

Report of Gaelic Groin Think Tank

PREVENTION AND
MANAGEMENT OF

Chronic Groin Pain in Gaelic Football

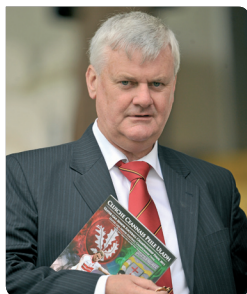


Sports Institute Northern Ireland in Association with Ulster Council GAA

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02

It is with great pleasure that Ulster GAA in partnership with The Sports Institute of Northern Ireland (SINI) welcome this concordat on the management of the “Gaelic Groin” phenomena.

Player welfare continues to be at the centre of coaching and games development and this new initiative will challenge us all to live up to those ideal standards. This initiative has involved medical personnel from our Counties as well as SINI. It has examined current practice and novel management strategies for this acute Gaelic groin condition.

We in Ulster GAA acknowledge the contribution of The Sports Institute, our own coaching and games staff along with the senior county medical teams throughout Ulster. This forum has provided an opportunity for senior county medical teams to share insights and experiences into the management of this difficult condition. Even more significant is the fact that they have produced a best practice resource in terms of prevention, assessment and treatment options.

Aogan O Fearghail

UACHTARÁN, CLG ULADH
PRESIDENT, ULSTER GAA





The Sports Institute Northern Ireland (SINI) is delighted to present this document in Chronic Gaelic Groin injuries.

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This piece of work involved strong collaboration with many medical personnel from within the GAA as well as years of practical learning at SINI.

It is important to acknowledge the longstanding relationship SINI has with the Ulster GAA Council and County teams.

Medical management within GAA has progressed significantly over the last number of years and this piece of work is testament to the changing attitudes within the sport.

We are grateful for the cooperation from the Ulster Council and the senior county medical teams and we hope that this document will act as a best practice resource that players, medical teams and managers will refer to.

Dr Shaun Ogle

EXECUTIVE DIRECTOR,
SPORTS INSTITUTE NORTHERN IRELAND

Athletic groin pain is a common and troublesome condition associated with sports involving twisting, turning and kicking and is a particular challenge in gaelic field sports, particularly football.

Recent injury surveillance data for senior level County gaelic football identified groin injury as the second most common problem following hamstring strain (The GAA Annual Injury Report, Season 2007). Furthermore, injury data from the Sports Institute Northern Ireland (SINI) revealed a particularly high incidence of chronic groin pain in academy level Gaelic footballers over a 5 year period (24% of all players). The current report is the result of a 'Gaelic Groin Think Tank' initiated by SINI in conjunction with the Ulster Council GAA. Members of the SINI sports medicine team met with Ulster County and University coaches, medical and physiotherapy staff. During this meeting open discussions regarding the predisposing factors related

to groin pain and its management were facilitated by SINI staff. Following this, a smaller group met a second time in an attempt to distil the conclusions from the initial meeting and to make appropriate recommendations for practice. The current report provides an overview of the issues related to groin pain in gaelic field sports and contains specific recommendations for effective management of a challenging condition.

“Unless the causes of chronic groin problems are addressed, we as a sport will only ever be fire fighting when we come to deal with the symptoms.”

Adrian McGuckin
GAA COACH

Although commonplace in gaelic football, much of the underlying factors relating to groin pain have been poorly described, which perhaps reflects the complex nature of the area.

Considering that the groin is a junction of three key anatomical areas (trunk, pelvis and lower limbs) it is not surprising that the clinical presentation of gaelic groin pain is often equally multifarious. Various presentations involving the pubic symphysis (Brennan et al, 2005), pubic bone stress (Verral et al, 2007) adductor tendon, psoas, hip joint (Holmich et al, 2004) and posterior abdominal wall (Orchard et al, 1998) have been described. In light of the complex nature of the anatomy in the region and the close functional and structural links between the various tissues, it is not surprising that multiple pathologies are often co-existent (Morelli and Smith, 2001). Indeed, pain, as observed by Orchard et al (2000), is not always a good indicator of pathology.

As a result, **the footballer with groin pain tends to present with a range of signs and symptoms** including reduced hip internal rotation (Verrall et al, 2005), reduced pelvic stability (Mens et al, 2006), decreased range of short hip adductors (Harvey et al, 1998), reduced hip adductor strength (Verrall et al, 2005b; Holmich et al, 2004) and altered muscle recruitment patterns (Jansen et al, 2010).

Furthermore, in addition to the complex interaction of the anatomical structures affected, gaelic groin is **frequently associated with high training loads** and is most frequently observed in athletes who

have engaged in a large volume of intense training or competition for an extended period of time. Consequently, it is suggested that the development of gaelic groin pain is the **result of a chain of events related to overuse, mechanical dysfunction and chronic changes of the involved structures** (this chain of events is summarised in Figure 1).

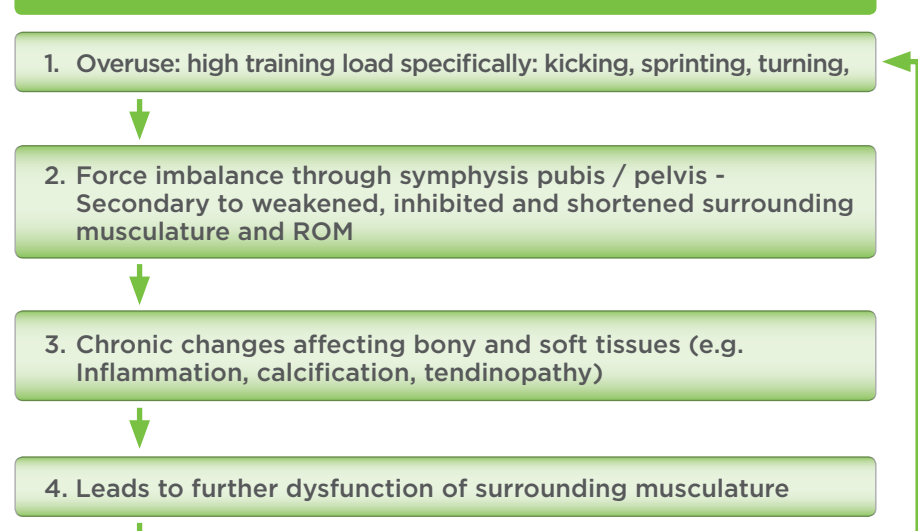
Another significant component of groin pain in this population is that players are often able to continue to train and compete in the presence of pain. **Athletes will regularly 'struggle on' with symptoms through one or more seasons until the condition deteriorates or performance is limited to a point that makes intervention obligatory.**

Generally, the severity of the condition and, as a consequence, the time required for symptoms

to resolve tends to be related to the duration of the symptoms. As a result early identification and management is recommended.

Given the complex and interconnected nature of gaelic groin pain, it is suggested that for any management approach to be effective it must consider, not only the structures specifically affected but the integration of the various anatomical structures into effective function of the entire kinetic chain as well as addressing any predisposing factors (most notably the nature and volume of workload).

Figure 1. Stages in the Development of Gaelic Groin Pain



While many strategies have been suggested for the management of athletic groin pain, these have often focussed on one anatomical structure (e.g. adductor longus, rectus abdominis) and as such may be limited in terms of their longer-term outcomes.

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A number of authors have described the intricate relationship between both contralateral and ipsilateral hip adductors and abdominal musculature (Robertson et al, 2007; Tuite et al, 1998; Strauss et al, 2007). Consequently, adductor longus, rectus abdominis, obliquus internis and transversus abdominis all have the potential to contribute to a composite mechanism that provides stability and force transmission in the groin. If, as postulated above, groin pain results from an imbalance of forces through the symphysis pubis / pelvis then a management approach directed at only one tissue or dysfunction may be ineffective. In addition, any technical deficiencies that may be present, for example kicking or cutting technique may further exacerbate the condition and as such particular focus should be placed on technically correct performance of sport-specific skills.

It is therefore reasonable to suggest that **management of patients with groin pain should adopt an interdependent approach** that addresses each of the factors outlined. **One of the primary factors in the rehabilitation of groin pain is modification of training load**, without which it is often impossible to effectively address key mechanical dysfunctions.



Rehabilitation

The **focus of rehabilitation should be directed at re-establishing efficient load transfer across the pubic region**. In order to achieve this, it is necessary to address a range of factors most notably retraining the global muscle / sling system, restoration of joint mobility and muscle extensibility as well as addressing any strength deficits.

Given that a number of dysfunctions may be present in the affected athlete, it is suggested that strategies are employed to address each of the observed deficits and to effectively integrate their rehabilitation into sport-specific movements. Common dysfunctions and proposed interventions are summarised in Table 1 below.

Table 1 – Gaelic Groin Rehabilitation Components

MECHANICAL DYSFUNCTION / MOVEMENT IMPAIRMENT	PROPOSED INTERVENTION
Reduced Hip Joint Range of Motion	Hip joint mobilisation: <ul style="list-style-type: none"> • Passive • Active
Reduced mobility of hip musculature (esp. gluteals, hip flexors and external rotators)	Flexibility training for hip musculature: <ul style="list-style-type: none"> • Hip flexors • Hip external rotators • Gluteals
Reduced Single leg Control	Single leg neuromuscular control training
Reduced Eccentric Hip Control	Dynamic force reduction training (landing mechanics): <ul style="list-style-type: none"> • Bilateral • Unilateral
Reduced Adductor Strength	Adductor strength training (Weight and non-weight bearing) <ul style="list-style-type: none"> • Isometric • Concentric • Eccentric
Reduced Hip External Rotator Strength	Hip rotator strengthening
Reduced Eccentric Abdominal Control	Eccentric abdominal training-uniplanar and multiplanar.
Reduced Lumbar Spine Range of Motion	Lumbar spine mobilisation: <ul style="list-style-type: none"> • Lower lumbar flexion
Poor Posture	Postural Re-education
Poor Lumbopelvic and Pelvofemoral control	Specific training of dynamic lumbopelvic and pelvofemoral control through range: <ul style="list-style-type: none"> • Lumbar extension / flexion control • Hip rotation control
Reduced Thoracic Rotation	Mobilisation thoracic spine: <ul style="list-style-type: none"> • Extension • Rotation Flexibility training thoracic spine and upper trunk: <ul style="list-style-type: none"> • Anterior chest wall • Trunk rotation
Reduced Inter-limb Coordination	Retrain functional integration of upper and lower limbs into sport-specific movement patterns
Sport-Specific Skills	Kicking <ul style="list-style-type: none"> • From hand • From the ground Catching Cutting Tackling Player evasion

Clearly, an athlete may present with one or more of these dysfunctions; effective management will require the appropriate development of a rehabilitation programme that addresses the issues specific to that individual. It is essential that each of these factors are addressed concomitantly to accelerate recovery and minimise recurrence.

History

Groin injuries are most common in sports **that involve twisting / turning / cutting and kicking e.g.** soccer, Australian Rules football and GAA football. When a patient presents with “groin pain” the potential list of diagnoses is long and the value of a good and thorough history cannot be over-emphasised. When the clinician has **completed their history taking, they should have a good working differential of likely diagnoses** upon which to base the subsequent examination. .

Important features to gather from the history include:

Onset & duration of pain – An acute inciting event or a gradual insidious onset? It is common for players to try and play on with or through a groin injury – is this a feature? For how long has the problem been going on? Frequently the cause is multifactorial and this is especially true in more longstanding injuries.

Progression of symptoms – it is important to ascertain if there has been an inciting event and to assess how symptoms have progressed since then.

Site of pain – The site where the athlete feels the pain. Is this discretely localised or more diffuse? Precise anatomical location of the pain can point to likely diagnoses e.g. pain localised to the proximal adductor muscles might suggest muscle strain whereas pain located to the region of the inguinal canal

might suggest a sportsman’s hernia. Since the origin of the pain is frequently multifactorial it is not unusual for the location of the pain to be somewhat diffuse.

Intensity and quality of pain – Why is the athlete presenting now? What does the pain prevent the athlete doing? How does the athlete describe the pain? Does the injury “warm-up” with exercise? Is post exercise stiffness a feature?

Impact on performance – Has the injury impacted on the athlete’s ability to perform to their desired level?

Previous history – Previous hip or groin injury is known to be a significant predictor of future injury¹. Any significant previous injuries should be noted. Also ask about any history of hip problems in childhood. Is there a history of any other significant medical conditions?

Level of sport and sporting load – It is known that the risk of sustaining a groin injury increases with the level of competition and number of training sessions². We feel that groin pain in GAA football is frequently related to overuse and hence the exact load that an athlete has been subjected to should be ascertained.

Occupation – The player’s ability to work may be compromised due to his groin pain. Similarly his ability to rest the injury may be compromised by the demands of his workplace.

Swelling / colour changes – The player should be asked about any swelling either temporary, transient or recurrent. Similarly, any history of bruising should be enquired about.

Triggers – What brings on the pain or makes it worse? Specifically ask about any pain with coughing or sneezing that may point towards a diagnosis of hernia.

Systems Review – The clinician should ask about general health and specifically look for any red flags; specifically target questions to the genito-urinary system. This is especially important in an “injury” with atypical presentation.

Features of a sports hernia on clinical examination

When a sports hernia is present, maximal **tenderness is normally located either over the mid-inguinal region, conjoint tendon (of transversus abdominis and obliquus internus) or the pubic tubercle. A dilated or tender superficial inguinal ring** (examined by invaginating the scrotum and asking the patient to cough) is often present on clinical examination.

¹ Gabbe B J, et al The association between hip and groin injuries in the elite junior football years and injuries sustained during elite senior competition. Br J Sports Med 2010;44:799-802

² Hölmich P, Larsen K, Krogsgaard K, Gluud C Exercise program for prevention of groin pain in football players: a cluster-randomized trial. Scand J Med Sci Sports. 2010 Dec;20(6):814-21.

Investigations

Having completed the history and physical examination the clinician needs to decide if any further investigations are required to definitively make a diagnosis and hence formulate a treatment plan.

Radiological investigations are not a substitute for careful history taking and clinical examination.

Care should be taken at this stage that we treat the patient and not the scan. It is not uncommon for radiological diagnosis to mislead the clinician. The choice of investigation will be governed by the likely diagnoses. Investigations utilised in this region include:

Plain radiography – This can be a very useful (yet often overlooked) initial investigation. It is relatively cheap and easily accessible and can assess both the hip joints and the symphysis pubis. Caution should be used if a pelvic stress fracture is suspected since plain radiography can be normal -especially in the early stages.

MRI – Magnetic resonance imaging has become more accessible in recent years. It is important that the scan should be reported by an experienced MSK radiologist. It is useful to assess a number of different potential problems in the groin region including bony stress injuries, muscle and tendon injuries and hip joint morphology. It is also good for assessing the symphysis pubis. In very experienced hands it can also be used to help identify hernia.

Ultrasound scanning –

Ultrasonography is a very useful tool but is operator dependent. It can usefully assess adductor tendon and muscle morphology – although this is much easier in thinner or less muscled individuals. Ultrasound has been also been used to demonstrate posterior abdominal wall insufficiency in sports hernia.

MR Arthrogram – This is the investigation of choice if labral injury of the hip is suspected.

CT scan – CT scans are often used as a secondary tool to assess bone pathology.

Isotope bone scans – Traditionally used to aid the diagnosis of stress fractures, in practice these are now used a lot less often because MRI is now usually the investigation of choice in this condition.

Bloods / Urine – The decision to test blood or urine is symptom or sign driven – e.g. to screen for infection or inflammation as a cause of pain.



Examination

Following history taking, the acquisition of information from the clinical examination helps to form a clinical picture. Specific examination of the groin should include three broad types of test: palpation, passive stretch and active muscle contraction. Before focusing on the groin a global picture of the athlete's movement qualities should be determined and assess general spinal range of movement and functional tests. Whilst groin pain somatically referred from the lumbar spine is unlikely it must be ruled out.³ It is also acknowledged that physicians and physiotherapists tend to adopt slightly different approaches to player assessment; as such the following list includes elements of both type of examination.

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Observation

- **Observe the resting posture of the athlete - do they have good postural tone and postural awareness?** Chronic groin pain sufferers often have a "kyphotic / lordotic" (thoracic /lumbar) posture with associated tight hip flexors, long weak abdominals and reduced thoracic extension. As outlined above this will influence the rehabilitation process.
- In athletes describing a localised swelling in the lower abdominal/ inguinal region (e.g. an inguinal hernia) - observe in standing and lying.

- How does the athlete get on/off the bed? Are they happy to engage their abdominals when lying down/rising? Inability to do so can be a poor prognosticator.

Spinal Examination

- Observe the planar movements of the lumbar and thoracic spine (flexion, extension, side flexion and rotation).
- Assess combined movements of the lumbar spine.
- Palpate accessory lumbar intervertebral range.

The Sacroiliac Joint

With the ability to refer to the groin it is important to clear the SI joint as a source of symptoms. The reproduction of pain in examination should occur posteriorly in the region of the buttock. Vleeming (2010) suggests using a composite of pain provocation tests and palpation of the long dorsal ligament to confirm the presence of an SI joint problem.⁴

Palpation

The following structures should be investigated with the athlete in a relaxed crook lying position:

- Proximal adductor tendons and the pubic tubercle.
- Symphysis pubis.
- Rectus abdominis attachment and the superior pubic ramus.

Features of a sports hernia on clinical examination

- Maximal tenderness located either over the mid-inguinal region, conjoint tendon (of transversus abdominis and internal oblique) or the pubic tubercle.
- A dilated or tender superficial inguinal ring (examined by invaginating the scrotum and asking the patient to cough) is often present on clinical examination.⁵

³ It was the group's experience that chronic groin pain caused by an obturator nerve entrapment was rarely seen in this group of sportsmen- as such the examination does not include neural examination but it should be used when indicated.

⁴ Laslett (2005) demonstrated high sensitivity (94%) and specificity (78%) when three out of six pain provocation tests were used to diagnose SIJ involvement and to rule it out when negative.

⁵ These findings need to be interpreted bearing the overall patient's presentation in mind. Groin pain sufferers are often dilated (dihesence) on both sides and many asymptomatic individuals display dilation.





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Hip/Groin Specific Tests:

Hip Joint

Range of Movement: test movement through range and quality of end feel.

- flexion, abduction, adduction, internal rotation, external rotation and extension.

Combined movements:

- Patrick's FABER (Flexion Abduction External Rotation) The region of symptom reproduction is important as the hip joint, SI joint or adductor tendon may all be stressed.
- Quadrant (hip flexion with internal rotation and adduction) - this will often reproduce symptoms in the hip joint including femoro-acetabular impingement. Tightness in the gluteal/external rotators may limit range in this test.
- Bent Knee Fall Out (Bilateral). This test demonstrates available range within the hip adductors and is often markedly reduced with hypertonia and guarding.⁶

Resisted testing: The region of symptom reproduction should be noted and it is useful to score the pain using a VAS for future reference.

- Resisted hip flexion at 90 degrees.
- Bilateral hip adduction "the squeeze test" at 0, 45 and 90 degrees of hip flexion.⁷
- Hip internal rotation, external rotation and abduction.
- Abdominal flexion; resisted abdominal flexion and rotation performed in crook lying.

Combined testing

Pubic Stress Tests: In Thomas test position assess

- passive range of hip extension and abduction.
- resisted hip flexion and adduction in the hanging leg (Cross over sign)⁸

Motor Control tests.

Active Straight Leg Raise: Assess the athlete's ability to transfer load effectively between the trunk and the lower limbs (Mens et al 2002, 2006). In a supine position score the perceived effort in lifting each leg 20cm off the bed.⁹ Apply pelvic belt and reassess ASLR and Squeeze test. Marked changes in strength, effort and pain may have implications for diagnosis and rehabilitation.

Where a Patient Reported Outcome Measure is required the HAGOS (hip and groin outcome score) has been validated by Thorburg and Holmich (2011) for use with a young chronic hip and groin pain population (A user's guide can be found at: <http://www.koos.nu/HAGOSuserguide.pdf>).

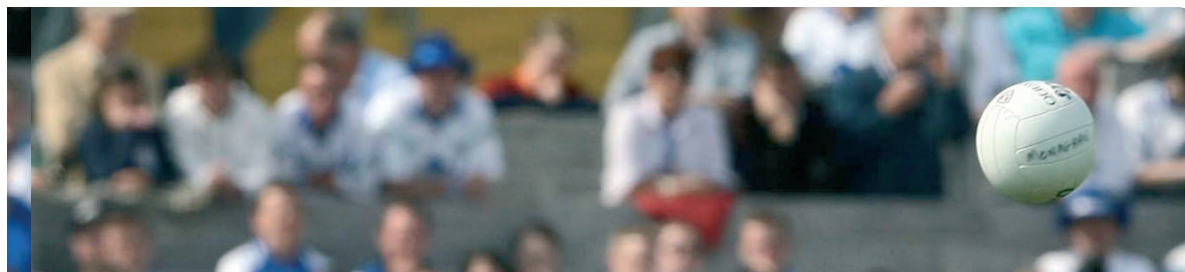
⁶ This test has high intra rater (ICC 0.9) and inter rater reliability (ICC 0.93) in footballers with/without chronic groin pain. (Malliaris P et al 2009)

⁷ The squeeze test has been shown to have high intra-rater reliability (ICC 0.94) and inter-rater reliability (ICC 0.83) in footballers with/without chronic groin pain. (Malliaris P et al 2009). An athlete complaining of chronic groin pain and having pain on a squeeze

test has a 92% chance of having bone marrow oedema on MRI (Verral G et al 2007)

⁸ This will not only test the iliopsoas muscles and tendons but will stress all the tissues across the symphysis. Often pain will be reproduced on the opposite leg to that being tested and this is often associated with a poorer prognosis. (High sensitivity, low specificity)

⁹ When the lumbopelvic/hip region is functioning optimally, the leg should rise effortlessly from the table (effort can be graded from 0 - 5) and the pelvis should not move (flex, extend, laterally bend or rotate) relative to the thorax and/or lower extremity. This requires proper activation of the muscles (both in the local and global systems) which stabilize the thorax, low back and pelvis.



The “Quick Fix”

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Discussion during the think tank highlighted the recurring theme of players seeking or being exposed to what can be described as “quick fix” type treatments. It was recognised that players often play with or through groin pain for considerable periods of time before they seek treatment. By the time they seek treatment, the cause of their pain is often multifactorial, and hence any successful treatment plan needs to address all contributing factors.

Unless underlying dysfunctions are identified and rectified there is a significant risk of re-injury. Treatments that mask symptoms to allow early return to play can be counter-productive as the player is exposed to increased risk of further injury and ultimately a longer period of time away from the playing field. We feel that **therapeutic interventions** should be seen as part of an overall treatment plan and while they **may have an important role to play in facilitating effective rehabilitation, they should not be used to hasten a premature return to play.**

Gaelic Groin: Pharmacological Interventions

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Pharmacological Interventions

Drugs can be useful in pain management. They are especially beneficial when combined with an appropriate rehabilitation programme. Care however should be taken that **medications are not used to merely mask an injury allowing a player to continue playing and hence aggravating their injury.**

Paracetamol is a good, relatively safe and well tolerated analgesic. Unlike NSAIDS, paracetamol has no deleterious effects on bone healing and is therefore a good first choice drug for pain management.

NSAIDS are frequently overused. They hamper bone healing and are potentially harmful to the GI, Renal and cardiovascular systems. They should be used judiciously.

Corticosteroids are most frequently administered by the injectable route. They can be a useful adjunct in managing symphyseal pain to permit appropriate rehabilitation but should not be used as a "quick fix". Corticosteroids can potentially weaken tendons and thus care must be exercised when administering them for groin injuries.

Local anaesthetics - Injectable local anaesthetics can be most useful as diagnostic agents in hip and pelvis problems. If the pain settles following the injection of anaesthetic, the site that has been injected can be identified as the source of pain.

Autologous Blood and Platelet Rich Plasma Injections (PRP) have gained much recent attention and both have been used for tendon and muscle injuries around the groin. Controversy still exists regarding the optimum way to prepare and deliver PRP and current evidence regarding the efficacy of these injections is limited.

Bisphosphonates have been used in pubic stress injuries with the aim of facilitating bone healing.

Surgical Intervention

Sports hernia is a term used to describe different inguinal pathologies relating to tears of the conjoint tendon, transversalis fascia or external oblique aponeurosis. Various surgical techniques are often used to repair these injuries including both open and laparoscopic procedures. Some techniques also concentrate on releasing or dividing nerves that have become entrapped (either the ilio-inguinal or genital branch of the genitofemoral nerves). Adductor tenotomy has also been used where adductor pathology is suspected.

Surgery for hip pathology in sportspeople has become increasingly popular over the past few years. Laparoscopic techniques are now employed for a number of different pathologies including acetabular labral injuries, osteochondral defects, loose bodies, ligamentum teres injuries, iliopsoas problems and bony impingement. Many techniques are relatively novel and long term success rates are uncertain.



Prevention of Chronic Groin Pain in Gaelic Football.

Like its rehabilitation, **the prevention of chronic groin pain requires a multifactorial approach.** This approach requires interventions at a number of levels to fundamentally deal with the various contributory factors. As indicated above, groin pain appears to be related to the relationship between overuse and a reduced ability of the pelvis to transfer forces. As such, **any prevention programme should not only attempt to increase players' ability to effectively transfer forces across the pelvis but also tackle the larger issue of load management.**

LEVEL OF INTERVENTION	
Primary	Athlete
Secondary	Squad/Coach
Tertiary	Sport

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Primary Interventions.

The key aim of this intervention focuses on the relative risk of developing groin pain in the near future. Like most other injuries a previous history of groin pain is linked to an increased risk of its recurrence. By **establishing who within a squad has a history of pain** one can direct further need for intervention (this can be carried out through the use of a questionnaire or interview). Included in the appendix is a risk calculator where severity of symptoms can

be factored against how recently they were experienced to give a gross measure of recurrence risk. **No single test can effectively identify those at risk of developing groin pain although there are several clinical findings that when combined can help highlight those at increased risk.** It is well established that athletes with chronic groin pain have reduced hip joint range of movement (Verral et al 2005), altered abdominal muscle function (Cowan et al 2009) and weaker adduction or abduction strength (Silvers 2011). By examining

active and passive hip range of movement (rotation and extension), hip adductor strength and range, lower abdominal muscle function and general posture it is reasonable to suggest it is possible to flag up those at risk. The following table outlines relevant clinical tests that can be used to identify at risk athletes.

TEST	SOURCE	ATHLETE SHOULD POSSESS
Hip Internal Rotation Range. Measured in prone with inclinometer. Thomas test	Normal range is defined as between 30-45 degrees. Brukner and Khan Clinical. Sports Medicine	Greater than 30 degrees With lumbar neutral- thigh rests at least horizontal.
Bilateral hip adduction strength (Squeeze test) Hips 45 degrees flexion, knees 90 degrees flexion with feet on bed. Measure using a PBU	Based on normative values of screening Collegiate GAA athletes (n= 75 age 18-22 years) using PBU preset to 20 mmHg. Also described in Malliaris P et al (2009) using Sphygmomanometer preset to 5 mmHG	Greater than 200mmHg PBU. Greater than 200 mmHg using Sphygmomanometer.
Lower Abdominal Flexion Strength. (Supine leg lower test.)	Comerford M. Performance Stability	Maintains PBU within 5 mmHg +/- during test with each leg.
Bent Knee fall out.	Malliaris P et al (2009)	Fibular head no more than 14cm from plinth

Athletes failing more than four of the above criteria are perceived as having an increased risk of developing groin pain if involved in a high volume of kicking/running related activity.

Secondary Interventions

Correct execution of sport-specific skills (e.g. kicking) with appropriate technique and with the underlying physical requirements to do so safely and effectively is the cornerstone of any injury prevention programme. The biggest challenge in implementing an effective squad intervention to reduce chronic groin pain is not necessarily in identifying the correct exercises, but rather **finding a way to effectively implement these exercises into the coaches'/squads' programme.** Like many other sports injuries there is evidence that when the **correct exercises are completed using the correct technique** and are supervised by a suitably qualified personnel, groin injury incidence may be reduced by up to a third (Silvers 2011). Successful sports injury prevention initiatives in football have used the warm up period within regular training to administer interventions (Soligaard et al 2008). **Comprehensive warm up injury prevention programmes have demonstrated high levels of athlete and coach compliance with the most compliant athletes having the lowest injury risk** (Soligard 2010). Silvers (2011) effectively reduced chronic groin pain using a twenty minute dynamic warm up beginning with multidirectional running drills

followed by specific strengthening exercises for the lower abdominal, gluteal and adductor region. The training programme emphasised synergy between the abductors and adductors with focus on good neuromuscular control of the whole kinetic chain.

Crow et al (2010) identified a relationship between bilateral adductor strength reduction and the onset of groin symptoms in Elite young Australian Rules players. The authors observed that a drop in **strength can be identified up to two weeks prior to onset of pain** and is most apparent one week before commencement of pain. As a result, it is reasonable to suggest that weekly **monitoring of adductor strength within a squad could identify those at risk of breakdown and allow early modification of activity.** Such a test can be easily carried out using a hand held Pressure Biofeedback Unit or sphygmomanometer and can take as little as twenty seconds to perform.

Tertiary interventions

Coaches have an integral part to play in the prevention of groin pain as they hold the key to training volume and design.

Several key recommendations relating to the scheduling of training and competition are outlined below. As chronic groin pain occurs most frequently in kicking field sports, recommendations related to the timing and volume of kicking are also included.

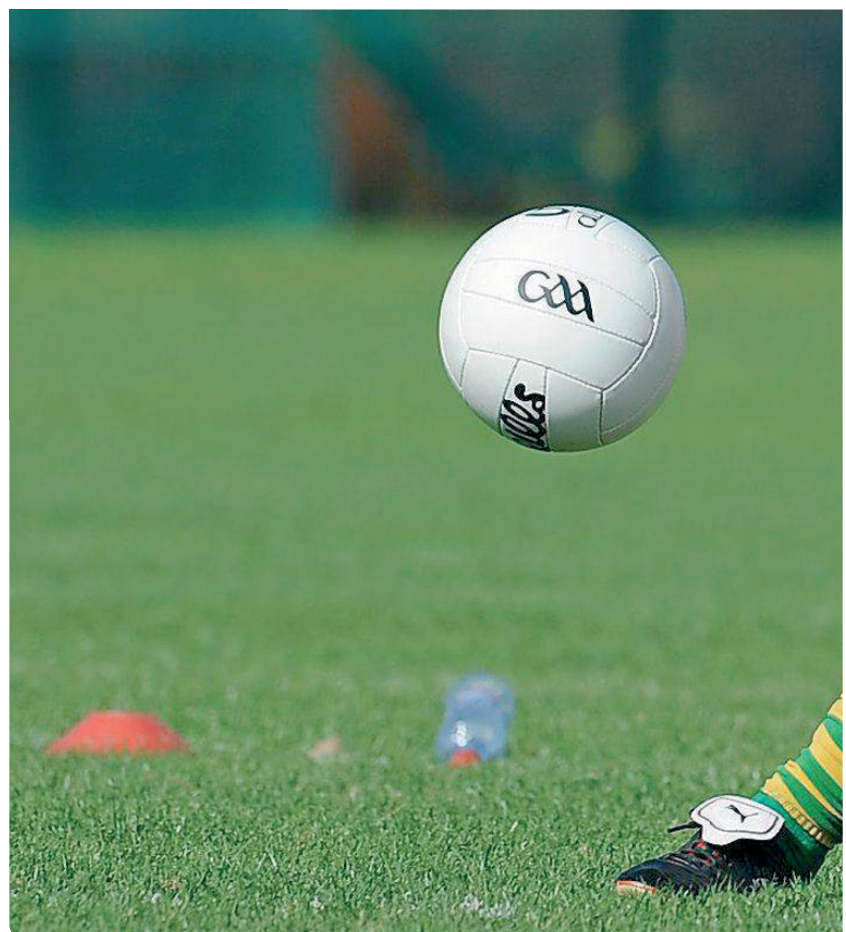
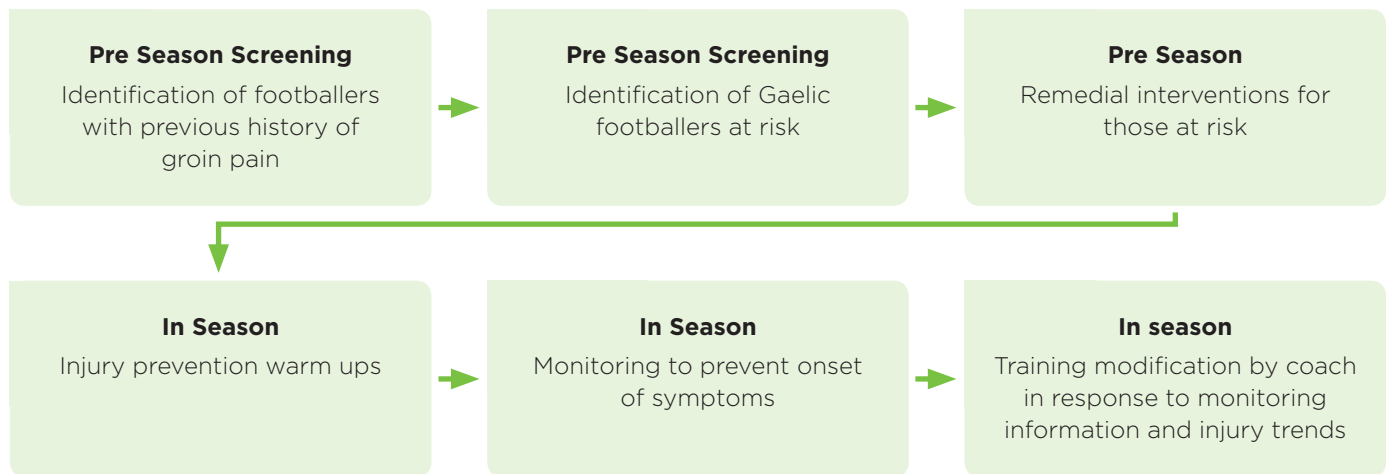
Recommendations

#1	Players should have no more than a total of four high intensity training sessions or matches in one week, with no more than two games per week. This should be complimented by strength and flexibility training sessions
#2	Players should play a maximum of 38 games per season
#3	Avoid high intensity training sessions or a high volume of kicking practice the day before games
#4	Players should avoid long range kicking before a proper warm-up has been completed
#5	Talented young athletes should have a nominated mentor to help decision making through the 17-21 age bracket. This individual should help decision making around game and training selection for appropriate squads
#6	All players should have a two month off-season period in the calendar year. (It is recommended that during this period players complete strength, flexibility and stability training in order to address any dysfunctions and appropriately prepare for the incoming season).



Steps Involved In Prevention of Chronic Groin Pain.

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Gaelic Groin: The SINI Experience



Sports Institute Northern Ireland

As a reaction to high levels of academy Gaelic footballers (71) developing chronic groin pain (pain greater than 6 week duration; 24% over a 5 year period- six requiring surgery) SINI formulated a plan to reduce its occurrence. This process involved screening for risk factors and identifying those with a previous history. Education was delivered to the group relating to planning their training, overtraining and the role of recovery. Those at risk received specific treatment and rehabilitation. In addition, the squad carried out a 30 minute injury prevention “warm up” prior to their gym programmes, which was delivered by a Chartered Physiotherapist twice a week for

10 weeks. The warm-up comprised dynamic flexibility including hip rotation, hip extension and thoracic mobility and a circuit of exercises aimed at improving hip adductor/abductor synergy and strength as well as trunk stability and control. Athletes also attended one gymnastics session per week with the focus of improving general mobility and trunk strength and control. Following this intervention, this group had no chronic groin pain and none of the group required surgery.



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Appendix: Risk Calculator

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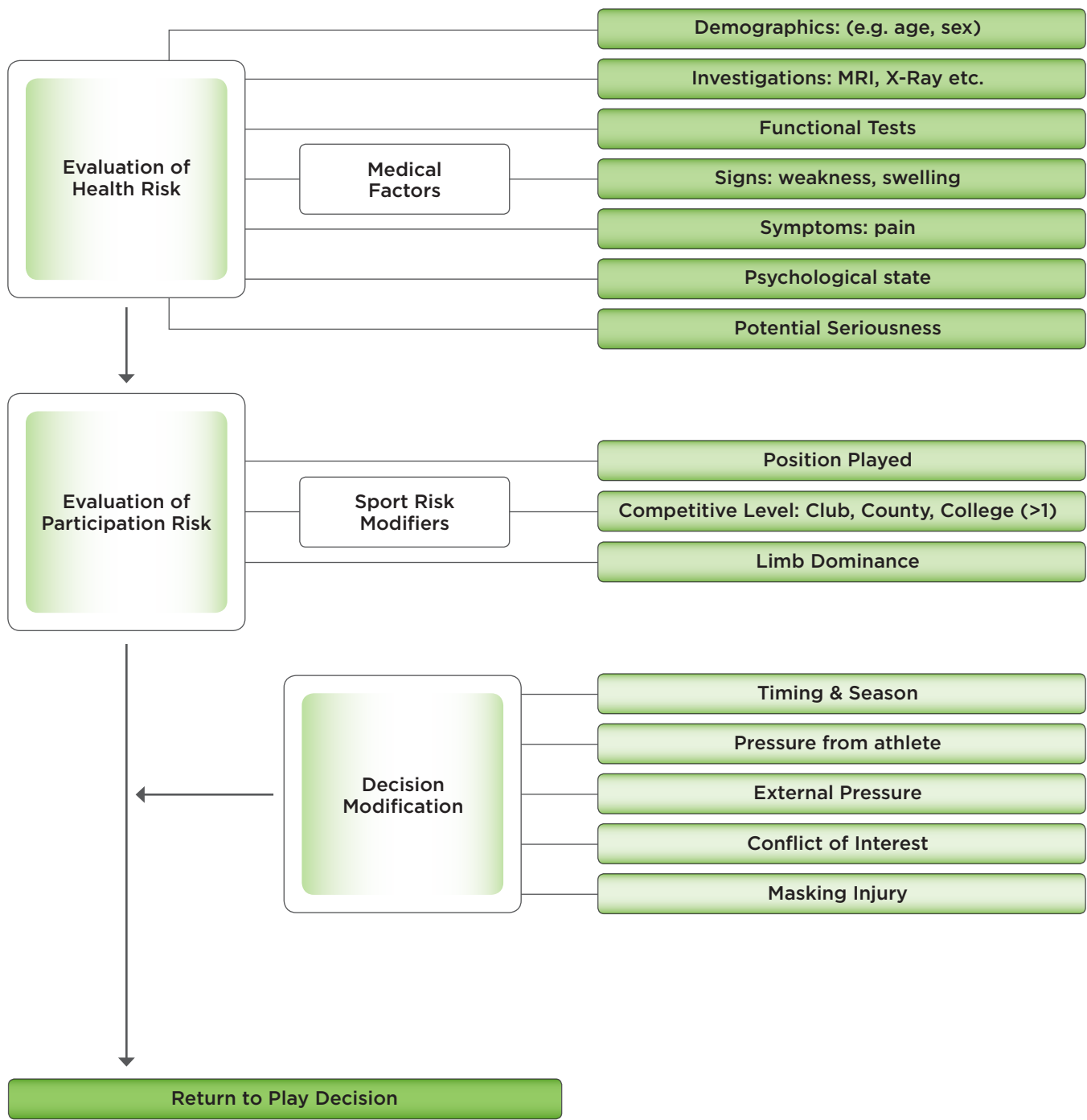
Time since last episode of groin pain (score)	Time Lost because of your groin problem				
	Under 1 week (1)	Under 1 month (2)	Under 3 months (3)	Under 6 months (4)	Between 6 months and 1 year (5)
1 year + (1)	1	2	3	4	5
1 year (2)	2	4	6	8	10
6 Months (3)	3	6	9	12	15
3 Months (4)	4	8	12	16	
1 month (5)	5	10	15		
1 week (6)	6	12	18		

Low Risk	1-3
Medium Risk	4-6
High Risk	7-9
Very High Risk	10-12
Marked Risk	13-19



Appendix 2: Return to Play Decision Making Algorithm

(Creighton et al. Return to play decisions: A decision based model. Clin J Sport Med 2010;20:379-385)



Brennan D, O'Connell MJ, Ryan M, et al. Secondary cleft sign as a marker of injury in athletes with groin pain: MR image appearance and interpretation. *Radiology* 2005;235:162-167.

Cowan SM, Schache AG, Brukner P, et al. Delayed onset of transversus abdominis in long-standing groin pain. *Med Sci Sports Exerc.* 2004;36:2040-2045.

Crow et al Hip adductor muscle strength is reduced preceding and during the onset of groin pain in elite junior Australian football players *J of Sc and Med Sport* 2009;13:202-4.

Falvey et al 2009. The groin triangle: a patho-anatomical approach to the diagnosis of chronic groin pain in athletes *BJSM* (43) 213-220

Hackney RG. The sports hernia: a cause of chronic groin pain. *Br JSports Med.* 1993;27:58-62.

Harvey D, Mansfield C, Grant M. Screening Test Protocols. Pre-Participation Screening of Athletes. Canberra, Australia: Australian Sports Commission; 1998:76.

Holmich P 2007 Long-standing groin pain in sportspeople falls into three primary patterns, a "clinical entity" approach: a prospective study of 207 patients. *Br J Sports Med*;41:247-252

Hölmich P, Hölmich LR and Bjerg AM. Clinical examination of athletes with groin pain: an intraobserver and interobserver reliability study. *Br. J. Sports Med.* 2004;38:446-451

Jansen JA, Poot B, Mens JM, Backx FJ, Stam HJ. The effect of experimental groin pain on abdominal muscle thickness. *Clin J Pain.* 2010;26(4):300-5.

Laslett M. et al 2005 Diagnosis of Sacroiliac Joint Pain: Validity of individual provocation tests and composites of tests. *Manual Therapy* (10) 207-218

Lynch SA and Renstrom PA 1999 Groin Injuries in Sport: Treatment Strategies *Sports Medicine*, 28(2), 137-144)

Malliaras P et al 2009. Hip flexibility and strength measures: reliability and association with athletic groin pain. *Br J Sports Med* ;43:739-744.

Mens J M, Vleeming A, Snijders C J, Koes B W, Stam H J 2002 Validity of the active straight leg raise test for measuring disease severity in patients with posterior pelvic pain after pregnancy. *Spine* 27(2):196

Mens J, Inklaar H, Koes B, Stam HJ. A New View on Adduction-Related Groin Pain. *Clinical Journal of Sport Medicine* 2006;16(1):15-19

Mens, J et al 2006. A new view on adduction related groin pain. *Clinical Journal of Sports Medicine* 16(1):15-19

Morelli V, Smith V Groin Injuries in Athletes *Am Fam Physician* 2001;64:1405-14

Orchard J, Read JW, Verrall GM, Slavotinek JP. Pathophysiology of Chronic Groin Pain in the Athlete. *International SportMed Journal.* 2000;1(1).

Orchard JW, Read JW, Neophyton J, Garlick D. Groin pain associated with ultrasound finding of inguinal canal posterior wall deficiency in Australian Rules footballers. *Br J Sports Med.* 1998;32:134-139.

Robertson BA, Barker PJ, Fahrer M and Schache AG. The Anatomy of the Pubic Region Revisited: Implications for the Pathogenesis and Clinical Management of Chronic Groin Pain in Athletes The Anatomy of the Pubic Region Revisited Implications for the Pathogenesis and Clinical Management of Chronic Groin Pain in Athletes. *Sports Med* 2009; 39 (3): 225-234

Silvers H 2011. The Santa Monica Groin Injury Prevention Study in male soccer. Conference Proceedings from 2011 3rd World Conference on Sports Injury Prevention. <http://www.iocpreventionconference.org/OnLPMonaco.php>

Soligard et al 2008 Comprehensive warm-up program to prevent injuries in young female footballers: cluster randomised controlled trial. *BMJ* 2008; 337

Soligard et al 2010. Compliance with a comprehensive warm-up programme to prevent injuries in youth football. *BJSM* (44) 11: 787-793

Strauss EJ, Campbell K, Bosco JA. Analysis of the cross-sectional area of the adductor longus tendon: a descriptive anatomic study. *Am J Sports Med* 2007 Jun; 35 (6): 996-9

Thorborg K, Holmich P et al. 2011. The Copenhagen Hip and Groin Outcome Score (HAGOS): development and validation according to the COSMIN checklist. *Br J Sports Med* 2011 45: 478-491

Tuite DJ, Finegan PJ, Saliaris AP, et al. Anatomy of the proximal musculotendinous junction of the adductor longus muscle. *Knee Surg Sports Traumatol Arthrosc* 1998; 6 (2): 134-7

Verrall GM, Hamilton IA, Slavotinek JP, et al. Hip joint range of motion reduction in sports-related chronic groin injury diagnosed as pubic bone stress injury. *J Sci Med Sport*. 2005;8:77-84.

Verrall GM, Slavotinek JP, Barnes PG, et al. Description of pain provocation tests used for the diagnosis of sports related chronic groin pain: relationship of tests to defined clinical (pain and tenderness) and MRI (pubic bone marrow oedema) criteria. *Scand J Med Sci Sports* 2005 Feb; 15 (1): 36-42

Verrall GM, Slavotinek JP, Fon GT and Barnes PG. Outcome of Conservative Management of Athletic Chronic Groin Injury Diagnosed as Pubic Bone Stress Injury. *Am. J. Sports Med*. 2007; 35; 467

Vleeming A et al 2008. European guidelines for the diagnosis and treatment of pelvic girdle pain *Eur Spine J*





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