

# IONTOPHORESIS FOR TREATMENT OF SHINSPLINTS.

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## INTRODUCTION

Shinsplint is the term used for the leg pain localized about the tibia bone. According to the biomechanical researches, it was hypothesized that shinsplints are the results of inflammation of the muscles that support the medial border of the foot, particularly the anterior and posterior tibialis muscles Delacerda FG 1980. The muscles contract eccentrically as the foot becomes weight bearing so as to support the medial border of the foot. It was also hypothesized that muscle inflammation results from excessive muscle contractions. The hypothesis was supported by experiments on rats whereby exercise-induced muscle inflammation resulted primarily from eccentric muscle contractions.

Shinsplints are a frequent problem for athletes yet it can happen for anyone. In spite of this condition's frequency, the information supported by research regarding its pathology + etiology is very little. Biomechanical analysis of the lower extremity proved that improper foot alignment is a significant factor in the etiology of shinsplints. Gehlsen et al. 1980.

Lillevedt et al., (1979) found a relationship between static foot alignment and shinsplints. If the calcaneus is in an inverted position, decreased relatively to the floor, with a static subtalar joint Gehlsen and Seger (1980) found that patients with shinsplints had a greater angular displacement between the calcaneus and the midline of the lower leg than patients without shinsplints. This displacement increased as the speed of running increased. So, there is a significant relationship between dynamic foot alignment and shinsplints.

Delacerda (1980) investigated 81 female patients with shinsplints: the longitudinal arch of the foot was not found to be a significant factor; however foot pronation as measured by vertical displacement of the navicular bone when the patient went from a non-weight bearing to a weight-bearing stance was a significant factor. He found that there was a relationship between quantitative electromyography of the anterior tibialis muscle and the degree of foot pronation, as determined by navicular displacement. As the degree of foot pronation increased, the quantitative electromyography values increased.

The purpose of this study was to determine the effectiveness of locally applied anti-inflammatory medication in the treatment of shinsplints. Iontophoresis was the method of application.

Procedure:

The 24 patients used in the study, were college athletes, training and competing during the academic year. They had shinsplints identified with pain along either the anterior lateral aspect or the posterior medial aspect of the tibia. 12 patients experienced shinsplints bilaterally, while 12 ones had shinsplints unilaterally; thus, a total of 36 shinsplints cases were treated with iontophoresis.

When treatment sessions started, they were asked:

- 1) To locate the pain, and classify it: mild, moderate or severe.
- 2) The skin area at the pain site was cleaned with isopropyl alcohol, also the sole of the foot on the involved leg was cleaned with alcohol.
- 3) A small quantity of medication was massaged into the skin over the painful area, and four tap water- soaked gauze pads were placed over the area.
- 4) 10 - x 3- cm. positive electrode was placed over the gauze pads. The 12 - x 4 - cm. negative electrode was placed on the sole of the foot with four moist gauze pads placed between the electrode and the patient's skin. Both aluminium electrodes were held in place by rubber straps.

The electrodes were connected to a low voltage direct current generator (TECA SP-2/T); and the current intensity was increased slowly to 5 milliamperes. The treatment lasted 20 minutes and was given at 48 hour intervals.



One half of the shinsplint cases were initially treated with 2.5% Xylocaine ointment. After 3 treatments, 0.5% hydrocortisone ointment was used for the duration of the treatment program. One half of the cases received treatment with 0.5% hydrocortisone for the entire treatment program. All cases continued their treatment while continuing their athletic training, until the patient no longer experienced any pain with 10 being the maximum number of treatments to be given.

#### RESULTS:

The 36 cases of shinsplints were treated with iontophoresis. Pain was localized along the anterior lateral aspect of the tibia in 14 cases; and along the posterior medial edge of the tibia in 20 cases. Two patients complained of pain in both locations. Tenderness to palpation was noted over the painful areas. Four patients complained of mild pain, 24 with moderate pain, and 8 with severe pain. Pain was increased in all cases with walking, running and climbing stairs.

A total of 82 iontophoretic treatments were given, 27 treatments with Xylocaine and 55 with hydrocortisone. An average of 3.05 hydrocortisone treatments were required to eliminate the pain with six treatments the maximum given and one the minimum. The pain decreased with each successive hydrocortisone treatment, until pain vanished with Xylocaine. The pain was totally absent for 1 to 6 hours after treatment but returned to the original intensity

prior to the next treatment.

#### DISCUSSION:

Biomechanically: shinsplints are the results of overstressing the muscles that support the medial border of the foot. Theoretically: the posterior tibialis and anterior tibialis muscles contract eccentrically as the foot becomes weight-bearing, and with overuse, muscle inflammation results from excessive eccentric muscle contractions Delacerda FG (1980). According to the experiments: the anterior tibialis and posterior tibialis muscles were the most frequent sites for shinsplints pain, thus it was suggested that a locally applied anti-inflammatory medication could be an effective treatment. The method applied was iontophoresis.

A parallel placement of electrodes was used, and the flow of electrical current would be along the longitudinal axis of the muscles. The superficial locations of the anterior tibialis muscle and part of the posterior tibialis were ideal for use of iontophoresis.

Hydrocortisone was selected as an ion source, being an anti-inflammatory agent used for treating myositis. It was decided to use a maximum number of 10 treatments with hydrocortisone, however the pain of shinsplints was eliminated with six treatments or less.

All patients reported a decrease in pain with initial treatment followed by decrease in pain with additional treatments: this

proved that muscle inflammation was the source of pain in shinsplints.

Xylocaine, has no anti-inflammatory properties, yet it was used in this study to minimize psychological overlay, as classifying the pains by the patient was the basis of treatment.

Patients did not know the type of medication they received, even they did not realize it, when they changed from Xylocaine to hydrocortisone. Although xylocaine has known anesthetic properties, the complete elimination of shinsplint pain for 1-6 hours was not an expected result. This result suggested that iontophoretic application of xylocaine has use for athletes involved in competition.

#### CONCLUSIONS:

The results of the study proved that shinsplints are the result of muscle inflammation. The application of hydrocortisone by iontophoresis was effective in the elimination of shinsplint pain. The iontophoretic application of Xylocaine gave temporary pain relief, a useful application for athletes in competition. The successful application of hydrocortisone and Xylocaine to the anterior and posterior tibialis muscles suggested these muscles were the location of shinsplint pain.



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