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Objective Dental caries occurs frequently in day life and is caused by acid from bacteria to dissolve the hard tissues of the teeth including enamel, dentin and cementum. In general, dentists use dental high-speed handpiece to remove the carious tooth structures under local anesthesia or sedation to relieve pain or anxiety during the treatment. Some studies indicate usage of laser to remove caries is less pain and lesser need for dental anesthesia than the conventional mechanical method by drill.

Thus, the aim of this study is to compare the pain score with two rating scale during cavity preparation for dental caries between Er:YAG laser irradiation and high-speed handpiece.

Method The study used Sapphire Er:YAG laser system (Wavelength: 2940 nm) and high-speed handpiece to drill a cavity over two different carious teeth, one was for laser irradiation and the other one was for high-speed handpiece, in the same subject. All 12 subjects were collected in Dentistry department of Kaohsiung Medical University Hospital, Taiwan. The pain score of record for subjects were used Numeric rating scale and facial rating scale during the preparation procedure. All data were used Mann-Whitney U Test for statistical analysis.



Laser system :
Sapphire Er:YAG Laser system
Technical support :
LightMed Dental Technology Corp. (No.96 Luke 5th. Rd., Luzhu Dist., Kaohsiung, Taiwan 82151
Tel : +886-7695-5111)



Frequency: 20 Hz
Pulse energy: 350 mJ
Watt: 7.0
Tip type: ST 100
Energy density: 21.2 J/cm²

Laser irradiation group

Before



After



High speed handpiece group

Before



After



Table 1. Description of caries treatment pain score.

Scale	Group	N	Mean	SD	Median	95% CI	
						lower	upper
Numeric	High speed	12	3.25	2.527	3.00	1.64	4.86
	Laser	12	1.75	1.913	1.00	0.53	2.97
	Total	24					
Facial	High speed	12	2.67	2.741	2.00	0.92	4.41
	Laser	12	1.17	1.801	0.00	0.02	2.31
	Total	24					

Table 2. Mann-Whitney U test results for caries treatment pain score.

Scale	Group	N	Mean Rank	Sum of Rank	U-value	Z-value	p-value
Numeric	High speed	12	14.71	176.50	45.50	-1.564	0.128
	Laser	12	10.29	123.50			
Facial	High speed	12	14.79	177.50	44.50	-1.716	0.114
	Laser	12	10.21	122.50			

Result The value of mean \pm SD of numeric rating scale was 1.75 ± 1.91 in laser irradiation group and 3.25 ± 2.52 in high-speed group. For facial rating scale, the value of mean \pm SD was 1.17 ± 1.8 in laser irradiation group and 2.67 ± 2.74 in high-speed group. of laser irradiation group. (Table 1) The statistical analysis revealed no significant difference between high-speed and laser both in numeric and facial scale. (Table 2)

Conclusion The statistical analysis of results (p -value: 0.128 in numeric rating scale and 0.114 in facial rating scale) showed no significant difference between these two groups. To use laser irradiation for cavity preparation might not reduce the discomfort for patients.