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Diagnosis and Control for the Second Degree of Lateral Gastrocnemius Muscle Tear in High-School Soccer Player: A Case Report

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ABSTRACT

This case study presents the epidemiology, etiology, diagnostic criteria, therapeutic intervention and modification, and rehabilitation of a lateral gastrocnemius tear in high school male soccer player. The patient injured his left gastrocnemius during soccer practice without contact. His injured leg was controlled with heel pad for equine to reduce the stress on injured gastrocnemius muscle for the initial of two weeks. The patient returned to regular practice 8 weeks after injury.

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Introduction

Muscle injuries in the calf are a relatively common clinical condition which is called "tennis leg" because of the prevalence in that sports [1,2]. Muscle injuries are recognized to be among the most frequent injuries occurring in the sporting and athletic population, and they account for more than 30% of all injuries in professional soccer players [3,4]. There are two main causes of muscle injuries. One is that the muscle injuries usually happen as indirect and non-contact situation with eccentric muscle contraction; such as kicking a ball, landing, and changing the direction and angle of movement [4]. The anther one is that the injured muscles are involved those muscles containing a great percentage of type II fibers, pennate architecture, and crossing two joints; such as hamstrings, rectus femoris, and gastrocnemius [5, 6].

The 5-year study of European soccer players revealed that 12% of the muscle injuries sustained, were injuries to the medial gastrocnemius muscle, was categorized as one of the top five injured muscle [7]. The purpose of this case study is to present the procedures of diagnosis and treatment associated with the lateral gastrocnemius tear and to review the grade system on muscle injury with ultrasound and clinical and physical test.

Case Presentation

A high school male soccer player, 15 years old, injured acute gastrocnemius muscle on right leg. The patient had no previous medical history and did not use medication. The patient, also, had never had muscle injuries on lower leg. The symptom presented with severe pain with throbbing, pain with palpation, loss of range of motion, and loss of strength. The medical diagnosis of the lateral gastrocnemius tear was identified by diagnostic ultrasound modality, clinical assessment and physical examination.

The patient reported that he experienced a sudden and sharp sensation at back of his calf when he faced his opponent to steal the call from him during soccer practice. The mechanism of this injury was that he reflexed to the movement of his opponent and tear his muscle as he planted the heel on the ground, extended the leg, and turned around the body. He thought that someone kicked the calf, but there was no one behind him. The severe pain was located and specified along the lateral aspect of the calf bulk muscle on the right leg.

The certified sports orthopedic doctor in the university hospital examined all clinical examinations for this injury. X-ray presented negative, but ultrasound images revealed abnormality and hemorrhage at the lateral aspect of the gastrocnemius muscle to utilize to rule out deep vein thrombosis [8,9]. Ultrasound presented a partial tear of the bulk gastrocnemius in the left leg. The soft tissue on the right calf did not present moderate swelling and bruising. During clinical examination, there was tenderness in the proximal part of the lateral calf belly on the right leg with palpation.

The length of pain area was 4cm. If a fasciotomy was ruptured as there might be an acute compartment syndrome, surgical intervention might be needed. As the calf muscle (Squeeze test) squeezed to identify for an Achilles tendon rupture, it was painful but the ankle was dorsiflexed. He was not able to dorsiflex the ankle by the hand during prone position with 90 degree of knee flexion.

The initial physical examination ran by the certified exercise physiologist revealed that he was unable to stand evenly with both feet. Another physical examination revealed a dragging walk with favoring the left leg. The patient, however, stood both feet evenly as he put the 10mm height of heel pad in his shoes. He raised heel and flexed knee in his left leg to control the leg

length of the injured leg to that of the uninjured leg because of the heel pad. He declined the use of crutches and/or walking boot to assist his mobility.

The last physical examination was dorsiflexion range of motion (ROM) and planter flexion function of ankle. It was an identical ROM to assess the condition of gastrocnemius muscle which a person was on prone or supine position with fully extended knee in the non-weight bearing state because the gastrocnemius muscle was two joints muscle.

Discussion

Reviewed the grade and classification of muscle injuries and presented different types of grades regarding the clinical modalities; clinical system, ultrasound imaging, and magnetic resonance imaging (MRI) [10]. The grade and classification of muscle injury in this study have been undergoing to identify the understanding of the features and condition of muscle injuries and to improve prediction of the prognosis of a given injury.

There was to classify muscle tear as first degree (localized pain, minor disability, mild swelling), second degree (localized pain, moderate disability, moderate swelling), and third degree (sever pain, disability, sever swelling) [11,12]. The classify of function for muscle tear was first degree (<5% loss of function), second degree (<5-50% loss of function), and third degree (>50% loss of function) [13]. The other physical function test was range of motion to classify first degree (<10°deficit), second degree (<10°-50°%deficit), and third degree (>50%°deficit) [13,14].
The muscle injury in this case study was graded according to the amount of muscle damage and function that has occurred following

Grade 1. A partial stretch or tearing makes a few muscle fibers injured. The muscle is tender and painful to palpation, but strength, ROM, and walking are normal.

Grade 2. A moderate stretch or tearing makes a greater percentage of the muscle fibers injured. A sharp snapping or pulling sensation may occur at the time of the injury. There is more tenderness and pain, noticeable loss of strength and function, deficit of ROM, and moderate swelling sometimes hemorrhaging. Use of the leg is visibly impaired, and limping when walking is common.

Grade 3. A sever tear of the muscle fibers, sometimes a complete muscle rupture. A "popping" sound may be heard and/or felt when the injury occurs. Hemorrhaging and swelling are apparent, sometime edema, ROM deficit, and loss of function and strength, and a "dent" in the muscle where it is torn is visible.

In this case, the patient presented minimal hemorrhaging on MRI, sever pain, a lot of dorsiflexion ROM deficit, loss of function and strength which was between grade 2 and 3. At the initial treatment, the patient was applied the most acceptable approach in the treatment of soft tissue injuries as RICE means rest, ice, compression, and elevation [2]. The RICE was applied during the 1st and 2nd week to reduce edema, hemorrhage, and pain in two times a day. The injured calf muscle was compressed with elastic bandage to minimize edema and hemorrhage.

Figure presented the recovery process of clinical assessment, diagnosis, and control of the lateral gastrocnemius tear for 6 months.

Figure: The process of diagnosis and condition of the lateral gastrocnemius muscle tear

	Initial	1st week	2nd week	3rd &4th week	5th& 6th week	7th&8th week	6month
Ultrasound	Positive(++)		Positive(+)	Negative			Negative
Pain	+++	++	+	Negative	Negative	Negative	Negative
Palpation	+++	+++	++	±	Negative	Negative	Negative
ROM*	–30 degree	–20 degree	–15 degree	–5 degree	Even	Evens	Even
Daily	less walk w/	normal walk w/	normal walk w/	walk w/	walk w/o		
Activity	10mm pad	10mm pad	8mm pad	5mm pad	pad		

*: ROM dorsiflexion of ankle as compared with non-injured leg

Conclusion

This study presented the series of diagnosis, treatment and control of the lateral gastrocnemius injury in the high-school male soccer player.

Learning points

Ultrasound is diagnostic modality to assess the primary imaging techniques for evaluation of patient with gastrocnemius tear. Heel pad to make equine foot is to minimize the extension force on the injured gastrocnemius muscle and to assist daily mobility instead of walking boot.

ROM of dorsiflexion on ankle is useful to identify the condition of gastrocnemius tear.

Contributor

The author has contributed equally in preparing the manuscript research, review, writing and all of them have approved the final draft of the article.

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