Arthroscopic treatment of the snapping iliopsoas tendon through the central compartment of the hip

A PILOT STUDY


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We undertook a prospective pilot study to determine whether arthroscopic surgery through the central compartment of the hip was effective in the management of a snapping iliopsoas tendon. Seven patients were assessed pre-operatively and at three, six, 12 and 24 months after operation. This included the assessment of pain on a visual analogue scale (VAS) and function using the modified Harris hip score.

All the patients had resolution of snapping post-operatively and this persisted at follow-up at two years. The mean VAS score for pain fell from 7.7 (6 to 10) pre-operatively to 4.3 (0 to 10) by three months (p = 0.051), and to 3.6 (1 to 8) (p = 0.015), 2.4 (0 to 8) (p = 0.011) and 2.4 (0 to 8) (p = 0.011) by six, 12 and 24 months, respectively. The mean modified Harris hip score increased from 56.1 (13.2 to 84.7) pre-operatively to 88.4 (57.2 to 100) at one year (p = 0.018) and to 87.9 (49.5 to 100) at two years (p = 0.02). There were no complications and no weakness occurred in the musculature around the hip.

Our findings suggest that this treatment is effective and would support the undertaking of a larger study comparing this procedure with other methods of treatment.

An audible and often palpable snap sometimes occurs when the hip is actively or passively flexed or extended. If symptomatic it is considered to be a clinical syndrome1,2 and there has been increasing recent interest in determining the underlying anatomical and biomechanical pathology, so that an appropriate solution may be offered. To date, only a few studies3 have examined this disorder, and it remains a diagnostic and therapeutic challenge.

The origin of the snap can be described as external to the hip, intra-articular or internal.3-8 An external cause appears to be the most common4,5,7 and is characterised by the passage of the posterior portion of the fascia lata and/or the catching of the leading edge of gluteus maximus on the greater trochanter.1,9 Intra-articular snapping may result from an intracapsular injury, which can be secondary to a variety of factors, including instability of the hip, labral injuries and bone loss.5,6,8 An internal origin occurs when the iliopsoas tendon impinges on the capsule8,10 and/or the femoral head.2,4,8,10 This last situation causes pain in the groin and the snapping can restrict athletic activities and, in more severe cases, encroach on the activities of daily living. Some authors have suggested that passage of the iliopsoas tendon over the iliopectineal eminence is the primary source of the snap.2,4,7,8 There may be associated conditions such as inflammation of an adjacent bursa or a minor labral tear.7 The diagnosis, which is difficult to make, may be made clinically on the basis of palpable or audible snapping during provocative testing, especially when internally or externally rotating the hip with the patient lying on their side.7

The first report describing internal pathology was by Nunziata and Blumenfeld.11 They described snapping of the iliopsoas tendon over the iliopectineal eminence and surgical success in two of three patients following lengthening of the tendon. Although there have been further reports,2,6,9,12 none has described an arthroscopic approach through the central compartment.

We therefore undertook a pilot study to evaluate this method of treatment, setting a minimum reduction in the symptoms of 30% as being clinically meaningful.

Patients and Methods

Our study was carried out prospectively on seven patients with a snapping hip referred for arthroscopic surgery between December 2005 and June 2006. A full explanation of the nature of the study was provided and all patients gave informed consent. All the procedures were performed in the same hospital by the same surgeon (MEKC).
The mean age of the patients was 33.6 years (23.0 to 45.0), four were female, three were male. The diagnosis of snapping iliopsoas syndrome was made clinically and MRI, MRI arthrography and ultrasound were used to identify associated conditions. Six patients had conservative treatment for at least five months with a minimum of one trial of non-steroidal anti-inflammatory medication and physiotherapy, without improvement. Six patients received corticoid injections (betametasone 5 mg) close to the iliopsoas bursa on the lesser trochanter guided by ultrasonography. Any response to injections had been transient, such that all six were deemed to be recalcitrant to conservative management. The seventh patient had severe acute symptoms and urgent surgical management was thought to be necessary.

The duration of symptoms, the level of physical activity, pain as indicated on a ten-point visual analogue scale (VAS), a modified Harris hip score\(^{13}\) and provocative tests including active flexion of the hip, active flexion against resistance, abduction and internal rotation were collected pre-operatively.

Operative technique. Arthroscopy was performed with the patient supine on a fracture table, with the post for countertraction in the central position, and a well-padded foam cushion in place to protect against any nerve compression. Anterior and lateral ports were used. Intra-articular inspection was followed by debridement of damaged labral tissue and cartilage. In two patients it was also necessary to undertake osteochondroplasty of the acetabular rim to treat a pincer-shape lesion,\(^{14}\) using a burr to remove any osteophytes and a shaver to remove excess cartilage.

With the arthroscope in the lateral portal and instruments in the anterior portal, an anterior and medial capsulotomy was performed under traction (Fig. 1). This approach allowed identification of the iliopsoas tendon, which was distinguished from the reflected insertion of the tendon of rectus femoris. The latter is close to the capsule behind the anterior acetabular rim. Once identified, the iliopsoas tendon was divided using radiofrequency equipment for one or two minutes (Serfas, Stryker, Kalamazoo, Michigan) (Fig. 2). Suturing of the capsule was not required. The extra-articular compartment was then evaluated and any potentially contributing osteophytes were resected. This was deemed to be necessary in six patients.

**Post-operative follow-up.** All patients stayed in hospital for one night. Assessments were made before discharge, and at three, six, 12 and 24 months post-operatively, when the patients were asked to rate their pain and the modified Harris hip score was recorded. The strength of flexion, extension, abduction and adduction of the hip were assessed by a physiotherapist, and graded from zero (complete paralysis) to 5 (full strength) in accordance with the MRC neurological scale.\(^{15}\) Complications were also recorded.

**Statistical analysis.** Post-operative pain and modified Harris hip scores were compared with pre-operative values using a two-tailed, paired Student \(t\)-test. A \(p\)-value \(\leq 0.05\) was considered to be significant. The \(p\)-value is the probability of obtaining a test statistic at least as extreme as the one that was actually observed, assuming that the null hypothesis is true.

**Results**

Pre-operatively, two patients had undergone conventional MRI and five MRI arthrography. All had a labral injury with an associated chondropathy. In two the pre-operative examination was normal, in two there was pincer-type and in three cam-type impingement. The mean duration of symptoms was 22.1 months (1 day to 60 months). In five patients the onset had been insidious, in one acute and in one traumatic. Five patients lived sedentary lives, one was moderately active, undertaking physical activity up to twice a week and one was more active pursuing physical activity at least three times weekly, including football. None was a professional athlete (Table I).

All patients attended each follow-up appointment, up to the final two-year post-operative assessment.
Although each patient had a definite snap pre-operatively, it was associated with immediate pain in only one. All the provocative tests were positive in all seven patients. All had resolution of the snapping post-operatively, without any recurrence at follow-up at two years.

Pre-operatively, the mean VAS for pain was 7.7 (6 to 10) (Table II). This fell to a mean of 4.3 (0 to 10) by the third post-operative month and to 3.6 (1 to 8) by the sixth month. At one and two years post-operatively, the mean VAS for pain was 2.4 (0 to 8 for both time periods). No statistically significant difference from the pre-operative value was observed three months after surgery, but at subsequent intervals the reduction was statistically significant (t-test, 6 months, p = 0.015; 12 months, p = 0.011; 24 months, p = 0.011).

The mean pre-operative modified Harris hip score was 56.1 (13.2 to 84.7). Post-operatively, it improved to a mean of 88.4 (57.2 to 100) at one year (t-test, p = 0.018) and 87.9 (49.5 to 100) at two years, still significantly improved compared with the pre-operative value (t-test, p = 0.02) (Table II).

Even if the patient with an acute onset of symptoms was excluded, these statistically significant differences persisted. The mean VAS for pain fell from 7.7 (6 to 10) pre-operatively to 2.4 (0 to 8) at one year (t-test, p = 0.27) and 2.4 (0 to 8) at two years (t-test, p = 0.29). Similarly, when including only the six patients with at least a five-month history of symptoms, the mean modified Harris hip score rose from 63.3 (39.6 to 84.7) pre-operatively to 86.5 (57.2 to 100) (t-test, p = 0.006) and to 83.9 (49.5 to 100) (t-test, p = 0.012) at one and two years, respectively.

Two patients (cases 2 and 5) reported no improvement in pain despite resolution of the snapping. These patients had relatively little improvement in the modified Harris hip score from 39.6 to 57.2 at one year and to 49.5 at two years, and from 73.7 to 81.4 at one year and to 81.4 at two years, respectively. This was attributed to improved function, despite no appreciable improvement in pain.

No patient had any post-operative complications and all returned to their original or better level of function shortly after operation. All had maximum strength of hip flexion, extension, abduction and adduction, both pre-operatively and at all post-operative assessments.

### Discussion

Taylor and Clarke were among the first to report attempts to treat snapping of the hip, describing an open medial approach, 2.5 cm distal to the inguinal crease, through which they released the iliopsoas tendon. In all, 16 hips were treated in 14 patients, of whom only seven (nine hips) had resolution of the snap. Of the seven with persistent symptoms, one still had snapping immediately post-operatively and six had recurrence with time. Additionally, five patients also had transient clicking.

Dobbs et al reported the surgical treatment of 11 snapping hips in nine adolescents with persistent pain after conservative treatment for three months. They used an anterolateral incision and lengthening at the musculotendinous junction of iliopsoas, with success in all patients at follow-up of four years. There was a single case of recurrence of symptoms, but even that patient showed some improvement.

Gruen et al described an alternative approach with lengthening of the iliopsoas tendon being carried out through an ilioinguinal incision 6 cm to 7 cm above and parallel to the inguinal crease. This was undertaken in 11 patients (12 hips) who had no improvement after

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### Table I. Details of the seven patients

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (yrs)</th>
<th>Gender</th>
<th>Side</th>
<th>Onset of symptoms</th>
<th>Activity level</th>
<th>Duration of symptoms (mths)</th>
<th>Snap post-operatively</th>
<th>Pain post-operatively</th>
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<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>F</td>
<td>L</td>
<td>Insidious</td>
<td>Sedentary</td>
<td>60</td>
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<tr>
<td>2</td>
<td>34</td>
<td>M</td>
<td>L</td>
<td>Insidious</td>
<td>Sedentary</td>
<td>14</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>42</td>
<td>F</td>
<td>R</td>
<td>Insidious</td>
<td>Moderately active</td>
<td>10</td>
<td>F</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
<td>F</td>
<td>L</td>
<td>Insidious</td>
<td>Sedentary</td>
<td>6</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>27</td>
<td>M</td>
<td>L</td>
<td>Insidious</td>
<td>Sedentary</td>
<td>18</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>24</td>
<td>M</td>
<td>L</td>
<td>Acute</td>
<td>Quite active</td>
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<td>No</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>45</td>
<td>F</td>
<td>R</td>
<td>Traumatic</td>
<td>Sedentary</td>
<td>48</td>
<td>No</td>
<td>No</td>
</tr>
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</table>

### Table II. Comparison of pain severity scores and modified Harris hip scores pre-operatively and at follow-up

<table>
<thead>
<tr>
<th>Post-operative follow-up (mths)</th>
<th>Pre-operative</th>
<th>3</th>
<th>6</th>
<th>12</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (range) 10 cm VAS* score</td>
<td>7.7 (6 to 10)</td>
<td>4.3 (0 to 10)</td>
<td>3.6 (1 to 8)</td>
<td>2.4 (0 to 8)</td>
<td>2.4 (0 to 8)</td>
</tr>
<tr>
<td>(p = 0.051)</td>
<td></td>
<td>(p = 0.015)</td>
<td></td>
<td>(p = 0.011)</td>
<td>(p = 0.011)</td>
</tr>
<tr>
<td>Mean (range) modified Harris hip score</td>
<td>56.1 (13.2 to 84.7)</td>
<td>N/A</td>
<td>N/A</td>
<td>88.4 (57.2 to 100)</td>
<td>87.9 (49.5 to 100)</td>
</tr>
<tr>
<td>(p = 0.011)</td>
<td></td>
<td></td>
<td></td>
<td>(p = 0.018)</td>
<td>(p = 0.02)</td>
</tr>
</tbody>
</table>

*VAS, visual analogue scale
† N/A, not available
conservative treatment for three months. There was complete resolution of the snap post-operatively in all 12 hips, with improvement of pain in nine patients. However, five patients had some weakness of hip flexion post-operatively.

Lengthening of iliopsoas was reported in a series of 80 patients with 92 affected hips, but with a high rate of complications. Recurrent symptoms occurred in 18 patients. Arthroscopic access to the psoas bursa has been described to allow release of the iliopsoas tendon at its insertion. In a series of six patients (seven hips), resolution of symptoms success was reported at a mean follow-up of 21.4 months. Four hips had an associated intra-articular disorder, which was corrected during surgery. Other authors have reported similar success using arthroscopic release.

All our patients had associated pathology as also reported by Flanum et al. Recently Anderson and Keene described arthroscopic release of the iliopsoas tendon in 15 athletes who had snapping of the hip. In 12 there was an associated labral tear, in two a tear of the ligamentum teres, and in two a chondral flap. Only three had no associated pathology. The iliopsoas tendon was approached through the peripheral compartment. All the patients returned to sport at their pre-injury level within a mean of nine months. In another study arthroscopic release of the iliopsoas tendon through an extracapsular approach directly at its insertion into the lesser trochanter was compared with capsulotomy carried out on the medial aspect of the peripheral compartment. There was no difference in outcome between the two procedures.

Open approaches for the surgical treatment of the snapping hip have generally been associated with complications including persistent pain, paraesthesia, sensory deficit, persistent weakness of flexion of the hip, haematoma requiring re-exploration and superficial infection. By contrast, with arthroscopic surgery complications have been milder and less frequent, with temporary loss of the strength of flexion of the hip being reported. Some studies have reported no complications.

In our study, two patients had no improvement in pain after surgery which we assumed was due to the associated chondral injury, although both had some improvement in function. Other authors have noted these associated injuries and the difficulty in determining if persistent pain is due to these conditions or to inadequate treatment of the snapping tendon. Our study has strengths and limitations. We assessed not only the resolution of the snapping, but also improvements in pain and function, the last by the modified Harris hip score, over a follow-up period of two years.

The limitations of our study included the small number of patients; one of whom had only one day history. With the exception of the retrospective review by Hoskins et al studies have included only a few patients. Additionally, we had no control group for comparison. Finally, we accept that, given the presence of associated conditions, the diagnosis of snapping and the decision to divide the tendon could be questioned. However, other conditions often co-exist in patients with a snapping hip. Nevertheless, the overall degree of improvement was greater than the 30% which we had initially assigned as the criterion for a clinically meaningful improvement. We feel that these findings justify a formal clinical trial to assess this form of surgical treatment.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References