International Journal of Physical Education, Sports and Health 2024; 11(1): 176-177

P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (RJIF): 5.38
IJPESH 2024; 11(1): 176-177

www.kheljournal.com
Received: 14-10-2023
Accepted: 02-11-2023

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Impact of long wave diathermy and DAPRE technique intervention on hamstring injury: A single case study

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DOI: https://doi.org/10.22271/kheljournal.2024.v11.i1c.3220

Abstract
Hamstring strain injuries are common among athletes and often require intensive rehabilitation to prepare athletes fora timely return to sport performance. Return to sport is typically achieved within weeks of the hamstring injury. But subsequent athlete performance may be impaired. Both rehabilitation and preventive measures are crucial but not standardized yet. On top of the standard rehabilitation program, it would be interesting to add safe treatment modalities which could speed up recovery from such an injury. In this article we present a young athlete with a large grade 1 hamstring injury which was treated with longwave diathermy and DAPRE technique. Although they can be biased, both treating physiotherapist as well as patient found that injury recovery went smoothly and quickly. The goal of this paper is to share this experience with other sports therapist and to invite the medical community to design randomized trials to confirm the clinical experience with this.

Keywords: Australian football players, long wave diathermy, clinical experience, hamstring muscles

Introduction
The hamstring muscles are the two-joint muscles that extend the hip and flex the knee joint. Hamstring Strain Injuries (HSIs) are classified as grade I in which there is a minor strain to rupture of some muscle fibers, grade II in which moderate tear or strain happens and grade III refers to the full rupture of all fibers. In sports, common hamstring injuries are strain-type which occurs as a result of a sudden alteration in direction and running, speeding up, losing speed and jumping.3 The incidence of recurrent injuries range between 30% of Australian football players and about 12 to 14% of soccer players.4 While the incidence of hamstring injuries has shown an increasing trend over the past two decades in team sports, such as rugby, and has been estimated between 12 to 17% of total injuries, with an increased rate of recurrence.

Risk factors have been classified as non-modifiable and modifiable factors, which are collectively known as muscle risk factors. Non-modifiable factors such as gender, height and age while modifiable factors are those that can change through physical activity or behavioral approaches such as weight, balance, strength or flexibility. In general, there are two types of risk factors responsible for hamstring injuries and they are classified into muscle and clinical risk factors. Muscle risk factors comprise reduced extensibility, muscle stiffness, postural fault, poor warm-up, muscle fatigue and weakness.

The Daily Adjustable Progressive Resistive Exercise (DAPRE) technique was developed clinically in an effort to provide an objective means of increasing resistance concurrently with strength increases during knee rehabilitation subsequent to injury/surgery. The key to the DAPRE technique is that on the third and fourth sets of exercise the patient performs as many repetitions as possible. The number of repetitions performed during the third and fourth sets is used to determine the amount of weight that is added to (or sometimes removed from) the working weight for the next set and session, respectively. Consequently, patients exercise nearer their optimal capacity during each weight rehabilitation session, and their strength redevelopment occurs at a much faster rate.

Case Report

Case History: The patient is a 25-year-old collegiate football player who suffered three hamstring strains in his left leg between the months of June and November 2023. Prior to transferring to the current college, the athlete tore his hamstring during practice with his former team. At his current college, he has experienced two more tears. The first injury occurred in a football game, when going for a kick on a high served football. Athlete collapsed grabbing at his hamstring. Athlete's pain was located on the mid distal aspect of the hamstring (Bicep femoris). Post injury, the athlete experienced edema and ecchymosis, which originated at the tear and moved distally down the calf. Athlete was unable to walk or bear weight. The second tear occurred in a different game. Athlete was accelerating to a full sprint to defend the ball, when he abruptly decelerated to change directions. Athlete fell to the ground in pain grabbing at his hamstring more proximal than the last hamstring tear.

Physical Exam: The first hamstring tear examination identified tenderness along the left mid to distal bicep region, but no tenderness along the left medial hamstring from proximal to distal. His left hamstring strength was 4 out of 5. He had mild ecchymosis and a palpable defect of the biceps on the left side. The second hamstring tear examination presented no distal or lateral hamstring tenderness, where the patient had prior felt discomfort. His left hamstring strength was 5 out of 5. Ecchymosis and edema still presented.

Differential Diagnoses: Adductor strain injury, avulsion injury, sacroiliac dysfunction, hamstring tendinitis, and ischial bursitis.

Tests and Results: Athlete had a Magnetic Resonance Imaging (MRI) that revealed a partial tear with associated edema in the bicep femoris muscle, at the distal third of the left thigh. In addition, the MRI identified a partial thickness cartilage erosion in the medial patellar facet, as well as 1.5 cm ganglion cyst. Moreover, a 1.7 cm bone island and an old benign cortical defect along the posterior cortex of the distal femoris metaphysis were identified.

Final Diagnosis: Left distal hamstring partial tear in the bicep femoris.

Procedures administered to the patient: He was treated in Physical Therapy three times per week for 3 weeks with DAPRE training and 3 sessions of long wave diathermy. By day 12, his strength on the involved extremity was greater than the uninvolved extremity and he reported clinically meaningful improvement in outcome scores. By Day 20, he was able to return to full sports participation without pain or lingering strength deficits. The patient in this case report was able to return to sport within 20 days and without recurrence. He demonstrated significant decreases in pain and dysfunction with long wave diathermy. He had greater strength on the injured extremity compared to contra-lateral previously injured extremity. This case illustrates the use of long wave diathermy and DAPRE technique exercise leading to a favorable outcome in a patient with hamstring strain.

Discussion

Hamstring tear is an over stretch to one or more of the three muscles of the hamstring. These injuries can be caused by muscle overload, stretched beyond capacity, or challenged with sudden eccentric load contraction. Other aspects to consider preventing injury are muscle tightness and muscle imbalance. Hamstring tears are very common within the sport of soccer. On average, 37% of soccer players will suffer from this injury each season. It was reported that on average this type of injury occurs at a frequency of 5.6 reported injuries per every 1000 hours of training. Considering that many of these athletes have a history of tearing their hamstring, it is much more common for the reoccurrence of the tear. It is also most common in athletes over the age of 25 years old.

Conclusion

This is the first case study that throws light into the effectiveness of longwave diathermy and DAPRE technique in hamstring strain among a footballer. This study demonstrated the effectiveness of longwave diathermy and DAPRE technique in muscle injuries. However, the duration of intervention and its effectiveness may varies among athlete and a non-athlete, which requires future studies in these areas in terms of a randomized controlled trial.

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