0.09	-6.525	< 0.001	***

(A) Control; (B) Er:YAG laser with 17% EDTA continuous irrigation for 60 sec irrigation; (C) Er:YAG laser with 15 sec \times 4 intermittent 17% EDTA irrigation (D); Er:YAG laser with 17% EDTA for continuous irrigation for 60 sec followed by 2.5% NaOCl; (E) Er:YAG laser with 15 \times 4 intermittent 17% EDTA irrigation followed by 2.5% NaOCl; and (F) Er:YAG laser with 60 sec continuous 2.5% NaOCl irrigation. Ca = Calcium, O = Oxygen, P = Phosphate.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Supplementary Table S4: Post hoc comparisons of calcium (Ca) content between treatment group and tooth area.

Post Hoc Comparisons - Treatment group × Tooth area for Calcium (Ca)						
Groups		Mean Difference	SE	t	<i>p</i> _{tukey}	Significance
Apical A	Coronal A	0.592	3.428	0.173	1	
	Middle A	11.593	2.591	4.474	0.002	**
	Apical F	10.651	2.591	4.11	0.008	**
	Coronal F	-2.781	2.591	-1.073	1	
	Middle F	-2.467	2.591	-0.952	1	
	Apical C	-3.25	2.591	-1.254	0.999	
	Coronal C	-3.441	3.428	-1.004	1	
	Middle Control	10.689	2.591	4.125	0.008	**
	Apical E	15.023	2.591	5.798	< 0.001	***
	Coronal E	-2.587	2.591	-0.998	1	
	Middle E	7.969	2.591	3.075	0.18	
	Apical B	1.55	2.591	0.598	1	
	Coronal B	-7.851	3.428	-2.29	0.689	
	Middle B	10.586	2.591	4.085	0.009	**
	Apical D	14.809	2.591	5.715	< 0.001	***
	Coronal D	-6.656	2.591	-2.569	0.483	
	Middle D	-1.196	2.591	-0.462	1	
Coronal A	Middle A	11.001	3.428	3.209	0.13	
	Apical F	10.059	3.428	2.934	0.247	
	Coronal F	-3.373	3.428	-0.984	1	
	Middle F	-3.059	3.428	-0.892	1	
	Apical C	-3.842	3.428	-1.121	1	
	Coronal C	-4.032	4.097	-0.984	1	
	Middle C	10.097	3.428	2.946	0.242	
	Apical E	14.431	3.428	4.21	0.006	**
	Coronal E	-3.179	3.428	-0.927	1	
	Middle E	7.377	3.428	2.152	0.781	
	Apical B	0.958	3.428	0.279	1	

	Coronal B	-8.443	4.097	-2.061	0.834	
	Middle B	9.994	3.428	2.916	0.258	
	Apical D	14.217	3.428	4.148	0.007	**
	Coronal D	-7.248	3.428	-2.114	0.803	
	Middle D	-1.788	3.428	-0.522	1	
Middle A	Apical F	-0.942	2.591	-0.364	1	
	Coronal F	-14.374	2.591	-5.547	< 0.001	***
	Middle F	-14.06	2.591	-5.426	< 0.001	***
	Apical C	-14.843	2.591	-5.728	< 0.001	***
	Coronal C	-15.034	3.428	-4.386	0.003	**
	Middle C	-0.904	2.591	-0.349	1	
	Apical E	3.43	2.591	1.324	0.997	
	Coronal E	-14.18	2.591	-5.472	< 0.001	***
	Middle E	-3.624	2.591	-1.399	0.995	
	Apical B	-10.043	2.591	-3.876	0.018	*
	Coronal B	-19.444	3.428	-5.672	< 0.001	***
	Middle B	-1.007	2.591	-0.389	1	
	Apical D	3.216	2.591	1.241	0.999	
	Coronal D	-18.249	2.591	-7.043	< 0.001	***
	Middle D	-12.789	2.591	-4.936	< 0.001	***
Apical F	Coronal F	-13.432	2.591	-5.184	< .001	***
	Middle F	-13.118	2.591	-5.063	< 0.001	***
	Apical C	-13.901	2.591	-5.365	< 0.001	***
	Coronal C	-14.092	3.428	-4.111	0.008	**
	Middle C	0.038	2.591	0.015	1	
	Apical E	4.372	2.591	1.687	0.966	
	Coronal E	-13.238	2.591	-5.109	< 0.001	***
	Middle E	-2.682	2.591	-1.035	1	
	Apical B	-9.101	2.591	-3.512	0.056	
	Coronal B	-18.502	3.428	-5.397	< .001	***
	Middle B	-0.065	2.591	-0.025	1	
	Apical D	4.158	2.591	1.605	0.979	
	Coronal D	-17.307	2.591	-6.679	< 0.001	***
	Middle D	-11.847	2.591	-4.572	0.001	**

Coronal F	Middle F	0.314	2.591	0.121	1	
	Apical C	-0.469	2.591	-0.181	1	
	Coronal C	-0.66	3.428	-0.192	1	
	Middle C	13.47	2.591	5.198	< 0.001	***
	Apical E	17.804	2.591	6.871	< 0.001	***
	Coronal E	0.194	2.591	0.075	1	
	Middle E	10.75	2.591	4.149	0.007	**
	Apical B	4.331	2.591	1.671	0.969	
	Coronal B	-5.07	3.428	-1.479	0.991	
	Middle B	13.367	2.591	5.159	< 0.001	***
	Apical D	17.59	2.591	6.788	< 0.001	***
	Coronal D	-3.875	2.591	-1.495	0.99	
	Middle D	1.585	2.591	0.612	1	
Middle F	Apical C	-0.783	2.591	-0.302	1	
	Coronal C	-0.974	3.428	-0.284	1	
	Middle C	13.156	2.591	5.077	< 0.001	***
	Apical E	17.49	2.591	6.75	< 0.001	***
	Coronal E	-0.12	2.591	-0.046	1	
	Middle E	10.436	2.591	4.027	0.011	*
	Apical B	4.017	2.591	1.55	0.985	
	Coronal B	-5.384	3.428	-1.571	0.983	
	Middle B	13.053	2.591	5.037	< 0.001	***
	Apical D	17.276	2.591	6.667	< 0.001	***
	Coronal D	-4.189	2.591	-1.617	0.977	
	Middle D	1.271	2.591	0.491	1	
Apical C	Coronal C	-0.191	3.428	-0.056	1	
	Middle C	13.939	2.591	5.379	< 0.001	***
	Apical E	18.273	2.591	7.052	< 0.001	***
	Coronal E	0.663	2.591	0.256	1	
	Middle E	11.219	2.591	4.33	0.004	**
	Apical B	4.8	2.591	1.852	0.924	
	Coronal B	-4.601	3.428	-1.342	0.997	
	Middle B	13.836	2.591	5.34	< 0.001	***
	Apical D	18.059	2.591	6.969	< 0.001	***
	Coronal D	-3.406	2.591	-1.314	0.998	

	Middle D	2.054	2.591	0.793	1	
Coronal C	Middle C	14.13	3.428	4.122	0.008	**
	Apical E	18.464	3.428	5.386	< 0.001	***
	Coronal E	0.854	3.428	0.249	1	
	Middle E	11.41	3.428	3.328	0.095	
	Apical B	4.991	3.428	1.456	0.992	
	Coronal B	-4.41	4.097	-1.076	1	
	Middle B	14.027	3.428	4.092	0.008	**
	Apical D	18.25	3.428	5.324	< 0.001	***
	Coronal D	-3.215	3.428	-0.938	1	
	Middle D	2.245	3.428	0.655	1	
Middle C	Apical E	4.334	2.591	1.673	0.969	
	Coronal E	-13.276	2.591	-5.123	< 0.001	***
	Middle E	-2.72	2.591	-1.05	1	
	Apical B	-9.139	2.591	-3.527	0.054	
	Coronal B	-18.54	3.428	-5.409	< 0.001	***
	Middle B	-0.103	2.591	-0.04	1	
	Apical D	4.12	2.591	1.59	0.981	
	Coronal D	-17.345	2.591	-6.694	< 0.001	***
	Middle D	-11.885	2.591	-4.587	0.001	**
Apical E	Coronal E	-17.61	2.591	-6.796	< 0.001	***
	Middle E	-7.054	2.591	-2.722	0.375	
	Apical B	-13.473	2.591	-5.2	< 0.001	***
	Coronal B	-22.874	3.428	-6.673	< 0.001	***
	Middle B	-4.437	2.591	-1.712	0.961	
	Apical D	-0.214	2.591	-0.083	1	
	Coronal D	-21.679	2.591	-8.366	< 0.001	***
	Middle D	-16.219	2.591	-6.259	< 0.001	***
Coronal E	Middle E	10.556	2.591	4.074	0.009	**
	Apical B	4.137	2.591	1.597	0.98	
	Coronal B	-5.264	3.428	-1.536	0.986	
	Middle B	13.173	2.591	5.084	< 0.001	***
	Apical D	17.396	2.591	6.713	< 0.001	***
	Coronal D	-4.069	2.591	-1.57	0.983	

	Middle D	1.391	2.591	0.537	1	
Middle E	Apical B	-6.419	2.591	-2.477	0.551	
	Coronal B	-15.82	3.428	-4.615	0.001	**
	Middle B	2.617	2.591	1.01	1	
	Apical D	6.84	2.591	2.64	0.432	
	Coronal D	-14.625	2.591	-5.644	< 0.001	***
	Middle D	-9.165	2.591	-3.537	0.052	
Apical B	Coronal B	-9.401	3.428	-2.742	0.362	
	Middle B	9.036	2.591	3.487	0.061	
	Apical D	13.259	2.591	5.117	< 0.001	***
	Coronal D	-8.206	2.591	-3.167	0.145	
	Middle D	-2.746	2.591	-1.06	1	
Coronal B	Middle B	18.437	3.428	5.378	< 0.001	***
	Apical D	22.66	3.428	6.61	< 0.001	***
	Coronal D	1.195	3.428	0.348	1	
	Middle D	6.655	3.428	1.941	0.891	
Middle B	Apical D	4.223	2.591	1.63	0.976	
	Coronal D	-17.242	2.591	-6.654	< 0.001	***
	Middle D	-11.782	2.591	-4.547	0.002	**
Apical D	Coronal D	-21.465	2.591	-8.284	< 0.001	***
	Middle D	-16.005	2.591	-6.177	< 0.001	***
Coronal D	Middle D	5.46	2.591	2.107	0.808	

(A) Control; (B) Er:YAG laser with 17% EDTA continuous irrigation for 60 sec irrigation; (C) Er:YAG laser with 15 sec \times 4 intermittent 17% EDTA irrigation (D); Er:YAG laser with 17% EDTA for continuous irrigation for 60 sec followed by 2.5% NaOCl; (E) Er:YAG laser with 15 \times 4 intermittent 17% EDTA irrigation followed by 2.5% NaOCl; and (F) Er:YAG laser with 60 sec continuous 2.5% NaOCl irrigation. Ca = Calcium, O = Oxygen, P = Phosphate.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Supplementary Table S5. Descriptive values of Ca/O ratios after the different treatments.

Group	Area	Mean	SD	SE	Coefficient of variation
Ca/O ratio					
Group A	Apical	0.653	0.19	0.06	0.292
	Coronal	0.732	0.12	0.04	0.157
	Middle	0.581	0.19	0.06	0.335
Group F	Apical	0.573	0.06	0.03	0.1
	Coronal	0.675	0.04	0.02	0.062
	Middle	0.863	0.11	0.05	0.126
Group C	Apical	0.336	0.16	0.05	0.462
	Coronal	0.379	0.26	0.08	0.678
	Middle	0.358	0.25	0.08	0.699
Group E	Apical	0.637	0.2	0.06	0.314
	Coronal	0.404	0.16	0.05	0.383
	Middle	0.624	0.14	0.05	0.227
Group B	Apical	0.323	0.22	0.07	0.666
	Coronal	0.207	0.13	0.04	0.607
	Middle	0.231	0.18	0.06	0.779
Group D	Apical	0.656	0.21	0.07	0.323
	Coronal	0.673	0.22	0.07	0.331
	Middle	0.819	0.26	0.08	0.315

Supplementary Table S6. Descriptive values of Ca/P ratios after the various treatments

Treatment Group	Tooth Area	Mean Ca/P ratio	SD	SE	Coefficient of variation
Group A	Apical	0.653	0.19	0.06	0.292
	Coronal	0.804	0.28	0.09	0.346
	Middle	0.581	0.19	0.06	0.335
Group F	Apical	0.573	0.06	0.03	0.1
	Coronal	0.675	0.04	0.02	0.062
	Middle	0.863	0.11	0.05	0.126
Group C	Apical	0.336	0.16	0.05	0.462
	Coronal	0.379	0.26	0.08	0.678
	Middle	0.358	0.25	0.08	0.699
Group E	Apical	0.637	0.2	0.06	0.314
	Coronal	0.404	0.16	0.05	0.383
	Middle	0.624	0.14	0.05	0.227
Group B	Apical	0.323	0.22	0.07	0.666
	Coronal	0.207	0.13	0.04	0.607
	Middle	0.231	0.18	0.06	0.779
Group D	Apical	0.656	0.21	0.07	0.323
	Coronal	0.673	0.22	0.07	0.331
	Middle	0.819	0.26	0.08	0.315

(A) Control; (B) Er:YAG laser with 17% EDTA continuous irrigation for 60 sec; (C) Er:YAG laser with 15 sec \times 4 intermittent 17% EDTA irrigation; (D) Er:YAG laser with 17% EDTA continuous irrigation for 60 sec followed by 2.5% NaOCl; (E) Er:YAG laser with 15 \times 4 intermittent 17% EDTA irrigation followed by 2.5% NaOCl; and (F) Er:YAG laser with 60 sec continuous 2.5% NaOCl irrigation.