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Clinical Reasoning in Physiotherapy Management and Return to Sport of an Elite Hockey Athlete With Adductor Related Groin Pain

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Abstract

Adductor related groin pain is a common and debilitating condition in hockey athletes leading to impaired performance and match unavailability. This case study explores the clinical reasoning involved in the management of a young male hockey player, suffering from adductor-related groin pain (ARGP). Assessment highlighted a complex case, symptoms stemming from several intrinsic and extrinsic factors. Treatment was directed at addressing these factors to resolve symptoms and achieve his goal of being fit in time for national squad trials.

Keywords: ***Adductor related groin pain, Return to sport, Hockey, Physiotherapy, Clinical reasoning.***

1. Subjective Assessment

A twenty-two-year-old male field hockey player, presented in early 2019 complaining of right sided pain through proximal adductors (body chart Fig. 1). Pain built up over two months since commencing pre-season, worse with competitive games and no inciting incident other than symptom history correlating with increased volume and intensity of load. Pain was experienced with sprinting (6/10 NRS) and changing direction bilaterally (7/10 NRS). Symptoms 'warmed up' with activity but increased after rest at half time. Morning stiffness for 30 minutes was experienced after activity and he experienced no nocturnal or referred pain, neural symptoms, symptoms on Valsalva or sitting up. Further questioning regarding the hip was also clear, the athlete experiencing no clunking, grinding, catching, giving way or locking of the hip.

The athlete had a past history (2015) of right sided groin injury, recalling a 'grade 2 groin tear' coming on suddenly when overstretching, requiring four months to complete rehabilitation, with symptoms fully resolved. The athlete also suffered from lumbar driven neural symptoms in the posterior right thigh, aggravated with prolonged lumbar flexion, required for hockey, controlled with neural gliding exercises and repeated lumbar extension.

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Normal load included two trainings and one game per week. He had played hockey for eight years, the current year having an inconsistent pre-season due to travel. The athlete had no medical conditions, medication history, red flags and no relevant family history. He was frustrated that his performance was limited due to pain, showing no other yellow flags. Working full time as an apprentice carpenter he did not perform any exercise outside of hockey. The goal of the athlete was to continue playing club hockey (currently start of season) and trial for the national squad in 20 weeks' time.

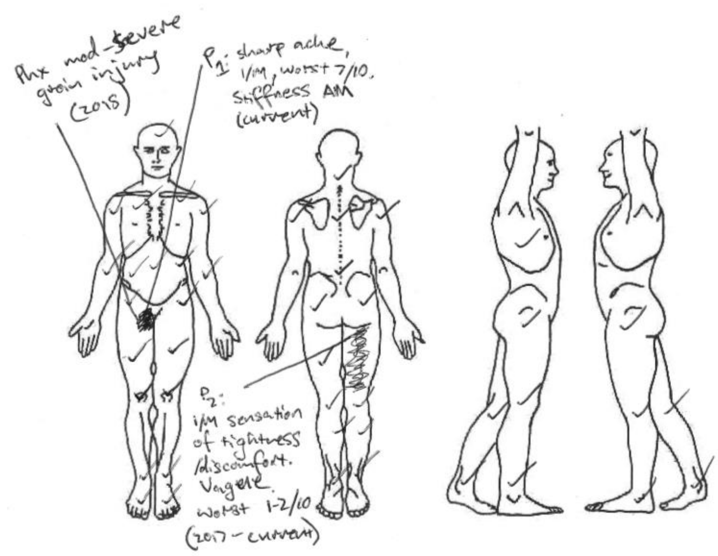

Fig. 1. Body chart.

Main problems identified through subjective assessment were:

- Pain
- Limitation of sport performance secondary to pain

2. Hypothesis

Clinician hypothesis was ARGP, a clinical entity defined by the Doha agreement, consistent with pain location and aggravating factors [26]. Considered skeletally mature and pain easing with activity, apophysitis and stress fracture were unlikely diagnoses [5]. Lack of a specific incident ruled out traumatic injuries, and combined with absent hip signs, there was no indication of intra-articular hip pathology [26]. No symptoms on abdominal activity or increasing intra-abdominal pressure decreased the likelihood of inguinal canal or rectus abdominus involvement, however clinical entities of hip, inguinal, iliopsoas and pubic related groin pain should always be considered until ruled out through physical examination [26]. Neurological and lumbar origins were also included in differential diagnosis due to past history and lumbar flexion required for sport.

Loading was a key contributor to symptom development, symptoms correlating to volume and intensity of load during sport and aggravating factors. Not completing a full pre-season reinforced this hypothesis, a significant risk factor for injury stemming from poor load tolerance [8]. Previous history of groin injury was another strong risk factor identified in the patient [25].

3. Relevant Anatomy

Anatomy of the adductor region is complex, showing high confluence of tissue and joint structures [19]. Out of the five hip adductors, adductor longus is the most commonly implicated in groin pain [21]. Inserting into the linea aspera of the femur, adductor longus' origin attaches to the superior ramus and an anterior tendinous portion joins the anterior pubic aponeurosis with connections to rectus abdominus, gracilis, adductor brevis, external oblique and the ilio-inguinal ligament. Fibres from the aponeurosis insert directly into the pubic symphysis capsule and disc [20]. Connectivity between multiple structures highlights the importance of accurate palpation in differential diagnosis, many clinical tests not loading these anatomical structures in isolation as discussed in Australian Physiotherapy Association [1] course proceedings. Regional anatomy of adductor longus is shown in Fig. 2.

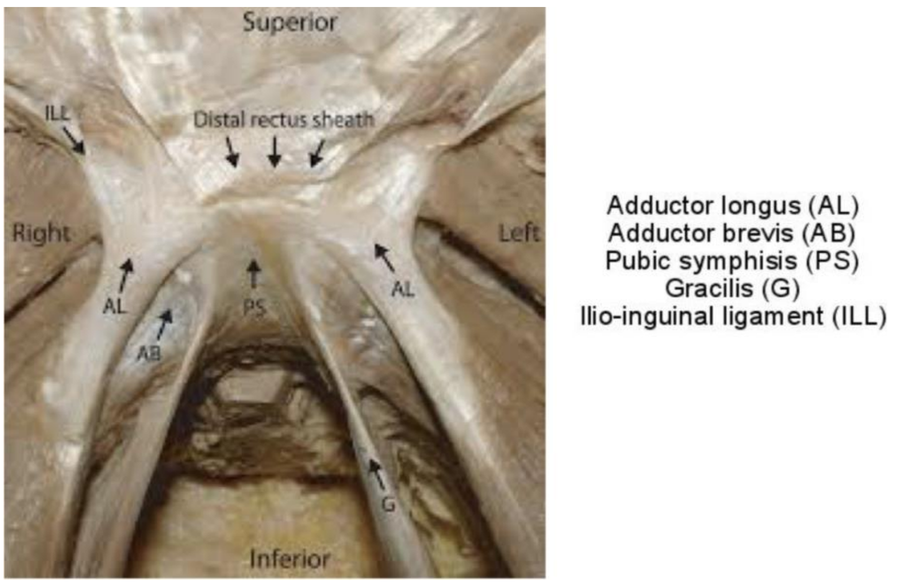

Fig. 2. Anterior pubic region cadaver dissection. Image from Norton-Old et al. [16].

4. Clinical Findings and Diagnosis

Physical examination results, shown in Table 1, confirmed diagnosis of ARGP, showing adductor tenderness and pain on resisted adduction [26]. Other findings consistent with ARGP included reduced bent knee fall out (BKFO), passive abduction range and positive squeeze test [12].

Hip, iliopsoas, inguinal and pubic-related groin pain were ruled out, identifying no symptoms on palpation and clearing tests for each region were normal [12]. Neural involvement was also ruled out.

Through the examination the main problems identified were:

- Hip adduction weakness;
- Restricted hip abduction range;
- Abnormal right lower limb biomechanics.

High tone through adductor longus was confirmed as a key contributing factor for loss of range. Re-assessment post soft tissue release of the muscle yielded significant improvement in BKFO, improving by 4 cm, surpassing the threshold for minimal clinically important change [17]. Passive abduction range and tenderness on palpation also improved.

Adductor weakness was another problem associated with groin pain [14]. Cortical inhibition contributed to adductor weakness, evidenced by significant improvement on squeeze test after isometric adductor holds. Extrapolating findings from results in patella tendinopathy, isometric exercise can reduce cortical inhibition, explaining improvement in strength and pain [18]. Resisted manual adduction was still weaker than the contralateral leg, indicating structural muscular adaptions were also contributing.

Obvious biomechanical deficiencies displayed on movement testing, were the same observed in 40% of athletes with groin pain [7]. Images of the athlete during hopping is shown in Fig. 3. Patient consent was obtained to use this image. As biomechanics were significantly different to the contralateral leg, correction was hypothesized to be important in recovery, although no high-quality evidence necessitates this in treatment of ARGP. Investigated on subsequent assessment, theraband applying a valgus force to the knee during single leg squat, increasing hip external rotator activation, improved lower limb mechanics and pain, confirming hip external rotation control as a contributing factor to biomechanical deficits [6], [15]. This correlated with physical exam findings of weak hip external rotation and endurance.

Fig. 3. Athlete hopping (initial assessment).

Referral for imaging was considered due to the significant past history of groin injury, however due to the absence of red flags and signs consistent with adductor related groin pain, referral was not recommended, consistent with the Doha guidelines [23]. No referral for surgical or medical opinion was indicated but would have been considered if symptoms were unresponsive with six weeks of conservative management.

A limitation of assessment was manual strength testing performed as the clinic's dynamometer was broken. Dynamometry has excellent reliability and reproducibility to quantify strength, reducing bias when compared to the subjectivity of manual testing [3], [4].

Table 1: Key Physical Examination Findings.

Examination	Result
Functional tests	• Single leg squat: R= knee valgus collapse, pain (2/10 NRS) • Running; R= knee valgus collapse, pain (3/10 NRS) mid-stance. No change running in hockey position • Single leg hop: R= knee valgus collapse, pain (4/10 NRS) • Single leg bridge max: R= 9; L=14
Range of motion (ROM)	• BKFO: R= 24 cm (guarding, 2/10 NRS), L= 20 cm nad • Passive hip abduction: R= 50° (P1, R2), L= 60° nad • Lumbar: clear
Resisted movements	• Squeeze test (supine) ○ 0°: Max= 130 mmHg, pain (5/10 NRS) ○ 45°: Max= 190 mmHg, pain (4/10 NRS) ○ 90°: Max= 220 mmHg, pain (1/10 NRS) • Hip adduction (supine): R +ve pain, L no pain • Hip abduction (supine): R=L nad • Hip external rotation (90° flexion): R ¾ strength of left, no pain
Other tests	• SLUMP: R +ve hamstring symptoms • Thomas test: nad • PSST: nad • Femoral nerve tension test: nad • Sit up: nad • FABER: nad • FADDIR: nad • Hip Quadrant: nad
Palpation	• Tender right adductor longus tendon and insertion (5/10 NRS), high tone

5. Management

Soft tissue release was utilized in subsequent treatments until normal BKFO and passive abduction ROM was maintained between sessions. Evidence supporting this approach is interpreted with caution as only 6% of publications identified were of high quality [22]. Alternatively, dry needling could be considered, showing similar mechanisms and outcomes to conventional manual therapy [9].

Isometric exercise was given as an initial home exercise, along with self-massage through the adductors. It was chosen to address these factors initially due to time limitations in the first appointment, both interventions clearly effective and easy for the patient to learn.

Following on from isometric exercise the patient completed a progressive adductor strengthening program (Table 2), maintaining isometrics as warm up decreasing cortical inhibition. The exercises based on work by Holmich et al. [13], are proven to increase adductor concentric and eccentric strength. A complimentary program addressing hip external rotator weakness (Table 3) was also delivered. Transitioning from activation work to eccentric control and functional movements. Continuation of hamstring and lumbar extension exercises were also encouraged to prevent right posterior thigh symptoms.

Exercises were progressed based on the Holmich et al. [13] criteria, when:

- Able to perform set dosage maintaining movement quality;
- No increase in symptoms post exercise.

Dosage varied, dependent on patient symptoms, fatigue and movement quality. Dosage parameters shown in Tables 2 and 3 were general guides reflecting the specific goal of each exercise, based on the guidelines of Baechle, Earle, and Wathen [2].

Table 2: Adductor Strength Program.

Exercise	**Dosage**	**Timeline**	**Goal**
Isometric adductor squeeze	10x10 second holds daily and prior to exercise	Maintained throughout	Activation + reduce cortical inhibition
Side-lying adduction	3x12, non-consecutive days	Week 2-4	Strength
Adductor lateral slide (furniture slider)	3x12, non-consecutive days	Week 3-22	Eccentric control + strength
Copenhagen adductor bridge (holds)	6x10 second holds, non-consecutive days	Week 4	Strength + reduce cortical inhibition
Side lunge with hockey ball drag	3x12, non-consecutive days	Week 4-22	Strength
Copenhagen adductor bridge (1 second concentric, 3 second eccentric)	3x6, non-consecutive days	Week 8 - ongoing	Power + eccentric control
Ice skater (lateral jump exercise) in hockey stance with stick	3x20, part of sport warm up	Week 8-22	Neuromuscular control

Table 3: Hip External Rotator Program.

Exercise	Dosage	Timeline	Goal
Double leg bridge with knee external rotation against theraband	3x15, daily and part of warm	Week 2 - ongoing	Activation + strength
Single leg bridge	3x12, non-consecutive days	Week 3-22	Strength
Prone theraband resisted hip external rotation (1 second concentric, 3 second eccentric)	3x15, non-consecutive days	Week 4-22	Endurance + eccentric strength
Crab walk (theraband resisted) whilst dribbling with hockey stick	3x20, non-consecutive days	Week 4 -22	Endurance
Ice skater (lateral jump exercise) in hockey stance with stick	3x20, part of sport warm up	Week 8-22	Neuromuscular control

Education was an important in management, prioritising goals in relation to a relatively long recovery period. Extrapolating data from a high-quality study of chronic groin pain, athletes averaged 18.5 weeks to return to sport [13]. On discussion with the athlete, national trials being the main goal, he agreed to initially rest from club competition. The athlete was advised to rest from hockey, necessary to re-establish strength, normalize tone, and bring his worsening pain under control without provocation by sport [13]. Stationary cycling, stick drills and passing at training were allowed, maintaining contact with the team, important for psychological wellbeing [11].

Straight line jogging was introduced at six weeks when pain-free. Training commenced at ten weeks showing equal range, hip external rotation strength and biomechanical deficiencies matched between sides and squeeze test results similar to that reported in asymptomatic athletes by Malliaras et al. [14]. On receiving a new dynamometer, measurement showing equal strength of adduction between legs and ipsilateral adduction/abduction strength ratio of 92%, represented adequate strength recovery [24]. Satisfying above criteria and resolution of symptoms, match play re-commenced at fourteen weeks, attending national trials at twenty weeks. Follow up indicated no regression on key physical examination signs and the athlete was happy with improvement and felt he was back to his 'normal' level of performance and was 'confident in his body again'. Rehabilitation exercises were ceased after national trials, the Copenhagen Adduction Exercise maintained, based on recent high-quality research showing performance reduced the risk of groin injury by 41% [10]. On review six months later, the athlete had been able to remain pain free and involved in national squad activities as well as maintaining club commitments.

6. Considerations

Other than training and warm up modifications, the only sport specific interventions used were the addition of hockey positions and ball skills into the exercise program, translating to functional postures and movements (Australian Physiotherapy Association [1]. Another treatment approach could involve stretching, to reduce cortical inhibition and improve range of motion. Evidence however is conflicting, Holmich et al. [13] recommended avoiding stretching citing increased tensile load potentially aggravating symptoms. However, more recent studies suggest stretching may be beneficial to re-align collagen fibres and reduce tone [27].

7. Conclusion

Diagnoses of groin pain is complex reflecting the nature of onset, often multifactorial, and requiring sound clinical reasoning to identify important contributing factors to deliver targeted and effective treatment. In this case a successful outcome was achieved through manual therapy, exercise, and education combined with considered return to sport.

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