Injury of the External Obturator Muscle in Professional Soccer Athletes

Original Article

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ABSTRACT

Several studies have investigated different injuries that occur among soccer players. However, it has been noticed that none has mentioned injury to the external obturator muscle. As a small and monoarticulated muscle, its incidence is probably low and barely documented in the literature. Therefore, the aim of this study is to present four external obturator muscle strain cases in a professional soccer team in 2008. The data was collected from a database using the software Sistema de Preparação Desportiva which provides data such as name, diagnosis, trauma mechanism, clinical history, time away from training and progress. All athletes who undertook Magnetic Resonance Imaging (MRI) of the external obturator muscle and presented rupture of the external obturator muscle were included in the study. Four external obturator muscle strain injuries were identified from a total of twenty-eight muscle strains during the year of 2006. All athletes presented diffuse pain on the hip for medial and lateral rotation of the joint. The predominant injury mechanism was lateral rotation of the trunk over the femur on closed kinetic chain. It was concluded that external obturator muscle strain injuries can be mistaken for those related to the hip adductor muscles due to the reported pain area. Clinical examination should be based on the athletes' report and functional tests, mainly for the hip rotator muscles. The MRI scan was essential to the location, classification and evaluation of the injury size.

Keywords: physical therapy, rehabilitation, strain

INTRODUCTION

Soccer is the most practiced sport in the world with approximately 200,000 professional and 240 million practitioners[1]. This sport is characterized by high physical demand with variations of aerobic and anaerobic metabolism, determined by high intensity movements with changes in direction, breaking, acceleration, spins and sprints which makes the sport a great source of injuries' incidence[2].

Many studies have assessed the different types of injuries which occur to in soccer players, both professional and amateur at different competition levels. These studies found differences in results due to the characteristics of the populations, terminology and methodology of research. However, in all of the studies muscle injuries (MI) appeared with great incidence[3-9].

MI is the commonest trauma which occurs in sports with incidence which ranges from 10% to 55% of all types of injuries, with 90% of them including strains and contusions[10,11]. The MI can be generated by a traumatic mechanism – contusions, strains or lacerations, or non-traumatic – late muscle pain and cramps[10-13]. Generally, muscle strains involve superficial and biarticular muscles such as the rectus femoris, semitendinosus, biceps femoris and gastrocnemius[10,11,14].

Among the many studies mentioned, none mentions injury of the external obturator muscle. Since this is a small and monoarticular muscle, its incidence is probably low and little reported in the literature. Therefore, the present study has the aim to present four cases of strain of the Obe in a professional soccer team in the year of 2006.

METHODOLOGY

This is a retrospective, descriptive, non-randomized study, with non-probabilistic intentional sample. The same study was conducted in the Physiotherapy sector of the Professional Medical Department of Grêmio Football Club of Porto Alegre and accepted by the Ethics and Research Committee of the Brazilian Center of Systemic Studies.

Data were collected from a database named Sistema de Preparação Desportiva (SPD) (Sports Preparation System). This program was created and developed by the informatics sector of the club and stores data concerning name, diagnosis, trauma mechanism, clinical history, time away from practice and evolution.

Inclusion criteria were athletes with image diagnosis for Obe strain and who were in the SPD program of the professional category in the year of 2006. Exclusion criterion was not to present Obe strain. A free and clarified consent form was given to the athletes participating in the study.

As routine of the physiotherapy department, at the time of the injury, the individuals were submitted to medical evaluation, followed by physiotherapeutic evaluation, in which data such as injury history, main complaint, pain classification, inspection, palpation and performance of tests for the hip region were recorded. During the tests, passive range of motion (ROM), free active movement and resisted active movement of the hip were verified. The tests were performed at dorsal, ventral and seated decubitus, with lower limbs pending.

Subsequently to medical and physiotherapeutic assessment, an MRI was required, which was performed in the Center for Diagnostic Imaging of the Mãe de Deus Hospital of Porto Alegre between 12 and 24 hours from injury, in which all athletes presented image compatible to partial tear of Obe muscle, with bruise along the muscle (figure 1). When diagnosis was confirmed, the individuals were reported to the physiotherapy sector, where they were submitted to physiotherapeutic treatment. The treatment protocol was divided in three phases, in which all subjects were submitted to the same physiotherapeutic procedures, according to description in table 1.

Figure 1. MRI of left thigh. Degree II muscle strain of external obturator muscle (10.0cm of longitudinal diameter) with edema of the muscle medial portion and sign of proximal partial disinsertion.

RESULTS

In the year of 2006, four injuries by strain of Obe muscle out of 28 injuries by muscle strain were recorded. These cases occurred in three athletes, and one of them presented this injury bilaterally.

All athletes reported diffuse pain in the adducting region for the compromised hip and in none of the cases a palpable sore point was identified. Concerning the function tests for hip joint, all of the individuals reported moderate pain during resisted movements of hip lateral rotation and medial rotation (table 2). Trunk lateral rotation over the femur in closed kinetic chain (gesture which promoted hip eccentric medial rotation), was the predominant trauma mechanism; however, in one of the cases it was not possible to specify the movement which caused the injury.

The athletes remained away from competition while under physiotherapeutic treatment, and the time away from practice was different between cases (figure 2). Despite of that, each athlete completed all the phases of the treatment protocol and was subsequently released to training with the team with no complaints and at the same functional level from pre-injury.

DISCUSSION

Muscle strain injuries are present in many studies concerned with incidence of injuries in soccer. Chomiak ***et al.***[9] found incidence of 15 (15%) muscle strains in 97 reported severe injuries when they

Table 1. Therapeutic procedures and aims of each treatment phase.

Phase	Therapeutic procedures	Aims
Inflammatory phase	TENS	To control inflammation
	Cryotherapy with compression	To decrease secondary injury
	Pulsed ultrasound	
Fibroblastic phase	Continuous ultrasound	To increase vascularization
	Short-wave diathermy	To facilitate the synthesis of the cicatricial tissue
	TENS	To restore ROM
	Cryokinetics	To restore muscular strength
	Static stretching	To maintain physicial and aerobic conditioning
	Isometric at different angles	
	Isotonic in OKC, CKC and with elastic tubes	
	Aerobic work of light to moderate intensity	
Remodeling phase	Continuous ultrasound	The same from previous phase
	Short-wave siathermy	To recover specific sporting abilities
	Static stretching	To return the athletes to pre-injury levels
	Isotonic in OKC, CKC and with elastic tubes	
	Plyometric exercises	
	Aerobic work of moderate to intense intensity	
	Training of the sporting gesture	
	Proprioceptive circuit	

TENS – transcutaneous electrical nerve stimulation; CKC – closed kinetic chain; OKC – open kinetic chain; ROM – range of motion.

Table 2. Referred complaint, type of movement which causes apin and time of treatment of each case.

	Complaint	Movement	Trauma mechanism
Case 1	Pain in adductor region diffuse to hip	Resisted to AD and OR. Passive IR and OR	?
Case 2	Pain in adductor region diffuse to the hip	Resisted to AD, IR, OR. Passive to IR and OR.	Trunk rotation over the femur in CKC
Case 3	Diffuse pain in the hip region	Active, passive and resisted to IR and OR	Trunk rotation over the femur in CKC
Case 4	Pain in the adductor region diffuse to the hip	Active and resisted to IR, OR, FLX and AD. Passive IR, OR	Trunk rotation over the femur in CKC

OR – outer rotation; IR – inner rotation; AD – adduction; FLX – flexion; CKC – closed kinetic chain.

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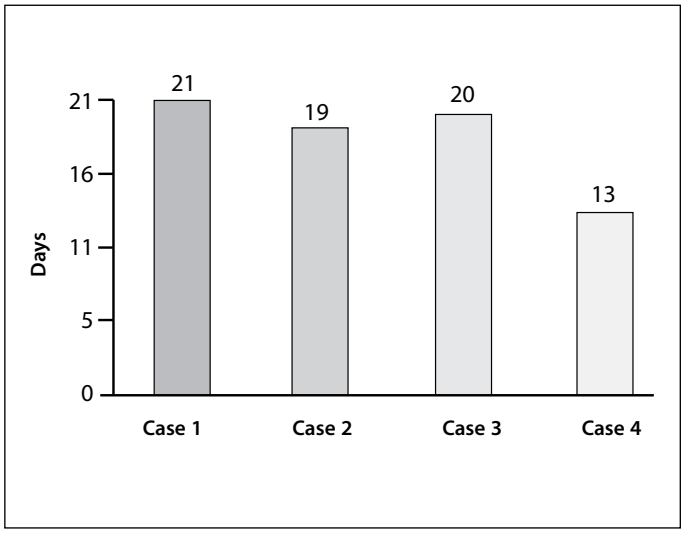

Figure 2. Time away from training in days for each of the cases.

assessed 398 soccer athletes from the Czech Republic, in a year period. Peterson ***et al.***[8] assessed 264 players of different ages and game levels during one year and found 183 muscle strains in 558 reported injuries. Junge ***et al.***[4] assessed the incidence of injuries during the FIFA and Olympic Games of 1998-2001 championships and found 901 injuries, from which 10% were strains. In another study during the World Cup of 2002 the same author recorded 25 (15%) strains out of 171 reported injuries. In all these studies the authors' concern was in reporting the types of injury related to soccer, with no accurate verification of muscle group involved.

Two studies pointed out injuries by muscle strain in their respective involved muscles. Volpi ***et al.***[7] in a five-year retrospective study in the main Italian league, found 30% (103) of MI and out of these, 17% (58) were strains. In the same investigation the authors mentioned incidence of 32% (33 cases) in the quadriceps, 28.1% (29 cases) in the hamstrings, 19.4% (20 cases) in the adductors, 12.6% (13 cases) in the gastrocnemius and 2.9% (three cases) in the abdominal muscles. Incidence of 4.9% was attributed to the sartorius, gluteus and iliopsoas muscles. In another investigation, using MRI to assess MI, Dias ***et al.***[11] found 36 muscle strains (83.7%) out of 43 reviewed exams, where 33% were degree II strains. All strain injuries were divided according to the affected muscle group, in which the medial gastrocnemius mucle presented five injuries, followed by the rectus femoris muscle with four injuries, long adductor with two and the soleus muscle with one injury. However, these investigations did not find any injury of the Obe muscle and there seems not to be report of this injury in soccer athletes.

Due to the high incidence of strain injuries demonstrated in soccer, it is necessary to better investigate on the injured muscular group so that a possible injury of the Obe muscle can be identified, since it can be misdiagnosed with an injury of adductors of the thigh. This statement is corroborated by our findings since in all reports there was complaint of pain in the adducting region being disseminated to the hip. Such fact can be due to the common innervation of the adductor muscles of the thigh and the Obe. The adductor magnus, short and long muscles of the thigh, as well as the Obe muscle, are innervated by the obturator nerve, originated from the lumbosacral plexus[15].

Considering that strain injuries present a painful and palpable spot[10-12,16] and that the adductor region was the site reported by the athlete, none of our cases presented this spot in the adductor region. This clinical datum could not be evidenced, since the injury was not in an adductor muscle, but in the Obe muscle, a deep muscle of the pelvis and hip[17,18].

All cases presented pain in the hip region during passive, active and resisted movements of lateral and medial rotations. The alterations in the muscle length, straining hence the injury site, were caused by the Obe actions during the tests. In case 3 the athlete reported pain especially when lifted foot from the ground and performed hip rotations at neutral position. According to Smith ***et al.***[18], the Obe, united with other rotator muscles, performed movements of lateral rotation of the hip, especially at neutral position. The same authors also reported that, when the hip is at 90º flexion, it starts to present an abduction component greater than the lateral rotation one. Nevertheless, Kapandji[17] states that the Obe is a lateral rotator, especially with flexed hip. Such statement is in agreement with the findings in our tests of rotations at dorsal decubitus with hip at 90º, in which pain was reported. This author also mentions Obe plays a role in hip flexion and adduction. This statement also corroborates the pain reports during resisted tests for hip adduction.

Strain injuries are mainly observed in eccentric mechanisms which occur during high velocity or intensity movements generated during the sporting gesture[2,10,12,14,16]. In two cases the eccentric mechanism was generated through a trunk rotation movement over the involved hip, when the lower limb was stuck to the soccer grass. The Obe muscle was hence submitted to a muscular action of great energy being unable to support the movement. Such fact can be understood due to its limited capacity in generating torque, since its force line passes close to the rotation center of the joint and when it contracts, it generates only joint compression[18]. According to Kapandji[17], its action line is similar to the direction of the femoral neck, making it present characteristics of a coapted muscle of the femoral neck in the hip bone. Cohen and Abdalla[12] report that the monoarticular and deep muscles are responsible for posture and tonus.

Concerning the arch of the movement, especially at hip neutral position, there seems to be narrow amplitude to dissipate energy of the eccentric movement, since its rotations present amplitude from zero to 40 degrees of inner rotation and from zero to 60 degrees of lateral rotation, when compared to other hip movements. Hughes ***et al.***[15] report that, with the alteration in hip positioning from neutral to flexed, the movement arch reached for the hip medial and lateral rotations can reach from zero to 70 and from zero to 90 degrees, respectively.

Different authors have reported that muscle strain injuries mainly occur in biarticular muscles[7,12-14] and in movements performed in open kinetic chain[14]; conversely, in our findings the predominant injury mechanism was in closed kinetic chain and the muscle involved was a monoarticular one.

According to Cross ***et al.***[19] and Dias ***et al.***[11], the presence of fluid collection, characterizing the hematoma, suggests muscle rupture and presents a hyperintense sign in the T1 and T2 images. All cases of this study were submitted to MRI exam for confirmation of the injury. The MRI was crucial to determine the diagnosis of muscle strain of Obe, since the clinical examination was not conclusive. The medical reports associated with our image interpretation classified the injuries as partial rupture of the Obe muscle.

Yoon ***et al.***[3] researched on the incidence of injuries in Asian championships and verified that 45.3% of the strain injuries caused the athletes to be away from training and games for more than four days.

Lopes ***et al.***[13], in a clinical study on MI, reported that the minimum time needed to obtain clinical cure and functional rehabilitation oscillates between two and three weeks. The same authors reported that presence of ecchymosis, 24h after injury, determines a severe injury, presenting prognosis of six to eight weeks. Cross ***et al.***[19] have assessed the prognosis of MI of quadriceps with MRI and observed that injuries of the central tendon presented rehabilitation mean time of 27 days. Verral ***et al.***[20], in a comparative study between the clinical findings and MRI for the prognosis of strain injuries of the hamstrings, found that athletes were away from training during 27 days in average. In our study, the athletes remained away from competition for maximum time of 21 days. There seems to have been reduction in the recovery time of the athletes as the professionals from the physiotherapy sector became familiar with the injury. From the first to the last case reduction of eight days away from training could be observed. All athletes should go under functional tests which simulated the game situations with no complaint during and after them so that they were considered apt again.

CONCLUSION

Several studies have investigated the incidence of injuries in soccer and it seems there is not any report on strain injury of the Obe muscle. Obe injury may be mistaken for an injury of the hip adductor muscles due to the site of the pain reported by the individual. Clinical evaluation should be based on the athlete's report in order to understand the trauma mechanism. Performance of functional tests for hip rotators is crucial to evidence possible diffuse pain, discarding hence an injury of the hip adductor group, since the site of the Obe muscle hampers an accurate palpatory examination. The use of an MRI exam is vital for the localization, classification and evaluation of the injury's extension, guaranteeing hence a precise diagnosis and allowing a safe therapeutic approach with favorable prognosis for evolution of the injury.

All authors have declared there is not any potential conflict of interests concerning this article.

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