

A CASE STUDY ON GROIN INJURIES

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Abstract: One-third of acute groin injuries are hip flexor-related, yet little is known about the specifics of these injuries. This study aimed to compare particular muscle injuries with reported injury scenarios and use magnetic resonance imaging (MRI) to describe acute hip flexor injuries in athletes with acute groin discomfort. Three sports seasons saw the prospective and sequential inclusion of male athletes with acute groin discomfort. Within 7 days following the accident, an MRI was carried out utilizing a dependable evaluation method and a standardized methodology. Included were all athletes whose acute hip flexor muscle injuries were determined by MRI.

A total of 156 athletes—of whom 33 athletes with a median age of 26 years (range, 18–35)—presented with acute groin discomfort. sixteen rectus femoris, twelve iliacus, seven psoas major, four sartorius, and one tensor fascia lathe injuries were reported. Kicking and running were the main causes of rectus femoris injuries while changing directions caused iliacus injuries more frequently. Tendonous damage was seen in 10 (63%) of the rectus femoris lesions. The MTJ was primarily the site of the iliacus and psoas major injuries, two of which contained tendinous damage.

In these muscles, we have highlighted specific damage sites that may be important for these injuries' clinical diagnosis and outcome. The majority of proximal rectus femoris injuries also involved tendinopathy. However, different acute iliacus and psoas injuries mostly happened at the MTJ. Only the iliacus or psoas major was injured during a change of direction, whereas rectus femoris injuries occurred primarily during kicking and sprinting.

Keywords: diagnosis; groin pain; hip; iliopsoas; imaging; muscle injuries; rectus femoris; thigh.

I. INTRODUCTION

The majority of acute groin injuries are adductor-related, although little is known about particular injury features that could be crucial for understanding the aetiology and treatment of these injuries. The purpose of the study was to use magnetic resonance imaging (MRI) to characterize acute adductor injuries in athletes. MRI findings of an acute adductor muscle injury in male athletes with acute groin discomfort were prospectively included.

Within 7 days following the accident, an MRI was carried out utilizing a dependable evaluation method and a standardized methodology. 71 athletes, with a median age of 27 years (range, 18–37), were among the 156 athletes who initially complained of acute groin discomfort. There were 25 athletes who sustained numerous adductor injuries, and there were 46 isolated muscle injuries.

There were 111 acute adductor muscle injuries in all, including 62 adductor longus injuries, 18 adductor brevis injuries, 17 pectineus injuries, 9 obturator externus injuries, 4 gracilis injuries, and 1 adductor magnus injury. Proximal insertion (26%), the intramuscular musculotendinous junction (MTJ) of the proximal tendon (26%), and MTJ of the distal tendon (37%) were the three primary injury sites for the adductor longus. One instance had intramuscular tendon damage. Twelve of the sixteen injuries at the proximal insertion were total avulsions.

According to this study, acute adductor injuries typically happen apart from other muscle injuries. In both isolation and in conjunction with other adductor muscle injuries, the adductor longus is the muscle that is damaged the most commonly. On MRI, three distinct sites for adductor longus injuries were seen, with avulsion injuries making up the majority of lesions at the proximal insertion and intramuscular tendon damage being rare

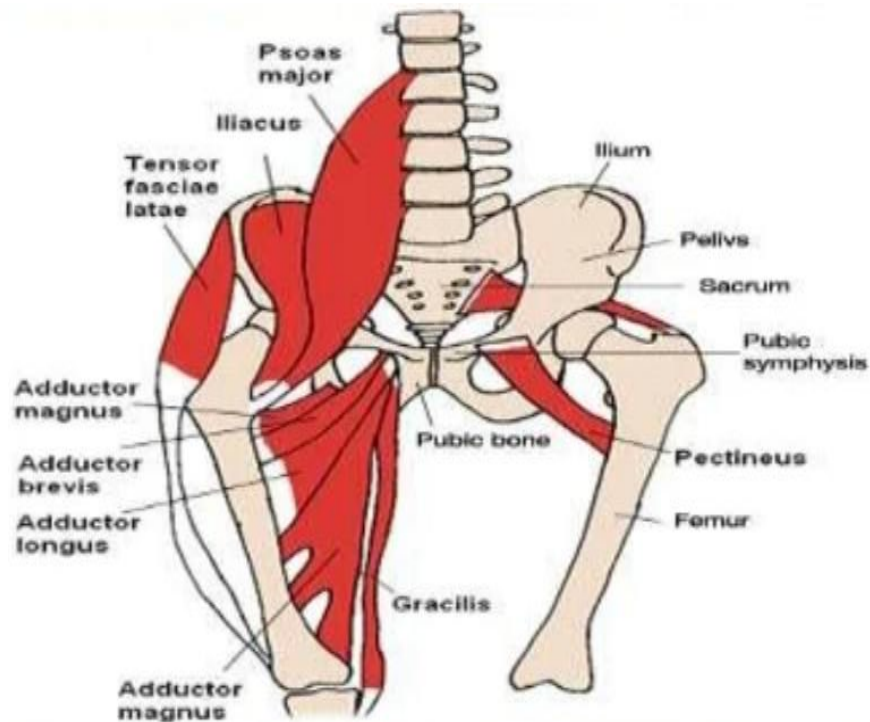


Fig (1) Overview of groin problems and injuries.



Fig (2) Different stages of groin injuries

1 EPIDEMIOLOGY OF GROIN INJURY

Groin injuries typically account for 2 to 5 percent of all sports-related injuries. The most common musculoskeletal cause of discomfort is an adductor strain. Furthermore, the discomfort that follows is frequently an unpleasant issue for those who participate in activities that require sprinting, fast acceleration, and deceleration adjustments. The adductor strain is perhaps the most common groin injury in sports. Groin injuries have been reported to occur 10%–18% often in football players. It is clear that sprains and pain in the pubic region in athletes have continued to worsen in some sports activities (e.g. hockey, soccer, and American football. Besides professional athletes, sports-related injuries in this area have been reported in 5% - 9% of secondary school students. Epidemiologically, groin injuries comprise 10 - 18% of all soccer injuries. Tyler et al. (2010) reported that in winter sports nearly 10% - 11% of all injuries are sprains worldwide. Groin sprains also comprised 10% of all injuries in Nordic hockey professionals. Mols et al. (1997) also reported that in similar sports in Finland, groin sprains were responsible for 43% of all muscle sprains. Another similar study in Nordic countries

reported that the incidence rate of groin pain was 10 - 18 cases per 100 football players. Giza et al. (2005) reported that in 2002, almost 9.5% of all male football players had groin sprains. According to another comparable study conducted in Nordic nations, there are 10 to 18 incidences of groin discomfort for every 100 football players. According to Giza et al. (2005), in 2002, groin sprains affected over 9.5% of all male football players. In 180 male players over the course of a year, 32 sprains were documented by Ekstrand and Gill Quist (1983; 13% of all cases).

Given the aforementioned, adductor sprains are not exclusive to the sports indicated. A hockey team experienced 3.2 sprains for every 1000 players. Additionally, compared to after the season, injury rates were often higher before the game season. Despite the fact that there have been many studies conducted on football injuries around the world, there is a dearth of information about the epidemiology of these injuries in Iranian football players, despite the fact that it is the most popular sport in our nation.

According to Halabchi, 21% of all injuries suffered by women doing Shotokan karate occurred to the lower extremities. In a related study, Shadanfar found that 10.1% of all injuries among professional male and female handball players occurred in the thigh, hip, and groin areas.

2 RISK FACTOR

Numerous studies have established a link between muscular/skeletal flexibility and sprains in various sports. The restriction of adductor muscle strength has been accompanied, to some extent, in all of the aforementioned trials by muscular sprains. In research including 306 football players, Arnason et al. (2004) found that a positive history of sprains and a reduced range of motion for hip abduction were risk factors.

Football players who often had groin sprains had restricted preseason hip ROM, according to Ekstrand and Gill Quist (1983). The condition still exists in various sports despite the application of prevention measures and the identification of risk factors. A predisposing factor for exercise-induced persistent groin discomfort was suggested to be decreased hip ROM. The most typical risk factors for adductor muscle sprains include stiffness, history, and an imbalance in the strength of the adductors and abductors in the hip.

3 CAUSES OF GROIN INJURY

From a causal perspective, the symptoms for different sorts of groin injuries can range from non-persistent benign acute symptoms to chronic, occasionally life-threatening disorders. One or more muscular/skeletal structures may be the source of the resultant local or widespread discomfort. Acute or chronic pain that can be viewed as the result of damage may appear similar to some chronic conditions.

In a thorough review of groin pain, Hackney RG (2012) discusses both common (hip joint pathology, hernia, snapping psoas) and uncommon (stress fracture, spinal pathology, intrapelvic causes) causes as well as differential diagnosis. Groin pain is characterized by an abnormal gait, unstable pubic symphysis, and hernia, as well as the concurrent presence of multiple hernias. Cause of pain even after one or a few of its causes have been treated. Furthermore, Freckleton G (2011) lists hamstring muscle sprain as the most frequent kind of injury in workouts requiring rapid changes in speed and acceleration.

Airele et al.'s research, however, indicated that overuse injuries were thought to be the primary reason for groin injuries. Numerous factors can contribute to groin discomfort, and 27% of instances have more than one component. However, it has been suggested that the primary cause of discomfort in football players and skaters is the training of each of the three adductor muscles.

According to Ekstrand et al. (1999), the major cause of groin discomfort is a muscular/tendinous strain in the adductor muscles and other muscles that cross the hip area. Groin injuries can result in persistent impairments. An estimated 0.81 injuries occur for every 1000 hours of activity among male football players.

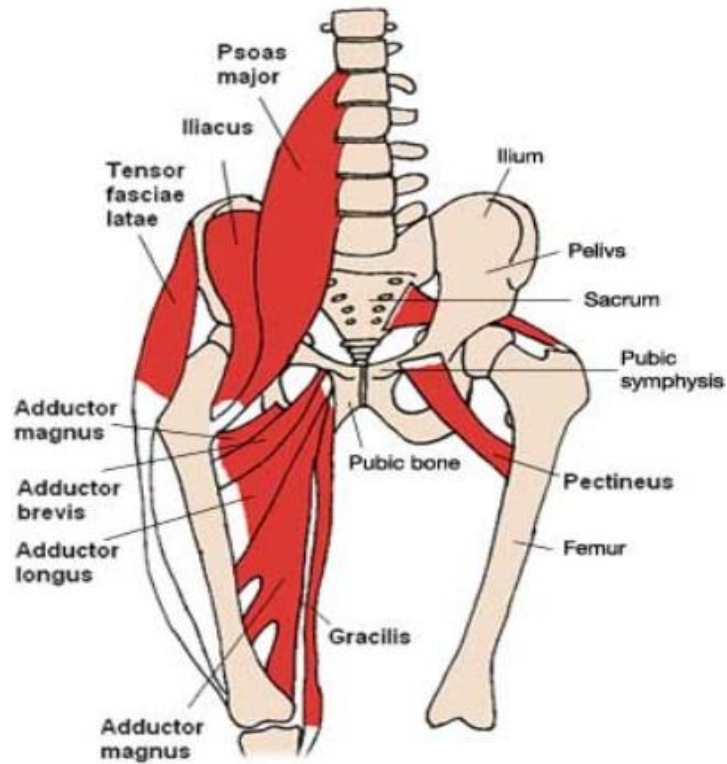


Fig (3) Groin Strain

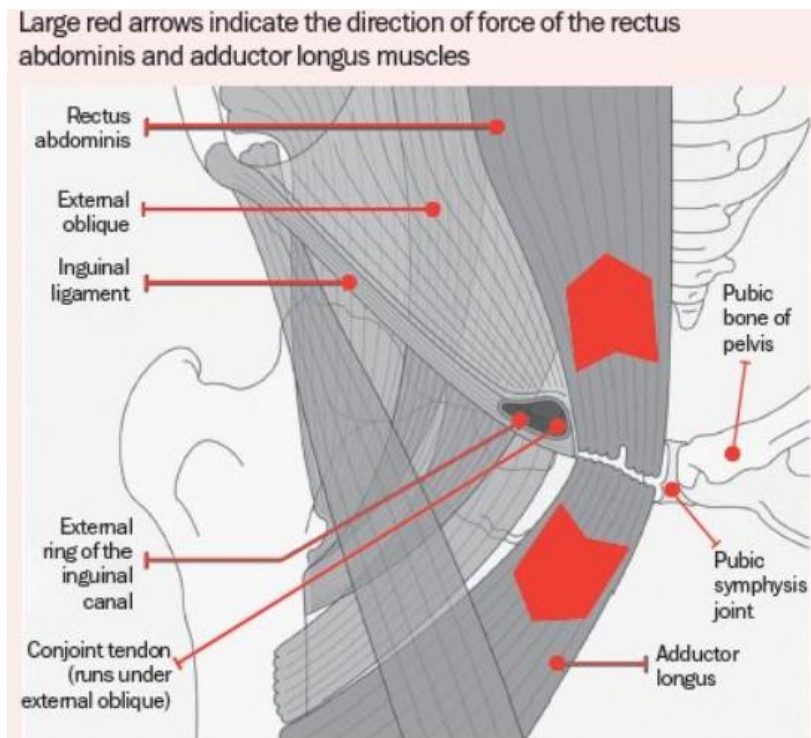


Fig (4) Anatomy of the groin region

II. LITERATURE SURVEY

The author has resulted that [1] One of the most frequent ailments associated with athletics is groin damage. This review's objectives were to describe the epidemiology, pinpoint risk variables, and look at both preventative and interventional strategies for lowering the incidence of this type of injury among athletes. In this, the author has resulted that [2] With an emphasis on acute musculotendinous groin lesions, provides a multi-dimensional MRI evaluation technique and analyses score repeatability. In this, the author has resulted that [3] Hip flexor injuries account for one-third of acute groin injuries, yet little is understood about how they occur. In order to evaluate acute hip flexor injuries in athletes experiencing acute groin pain, this study used magnetic resonance imaging (MRI) to compare specific muscle lesions with reported injury situations. Male athletes who experienced severe groin pain were gradually added to three sports seasons. An MRI was performed using a reliable assessment method and a regular operating procedure within 7 days of the accident. All athletes with hip flexor injuries that were discovered by MRI were included. A total of 156 athletes—of whom 33 presented with severe groin pain—had a median age of 26 years (range, 18–35).

The following injuries were noted: sixteen rectus femoris, twelve iliacus, seven psoas major, four sartorii, and one tensor fascia lathe injury. While iliacus injuries were more usually induced by changing directions, rectus femoris injuries were mostly caused by running and kicking. In 10 (63%) of the rectus femoris lesions, tendon injury was seen. Major lesions to the iliacus and psoas, two of which had tendinous injuries, were large to the MTJ. We have emphasized certain areas of injury in these muscles that may be crucial for the clinical diagnosis and prognosis of these injuries. In most cases, tendinopathy was also seen in proximal rectus femoris injuries. However, different acute iliacus and psoas injuries mostly occurred at the MTJ. When changing directions, only the iliacus or psoas major was hurt; in contrast, rectus femoris injuries mostly happened when kicking and running. In this the author has resulted that [4] High-intensity sports frequently result in acute groin injuries, however, there is a lack of information on these injuries' features, including their causes, clinical manifestations, and imaging results. In this, the author has resulted that [5] The term "athletic groin pain" (AGP) covers a wide range of chronic disorders that cause discomfort in the inguinal area.

This study compared the rates of return to play (RTP rate) and timeframes of return to play (RTP time) following surgical and rehabilitative therapies for AGP. In this, the author has resulted in that [6] Stretching is commonly utilized in rehabilitation protocols for groin discomfort or injury; however, it is unclear how stretching specifically contributes to and fits into multimodal healing procedures. Our aim was to thoroughly examine the benefits of stretching for groin injury or pain rehabilitation. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards, PICOS eligibility criteria were used: Athletes with groin pain or injuries; interventions with stretching as the differentiating factor; comparison groups not using stretching; outcomes symptom remission or improvement and/or time to return to sport and/or return to play; study design randomized controlled trials. On March 26, 2021, searches were conducted in the databases CINAHL, Cochrane Library, EBSCO, EMBASE, Pedro, PubMed, Cielo, Scopus, SPORT Discus, and Web of Science without respect to language or time restrictions. Out of the 117 results that were found, 49 were eliminated during screening and 65 were duplicates.

The three papers that were qualified for full-text analysis did not meet all of the inclusion requirements (participants, intervention, and/or comparators). We next looked outside the protocol for non-randomized trials and case series, but we were unable to locate any interventions where stretching was the key differentiator. There were no studies that looked particularly at how stretching helped athletes recover from groin injuries or treat their discomfort. The effectiveness of these therapies is currently uncertain, and more study needs to be warranted. In this, the author has related that [7] One of the most typical ailments that occur when playing sports is groin injury. The objective of this research was to describe the epidemiology, identify risk factors, and assess preventative and interventional approaches for lowering the incidence of this type of injury among athletes.

Problem Statement: Groin Injuries

Groin injuries are a prevalent and debilitating problem affecting individuals involved in various physical activities, including sports, exercise, and everyday movements. These injuries typically involve the muscles, tendons, and ligaments in the groin region, leading to pain, reduced mobility, and decreased quality of life.

Despite their high incidence and significant impact on individuals, groin injuries present several challenges that need to be addressed:

1. Lack of accurate diagnosis: Groin injuries encompass a range of conditions, such as strains, sprains, hernias, and hip-related problems, making their diagnosis complex. The absence of reliable diagnostic tools and standardized assessment methods often leads to delayed or incorrect diagnoses, hampering appropriate treatment and recovery.



2. **Inadequate prevention strategies:** While groin injuries can occur due to accidents, many are preventable through proper conditioning, warm-up exercises, and technique correction. However, there is a lack of widely accessible and evidence-based prevention strategies tailored to different populations, including athletes, weekend warriors, and individuals with sedentary lifestyles.
3. **Limited treatment options:** Effective treatment options for groin injuries are limited, and the available interventions often focus on symptom management rather than addressing the underlying causes. This results in prolonged recovery periods, recurrent injuries, and a significant economic burden on individuals, healthcare systems, and society as a whole.
4. **Insufficient rehabilitation protocols:** Rehabilitation is crucial for groin injury recovery, but there is a lack of standardized and comprehensive rehabilitation protocols. This leads to variations in the quality and effectiveness of rehabilitation programs, hindering optimal recovery outcomes and increasing the risk of re-injury.
5. **Impact on athletic performance:** Groin injuries can have a profound impact on an athlete's performance and career, often leading to extended absences from training and competition. The absence of tailored and evidence-based return-to-sport guidelines further exacerbates the challenges faced by athletes in safely resuming their activities and preventing re-injury.

Addressing these challenges associated with groin injuries is crucial to improve diagnostic accuracy, enhancing prevention strategies, developing effective treatment options, establishing comprehensive rehabilitation protocols, and optimizing return-to-sport guidelines. By doing so, individuals at risk of groin injuries can receive appropriate care, leading to faster recovery, reduced recurrence rates, and improved overall well-being. Additionally, a more comprehensive approach to groin injuries can benefit athletes, recreational sports enthusiasts, and individuals in various occupational settings, minimizing the personal, societal, and economic impact of these injuries.

Overcoming Groin Injuries

To address the challenges associated with groin injuries, several measures can be taken to improve prevention, diagnosis, treatment, rehabilitation, and return-to-sport protocols. Here are some strategies to overcome groin injuries:

1. **Enhanced prevention strategies:** Implementing evidence-based prevention programs that focus on proper warm-up exercises, strengthening exercises for the groin muscles, and technique correction can significantly reduce the incidence of groin injuries. These programs should be tailored to different populations and sports activities, emphasizing education, conditioning, and injury risk awareness.
2. **Accurate diagnosis:** Develop and promote the use of advanced diagnostic tools and standardized assessment methods for groin injuries. This may include imaging techniques such as ultrasound, magnetic resonance imaging (MRI), or diagnostic injections to aid in precise diagnosis and differentiate between various groin conditions.
3. **Improved treatment options:** Conduct research to explore and develop innovative treatment approaches for groin injuries. This may involve collaborations between medical professionals, physiotherapists, and researchers to investigate new interventions such as regenerative therapies, minimally invasive surgical techniques, and targeted rehabilitation strategies that address the underlying causes of groin injuries.
4. **Comprehensive rehabilitation protocols:** Establish standardized and comprehensive rehabilitation protocols for groin injuries. These protocols should include specific exercises targeting the affected muscles and soft tissues, as well as progressive loading programs to rebuild strength, flexibility, and functional movement patterns. Rehabilitation should also address any underlying biomechanical issues and incorporate principles of pain management and psychological support.
5. **Evidence-based return-to-sport guidelines:** Develop evidence-based guidelines to guide athletes' safe return to sports activities following groin injuries. These guidelines should consider individualized assessments, functional testing, and progression criteria to ensure a gradual and successful return while minimizing the risk of reinjury. Collaboration between sports medicine professionals, coaches, and athletes is crucial to implementing these guidelines effectively.
6. **Education and awareness:** Increase public awareness and education about groin injuries, their risk factors, and preventive measures. This can be achieved through public health campaigns, sports organizations, and community

initiatives to promote proper training techniques, warm-up routines, and the importance of seeking early medical attention for groin pain or discomfort.

7. Research and collaboration: Encourage research collaborations between medical professionals, researchers, and sports organizations to advance the understanding and management of groin injuries. Funding support for research projects investigating prevention, diagnosis, treatment, and rehabilitation strategies can drive innovation and improve outcomes for individuals with groin injuries.

By implementing these strategies, it is possible to overcome the challenges associated with groin injuries, ultimately reducing their incidence, improving diagnostic accuracy, optimizing treatment outcomes, and facilitating a safe return to physical activities.

CONCLUSION

Groin injuries are a significant problem that affects individuals engaged in various physical activities, causing pain, reduced mobility, and decreased quality of life. Addressing the challenges associated with groin injuries requires a comprehensive approach focused on prevention, accurate diagnosis, effective treatment, tailored rehabilitation, and evidence-based return-to-sport protocols.

By implementing enhanced prevention strategies, such as targeted conditioning and technique correction programs, the incidence of groin injuries can be reduced. Additionally, the development and promotion of advanced diagnostic tools and standardized assessment methods can aid in accurate and timely diagnosis, facilitating appropriate treatment and recovery.

Improving treatment options for groin injuries, including innovative interventions and regenerative therapies, can help address the underlying causes and shorten recovery periods. The establishment of comprehensive rehabilitation protocols, incorporating specific exercises, progressive loading, and addressing biomechanical factors, is essential for restoring strength, flexibility, and function in the affected groin area.

Evidence-based return-to-sport guidelines ensure a safe and successful return for athletes, minimizing the risk of reinjury. Education and awareness initiatives play a vital role in promoting proper training techniques, warm-up routines, and early medical attention for groin pain or discomfort. Collaboration between medical professionals, researchers, sports organizations, and individuals affected by groin injuries is essential to drive research, innovation, and knowledge sharing in this field. By implementing these strategies, it is possible to overcome the challenges associated with groin injuries, leading to improved outcomes, reduced recurrence rates, and enhanced overall well-being for individuals at risk.

Ultimately, a comprehensive approach to groin injuries benefits not only athletes but also individuals in various physical activities and occupations, alleviating personal suffering, minimizing societal and economic burdens, and promoting a healthier and more active lifestyle.

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