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Individualized multi-modal management of osteitis pubis in an Australian Rules footballer

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Abstract

Objective: The purpose of this case report is to describe and discuss the successful management of osteitis pubis in a semi-elite Australian Rules football player through the utilization of an individualized multi-modal treatment approach provided by a chiropractor.

Clinical Features: A 20-year-old male semi-elite Australian Rules football player presented to a chiropractic clinic with groin pain of eight months duration. A clinical diagnosis of osteitis pubis was made through synthesis of the patient history and physical examination.

Intervention and Outcome: Treatment consisted of high velocity low amplitude spinal manipulative therapy, mechanically assisted adjusting techniques utilizing a hand-held mechanical thrusting instrument and drop piece table, myofascial release and active release soft tissue techniques, proprioceptive neuromuscular facilitation stretching, and an individually designed rehabilitation program. Resolution of signs and symptoms occurred over four weeks. No recurrence of injury was reported over a six-month period.

Conclusions: This case suggests that the implementation of an individualized multi-modal management approach directed specifically toward an athlete's deficiencies and requirements, may lead to a more rapid recovery from osteitis pubis.

Introduction

Groin injuries have a high incidence in Australian Rules football, occurring at a rate second only to hamstring muscle strain.[1,2] In the Australian Football League (AFL), the high incidence of groin injuries (3-4 new injuries per club per season) is compounded by its high prevalence with approximately 12 games missed per club per season (in a season of 22 games).[1] As a group, groin injuries represent a number of overlapping pathologies, including adductor muscle strains, tendinopathy, abdominal wall deficiency (sports hernias) and osteitis pubis.[1,3-5]

Within the sports medicine literature, osteitis pubis is described as a painful inflammatory condition of the pubic bones, pubic symphysis and surrounding

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structures.[6-9] It is a condition caused by repetitive inappropriate mechanical stress and shear forces acting on the pubic symphysis and anterior pelvis.[10,11] It has a high incidence in sports which require interval sprinting, rapid change of direction and repetitive kicking, such as Australian Rules football and soccer.[3,10,12,13] Osteitis pubis is a condition characterized by chronicity,[3,11] which may run a prolonged and disabling course if misdiagnosed or mismanaged.[9]

In Australia, athletes presenting with groin pain for a duration greater than six weeks, with tenderness of the pubic symphysis and/or superior pubic rami are considered to have osteitis pubis.[10,14,15] Conventional radiographs characteristically show bilateral symmetric involvement of the pubic bones and adjacent rami, with irregularity of the joint margin, subchondral sclerosis and widening of the joint space.[5,16] However, it must be noted that these findings are commonly identified in the absence of symptoms[17] and some patients will never manifest definitive radiologic changes.[16] Magnetic Resonance Imaging (MRI) is capable of both diagnosing osteitis pubis and aiding in differential diagnosis.[18] The most reliable MRI findings of osteitis pubis (with a history of less than six months duration) are subchondral bone marrow edema, fluid in the pubic symphysis joint and periarticular edema.[18] In chronic osteitis pubis (present for more than six months) subchondral sclerosis, subchondral resorption, bony margin irregularities and osteophytes are the most reliable MRI findings.[18] Clinically, Verrall et al[14] suggest using the Single Adductor test, the Squeeze test and the Bilateral Adductor test (pain provocation tests) in the assessment and diagnosis of osteitis pubis. It was demonstrated that if all three pain provocation tests were positive, there is a high positive predictive value for an athlete having osteitis pubis and/or pubic bone marrow edema on MRI.[14]

Osteitis pubis is a difficult clinical challenge owing to little consensus on the appropriate management.[19] It has been stated that it is a self-limiting condition that will eventually resolve with prolonged rest.[20,21] Conversely, studies have recommended corticosteroid injection of the pubic symphysis,[22,23] whereas another study demonstrated the efficacy of dextrose prolotherapy.[24] Curettage of the pubic symphysis has been suggested to be of benefit for athletes,[25,26] whilst aggressive stretching of the adductors has also been recommended.[22,23] Recently, evidence has proposed the use of an active rehabilitation program directed at improving the coordination and strength of the musculature acting upon the pelvis.[20,27,28] The purpose of this paper is to describe a case of osteitis pubis that was effectively managed with a multi-modal treatment approach, individualized to the patient's specific biomechanical and athletic requirements.

Case report

A 20-year-old male, semi-elite Australian Rules footballer presented with right-sided groin pain of eight months duration. The onset was insidious, occurring within the middle of the previous year's football season, with no history of trauma. The patient had not played a game or been able to train for the remainder of the season, nor had he been able to commence (preseason) training for the upcoming season due to the injury. He had been treated with massage and stretching to the adductor musculature and advised to rest. He had suffered one episode of self-limiting low back pain 12 months prior. There had been no previous history of groin injury.

On physical examination, the right pelvis was low compared to the left in standing posture. There was reduced range of motion of the right hip flexors (+10° Thomas test), as well as the right (30° hip abduction) and left (35° hip abduction) adductors. Pain was elicited during palpation of the pubic symphysis and right superior pubic rami. Tenderness and hypertonicity through the right adductors, psoas and iliacus musculature were noted. There was weakness of the right iliacus, and bilateral gluteus medius and adductor musculature on resisted muscle testing, graded 4/5. Weakness of the left external oblique (which also assesses the right internal oblique), rated 4/5, was also recorded. The single adductor, bilateral adductor and squeeze pain provocation tests were all positive for the reproduction of the patient's groin pain. General motion restriction of the thoracic and lumbar spine, pubic symphysis and right sacro-iliac joint (SIJ) was observed during dynamic (inter-segmental motion) palpation. The supine transversus abdominis (TrA) functional capacity evaluation (FCE) revealed decreased control of lumbopelvic posture when attempting to flex the right hip. Other physical examination findings and testing procedures including Trendelenburg, Valsalva, neurological and orthopaedic examinations were unremarkable. A clinical diagnosis of osteitis pubis was made through synthesis of the patient history and physical examination.

The multi-modal treatment and management of this patient consisted of: high velocity low amplitude (HVLA) spinal manipulative therapy (SMT) to the thoracic and lumbar spine; mechanically assisted adjusting techniques (MAT) to the pubic symphysis utilizing a hand-held mechanical thrusting instrument; drop piece manipulation to the right SIJ; myofascial release (MFR) and active release soft tissue techniques (ART) applied to the right psoas, iliacus and adductor musculature; proprioceptive neuromuscular facilitation (PNF) stretching of the adductor muscles; and an individually designed rehabilitation program outlined in Table 1. Post treatment, Thomas test was +5° on the right, and muscle strength of the right iliacus and bilateral adductors was graded 5/5.

Table 1 Individualized rehabilitation program

	Sets and repetitions
Phase 1 Awareness & Control/Relative Rest	
• Supine TrA alternate hip flexion *	2 × 10
• Supine TrA alternate hip abduction *	2 × 10
• Stationary cycling	3 × 15 min [a]
Phase 2 'Core' Integration/Flexibility	
• Continue Phase 1 exercises as prescribed	
• Supine SB (legs supported) oblique twist *	2 × 10
• SB lateral flexion *	2 × 10
• Supine adductor static stretching *	2 × 60 sec
• Stationary cycling	6 × 10 min [b]
Phase 3 Glut Integration/Return to Semi-Training	
• Continue Phase 1 & 2 exercises as prescribed	
• Supine bridge with resisted hip abduction *	2 × 30 sec
• Stationary cycling	6 × 10 min [b]
• Run-throughs	10 × 100m [c]
• Stationary kicking	50 each leg [d]
Phase 4 Functional Integration/Return to Full Training	
• Continue Phase 1-3 exercises as prescribed	
• Standing SB wall running technique *	2 × 10
• Standing eccentric-concentric adductor slide *	2 × 10
• Return to preseason training	

N.B.: The patient progressed to the next phase of rehabilitation when he was able to complete the entire session on consecutive days without pain exacerbation and without fatigue.
TrA = transversus abdominis; SB = Swiss-ball.

* Performed three times per day.

[a] Interval training: 2 min 50% intensity, 1 min 75% intensity, 5 min rest between sets;

[b] interval training: 1 min 50% intensity, 1 min up to 90% intensity, 5 min rest between sets;

[c] increasing intensity from 25% to 75% over the 10 sets; walk back recovery.

[d] beginning at 5 m, increase kicking distance every 10 kicks by a further 5 m.

The patient received four treatment sessions over four weeks, which included the above treatment and individualized rehabilitation progressions (Table 1). By the fourth treatment, no pain could be elicited during palpation of the pubic symphysis or the right superior pubic rami. All resisted muscle testing was graded 5/5 and range of motion had improved with Thomas test being 0° on the right, and hip abduction was 45° bilaterally. All pain provocation tests were negative, i.e. no groin pain was reproduced. The supine TrA FCE demonstrated improved control of lumbopelvic posture during right hip flexion. The patient returned to preseason training following the fourth treatment. He continued to perform the entire rehabilitation program two to three times per week throughout the entire football season as a preventative measure. The patient completed the season without re-injury.

Discussion

The goals of the rehabilitation were to improve the neuromusculoskeletal balance and specific deficiencies of the patient's lumbopelvic-hip complex, improve cardiovascular fitness levels, and for the patient to return pain free to football preseason training. Throughout the patient's rehabilitation, exacerbation of the groin pain was to be avoided. Should the patient experience an increase in groin pain greater than three (out of 10 on a numeric pain scale) that lasted longer than 24 hours, he was to cease the rehabilitation until the pain reverted back to the pre-session level (e.g. pain 3/10; perform prescribed rehabilitation; pain increase to 7/10 for 24 hours; cease rehabilitation until pain was 3/10 again). Fatigue during corrective exercises was also to be avoided. Any loss of 'TrA awareness', incorrect movement patterns or the onset of muscle tremors were considered signs of fatigue and was an indicator for the patient to rest.

Individualized rehabilitation

The initial phase of rehabilitation placed emphasis on correcting the patient's specific deficiencies in lumbopelvic-hip motor control. The major focus was to enhance the patient's awareness of his TrA in a supine, stable position and then integrate this 'TrA awareness' into specific exercises designed to improve the control of his lumbopelvic posture. Facilitation techniques such as verbal cues and tactile feedback were utilized to

necessitate correct TrA muscle activation and movement patterns. Additionally, 'relative rest' was prescribed with a restriction of preseason training. The patient was advised to attend training and use a stationary bike for cardiovascular fitness (using the aforementioned pain guide-lines), and could perform stationary handball skills/drills (but no kicking, jogging/running or jumping).

The second phase of rehabilitation focused on the continuing correction of the patient's lumbopelvic-hip motor control, and improving the flexibility of the adductor musculature. The objective of the corrective exercises was for the patient to integrate his 'TrA awareness' into unstable base training through use of a Swiss-ball. The specific Swiss-ball exercises were designed to facilitate and strengthen the oblique abdominal musculature (determined by the patient's physical examination findings). Static stretching of the adductor muscles was prescribed to improve their flexibility and hip abduction range of motion. In addition, the patient was advised to continue with the previous rehabilitation phase.

The third phase of rehabilitation was designed to correct the final deficiency of the patient's lumbopelvic-hip motor control and integrate a return to training program. The gluteal musculature, particularly the gluteus medius, was targeted via supine, stable exercises, integrating the patients 'TrA awareness' and lumbopelvic posture control. The 'relative rest' was progressed (using the previous pain guide-lines) with a continued restriction of preseason training. The patient was advised to attend training and replace the stationary cycling with run-throughs and stationary kicking of the football (along with the handball skills/drills). The stationary bike was to be continued on the days he did not have preseason training. The previous two phases of corrective exercises were to be continued.

The fourth phase of rehabilitation focused on functional integration and return to full training. The improvements in lumbopelvic-hip motor control were to be progressed and integrated into more functional tasks through the utilization of upright, dynamic exercises. The patient was to continue all the corrective exercises from the previous three phases. A return to full training was permitted based on the physical examination findings and patient function.

Previous active rehabilitation programs have placed importance on strengthening the adductor muscles[27,28] and the muscles acting on the pelvis.[20,27,28] Jansen et al[29] reported the resting thickness of the TrA is smaller in athletes with chronic groin pain and might require specific rehabilitative exercises. Wollin and Lovell[28] suggested that a rehabilitation program emphasize adductor and gluteal strength and endurance in association with 'inner core stability'. They concluded their case series by stating that a rehabilitation program should be based around sport specific requirements.[28] It is the opinion of the author, however, that any rehabilitation program needs to be designed specifically to the individual. This case utilized relative rest; strengthening of the TrA, gluteal, adductor and oblique abdominal musculature to correct lumbopelvic-hip motor control; and adductor flexibility training to improve hip joint range of motion.

Hip joint range of motion

A restriction in hip joint range of motion has been implicated as a cause of osteitis pubis[10,12,30] Studies consider that during weight-bearing the superior pubic rami and pubic symphysis link the femur to the posterior pelvic structures and spine, with the centers of rotation being near the pubic symphysis.[31] It has been proposed that reduced hip range of motion results in greater stress across the superior pubic ramus and pubic symphysis, particularly distraction and/or tension.[3]

The research of Verrall et al[3] demonstrated that a reduction of hip joint range of motion is evident in athletes with chronic groin injury. This in turn led to a further study which revealed that a restriction in hip joint range of motion precedes the development of chronic groin injury, and may be a risk factor for the condition.[32]

It has been stated that athletes who recover from their groin injury had an increased hip joint range of motion compared to athletes with current pain, proposing the role of increasing hip joint range of motion in rehabilitation.[3] It could be suggested that the improvement in hip extension and abduction motion seen in this case contributed to the patient's recovery.

Spinal manipulative therapy

Spinal manipulation for the treatment of osteitis pubis has not been documented, despite suggestions that manual therapy, mobilization and manipulation techniques are frequently used.[28,33,34] Fricker[35] stated that correcting any limitation of movement in the SIJ or lumbosacral joints is vital in the management of osteitis pubis. However, this is the first case to identify motion restrictions during dynamic inter-segmental motion palpation and the treatment thereof.

Instability of the pelvic ring can be caused by the stresses of abnormal motion at any one of the three joints (i.e. the two sacroiliac joints and the pubic symphysis).[36] The TrA and internal oblique have been proposed to be important in maintaining the stability of the SIJ.[37,38] Marshall and Murphy[38] demonstrated that SIJ manipulation can increase the feed-forward activation of the TrA and internal oblique muscles. Therefore, it can be theorized that the SMT used in this case helped optimize the patient's lumbopelvic biomechanics by removing the stresses of abnormal SIJ motion. Also, it can be hypothesized that the manipulation used in this case increased the feed-forward activation of the TrA and internal oblique muscles, improving the stability of the SIJ.

Multi-modal management

The individualized multi-modal treatment approach used in this case demonstrated a return to football in four weeks. This outcome is favorable when compared to the return to sport time ranges reported by Fricker et al (9.6 months),[10] Homlich (median of 18.5 weeks),[27] Rodriguez et al (4-10 weeks)[9] and Wollin and Lovell (average of 13 weeks).[28] It must be noted that the multi-modal management approach used in this case cannot be generalized to all athletic populations with osteitis pubis. It is the opinion of the author that a treatment protocol must be designed and implemented individually with an athlete's specific biomechanical and sporting performance requirements in mind. In this case, the athlete had poor lumbopelvic-hip motor control, decreased strength of muscles which act upon the pelvis, reduced hip joint range of motion, as well as motion restrictions of the thoracic, lumbar, pubic symphysis and sacro-iliac articulations. Therefore, the emphasis of management was to correct these deficiencies whilst integrating the treatment to the biomechanical and sporting requirements of Australian Rules football.

Limitations

Research on the reliability of chiropractic management for osteitis pubis is lacking, which is compounded by the nonexistence of literature regarding SMT for this condition. This report demonstrates only a single case, and therefore, the management protocol cannot be generalized to all cases of osteitis pubis or to all athletic populations. Further research involving larger randomized controlled and clinical trials with long-term follow up are both required and warranted to clarify the effectiveness of an individualized multi-modal treatment approach in the management of osteitis pubis. Future directions for chiropractic research should investigate the effect of SMT in the treatment of osteitis pubis.

Conclusion

Osteitis pubis has a high incidence in Australian Rules football, which is compounded by its high recurrence rate and high rate of chronicity. This case report details the successful management of osteitis pubis in a semi-elite Australian Rules football player utilizing a multi-modal approach. Although a variety of effective treatment systems have been documented within the literature, the implementation of an individualized management approach which integrates all treatment methods and is directed specifically toward the athlete's deficiencies and requirements, may lead to a more rapid recovery. This should be investigated further in randomized controlled and clinical trials with long-term follow up. Future studies will also need to examine the effect of SMT in the treatment of osteitis pubis.

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