Format: Abstract

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Dose-dependent effect of the pulsed Nd:YAG laser in the treatment of crushed sciatic nerve in Wister rats: an experimental model.

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Abstract

The objective of the study was to investigate the efficacy of three energy densities 4, 10, and 50 J/cm^2 of pulsed Nd:YAG laser for the treatment of crushed sciatic nerve in Wister rats by evaluating changes in the sciatic functional index and the electrophysiology.A total of 180 Wistar rats were involved in the study. Rats were randomly assigned to five groups. Rats were subjected to the sciatic nerve crushing. Control negative (CONT-ve), which received no crushing; control positive (CONT+ve), which received crushing with no laser; and HILT-4, HILT-10, and HILT-50 groups, which received pulsed Nd:YAG laser (10 Hz, 360 mJ/cm^2) with energy densities 4, 10, and 50 J/cm^2, respectively. The SFI, the amilitude of compound motor action potential (CMAP) and sciatic motor nerve conduction velocity (MNCV) were measured before and after seven, 14, and 21 days after crushing. For the SFI and electrophysiological analysis, repeated measures ANOVA is used, followed by Bonferroni's repeated-measures test. Statistical significance was set at $p < 0.05$. After one week, there was no significant difference in SFI, CMAP, and MNCV among the three laser groups with significant changes between them and CONT-ve and CONT+ve groups. There was a significant increase in either CMAP amplitude or MNCV after 14 days with significant decrease in the SFI after 21 days among all treatment groups. The pulsed Nd:YAG laser applied with energy densities 4, 10, and 50 J/cm^2 significantly decreased the SFI and increased the CMAP and MNCV of the crushed sciatic nerve in Wister rats. Among laser doses, the difference in the rate of recovery in the electrophysiology was found after two weeks while in the SFI after three weeks. The improvement after the nerve injury was time and dose dependent.

KEYWORDS: Crushing injury; Electrophysiology; Energy density; Pulsed Nd:YAG laser; Sciatic functional index

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