

Effect of Low Level Laser Therapy (830 nm) With Different Therapy Regimes on the Process of Tissue Repair in Partial Lesion Calcaneus Tendon

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Background and Objective: Calcaneus tendon is one of the most damaged tendons, and its healing may last from weeks to months to be completed. In the search after speeding tendon repair, low intensity laser therapy has shown favorable effect. To assess the effect of low intensity laser therapy on the process of tissue repair in calcaneus tendon after undergoing a partial lesion.

Study Design/Materials and Methods: Experimentally controlled randomized single blind study. Sixty male rats were used randomly and were assigned to five groups containing 12 animals each one; 42 out of 60 underwent lesion caused by dropping a 186 g weight over their Achilles tendon from a 20 cm height. In Group 1 (standard control), animals did not suffer the lesion nor underwent laser therapy; in Group 2 (control), animals suffered the lesion but did not undergo laser therapy; in Groups 3, 4, and 5, animals suffered lesion and underwent laser therapy for 3, 5, and 7 days, respectively. Animals which suffered lesion were sacrificed on the 8th day after the lesion and assessed by polarization microscopy to analyze the degree of collagen fibers organization.

Results: Both experimental and standard control Groups presented significant values when compared with the control Groups, and there was no significant difference when Groups 1 and 4 were compared; the same occurred between Groups 3 and 5.

Conclusion: Low intensity laser therapy was effective in the improvement of collagen fibers organization of the calcaneus tendon after undergoing a partial lesion. *Lasers Surg. Med.* 41:271–276, 2009. © 2009 Wiley-Liss, Inc.

Key words: calcaneus tendon; diode laser; lesion tendon; low level laser therapy; physical therapy; repair tissue

INTRODUCTION

The calcaneus tendon is one of the most frequently injured tendons in human beings, followed by digital flexors, due to overuse, trauma caused by firearm wounds, and sharp objects [1].

Owing to the slow pace of healing, the rupture of the calcaneus tendon is considered a serious injury, and it has drawn the attention of several researchers [2].

Spontaneous rupture of the calcaneus tendon occurs between 2 and 6 cm of its insertion into the calcaneus bone. Histological examination has suggested that such tendons had already undergone primary degeneration [3] and showed important alterations in the type of collagen fibers [4].

In order to observe blood supply to the calcaneus tendon, CARR & NORRIS (1989) [5] verified that the number of blood vessels varies along the length of the tendon and their highest concentration occurs in the calcaneus insertion and up to 4 cm above it, considering that neoangiogenesis is a vital part of the healing process, as it restores normal circulation and carries more cells and nutrients to the injured location, thus limiting ischemic necrosis and allowing tissue repair [6].

Due to its low blood supply, the calcaneus tendon is a structure that can take weeks or even months to heal completely [2,7].

During the period of the lesion, it is customary for the patient to remain immobilized in order to prevent a new rupture, which could generate countless functional complications, including ultra-structural and biomechanical alterations in the tendon [8,9].

Such complications, caused by prolonged immobilization, can be minimized by shortening the duration of the tendon repair [3].

Trying to accelerate tendon repair, several physical agents such as ultrasound [10], electrical stimulation [11], and low level laser therapy [12] have shown beneficial effects.

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