

The Influence of Different Exercise Models Intervention on the Healing of Rats' Achilles Tendon

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Abstract

The aim of this study was to compare the effect of the interventions of different exercise models on tendon recovery. Method: SD male rats (n=18) with 200-250g at 8-week were the experimental animal in this study. There were three different exercise groups, control (C), running (R), and swimming (S), respectively. Each group had six rats, which their Achilles tendons of right legs were cut off. The exercise intervened after the 5th day of injury. The evaluation of Achilles Functional Index (AFI) was carried on at the second, 5th, 7th, 14th, and 28th day of the operation. After histochemistry stain, collagen arrangement and growth were observed by polarized light microscope in the 7th and 28th days. The running model in this study was once each day, 15 minutes each time, at the speed of 4 meters / minute for the first two days, the speed was increased to 12 meters / min after the first 2 day (See et al. 2004). In swimming, six rats swam at the same time, 15 minutes each time, once time a day, and their tails was free of weight. The control group did not do either running or swimming. Results: The values of AFI were -3.76 ± 13.68 , -14.23 ± 12.01 , and -12.2 ± 10.67 for C, R, and S, respectively and it was no significant difference among three groups ($p = .272$). Collagen growth : (一) Collagen arrangement : (1) The R group showed worse connection between new and old tissues in the 7th day. (2) In 28th day, new collagen arrangement was tidier in both R and S groups. (3) In 28th day, a microscopic crimp structure was found in the R group and its growth was similar to normal tendon tissue. Neither S nor C did show this phenomenon. As a result, running probably makes injury tendon with better cushion capability. (二) Collagen proliferation : In 7th day, the collagen ratio of type III to I were 0.92 ± 0.26 , 0.83 ± 0.18 , and 0.99 ± 0.27 for C, R, and S, respectively. There were no significant differences among them ($p > .05$). In 28th day, the same ratio did not show significant differences. However, the smaller trend of this ratio was found in the C group. Conclusion: Exercise should be intervened after the 5th day of Achilles injury, because exercise could enhance tidier arrangement in collagen. In addition, swimming should be the first option in order to avoid worse arrangement and connection between new and old tissues. However, a microscopic crimp structure was found in the R group and it made recovered-tissue close to normal tissue. Consequently, the research with respect to the time of running intervention after injury is warranted.

Key word : collagen, tendon injury, Achilles tendon