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不同电流强度电针对兔骨骼肌钝器伤后改善微循环、抗纤维化和抗氧化能力的作用

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摘要：

摘要目的：观察在相同频率（2Hz）下，0.2mA、0.4mA和0.6mA电针对家兔骨骼肌钝器伤后修复过程中改善微循环、抗纤维化和抗氧化的作用效果。方法：将24只新西兰兔随机分为模型组、0.2mA组、0.4mA组和0.6mA组；建立腓肠肌急性钝器伤模型，治疗组分别以0.2mA、0.4mA和0.6mA电针刺激足三里和阿是穴，频率2Hz，15min/次，隔日1次，模型组自然愈合；在28d时检测腓肠肌表面血流灌注值；14d、28d时通过HE和Masson染色，观察病理变化，分析胶原纤维和肌纤维面密度；分别在造模前、造模后第1d、4d、7d、14d、28d检测血清肌酸激酶（CK）、总抗氧化能力（T-AOC）、丙二醛（MDA）水平。结果：0.4mA组血流灌注值显著高于模型组、0.6mA组（P<0.05），0.4mA与0.2mA组比较差异不显著（P>0.05）；0.4mA电针能促进肌纤维再生反应，在第28天时胶原纤维面密度显著低于其他3组（P=0.05），肌纤维面密度显著高于其他3组（P=0.05），胶原纤维和肌纤维面密度整体呈负相关（r14=-0.783，P<0.01；r28=-0.839，P<0.01）；第14天和28天，0.6mA组CK显著高于其他3组（P<0.05）；第14天，0.4mA组T-AOC显著高于其他3组（P<0.05），0.2mA组次之；第7天和第14天，0.6mA组MDA显著高于其他3组（P<0.05）。结论：0.4mA电针对骨骼肌钝器伤后改善局部微循环、减少胶原纤维面密度、增加肌纤维面密度和提高抗氧化能力效果最好，0.2mA次之，0.6mA电针有损害效应。

关键词：骨骼肌 钝器伤 电针 微循环 纤维化 氧化性应激

Effects of electroacupuncture with different current intensities on microcirculation,anti-fibrosis and anti-oxidation capacity in skeletal-muscles of rabbits after acute contusion

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Fund Project:

Abstract:

Abstract Objective: To investigate the effects of electroacupuncture(EA) treatment with different current intensities on microcirculation, anti-fibrosis and anti-oxidation capacity in skeletal muscles of rabbits after acute contusion. Method: Twenty-four male New Zealand white rabbits were randomly and equally divided into four groups:control group, as well as 0.2mA,0.4mA and 0.6mA treatment groups. The acute skeletal muscle contusion model was produced at the gastrocnemius by specific device. In 3 treatment groups electro-acupuncture(2Hz) were applied on Zu Sanli(ST36) and living acupoints for 15min every two days with different current intensities(0.2mA,0.4mA and 0.6mA). Perfusion unit(PU) values at gastrocnemius surface were detected at the 28th day.The muscles were sampled at the 14th and 28th day respectively after contusion, and the muscle tissues were dyed by H&E and Masson staining. The pathomorphology changes were observed and the percentages of densities of collagen fibers and myofibers were analysed. The serum was sampled at the day before modeling as well as the 1st, 4th 7th, and 28th day respectively after contusion, and the creatine kinase(CK), total-antioxidunt capacity(T-AOC) and malondialdehyde(MDA) were investigated. Result: PU values in 0.4mA group were significantly higher than that in model group and 0.6mA group(P<0.05).There was no significantly difference between 0.4mA and 0.2mA groups. EA treatment with 0.4mA current intensity could promote myofiber regeneration reaction. As compared with other groups, the percentage of densities of collagen fibers in 0.4mA group decreased significantly on the 28th day after contusion(P=0.05),but myofibers increased significantly(P=0.05).The percentags of densities of collagen fibers and myofibers were negatively correlated(r14=-0.783, P<0.01; r28=-0.839, P<0.01).The activity of CK in 0.6mA group were higher than that in other groups at the 14th and 28th day after contusion(P<0.05).The capability of T-AOC in 0.4mA group were higher than that in other groups at the 14th day after contusion(P<0.05),and followed by 0.2mA group.The concentration of MDA in 0.6mA group was higher than that in other groups at the 7th and 14th day after contusion(P<0.05). Conclusion: EA treatment could significantly improve the local microcirculation,decrease the percentage of density of collagen fibers,and increase the myofiber density and anti-oxidation capacity.Among the 3 groups, the effect of 0.4mA group was the best,and followed by 0.2mA group. EA treatment with 0.6mA might has detrimental effect on contusion muscle.

Keywords:skeletal muscle contusion injury electroacupuncture microcirculation fibrosis oxidative stress

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