Iliopsoas Bursa Injections Can be Beneficial for Pain after Total Hip Arthroplasty

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Abstract Impingement of the iliopsoas tendon is an uncommon cause of groin pain after total hip arthroplasty (THA). We asked whether selective steroid and anesthetic injections for iliopsoas tendonitis after THA would relieve pain and improve function. We retrospectively reviewed 27 patients with presumed iliopsoas tendinitis treated by fluoroscopically guided injections of the iliopsoas bursa. Pre- and immediately postinjection, questionnaires and telephone followup questionnaires were administered to determine patient outcomes. Four patients were lost to followup and we were unable to obtain information from relatives on an

additional four; the questionnaire was administered to the remaining 19 patients, including six who subsequently had surgery at an average of 44.6 months (range, 25–68 months) after their first injection. The average modified Harris hip score in the 19 patients improved from 61 preinjection to 82 postinjection and the average pain improved from 6.4 preinjection to 2.9 postinjection, but eight patients (30%) required a second injection at an average of 8.2 months after the first injection. Ultimately, six patients (22%) had an additional surgical procedure to address the underlying cause of the iliopsoas irritation. Iliopsoas tendonitis is uncommon after THA but should be considered in the differential diagnosis of all patients who present with groin pain after THA. Selective steroid and anesthetic injections of the iliopsoas bursa give adequate pain relief in the majority of patients and should be considered part of the nonoperative treatment plan before surgical release of the iliopsoas tendon or component revision.

Level of Evidence: Level IV, therapeutic study. See Guidelines for Authors for a complete description of levels of evidence.

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Each author certifies that his or her institution has approved the human protocol for this investigation and that all investigations were conducted in conformity with ethical principles of research.

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Introduction

Determining the etiology of pain after THA can be a diagnostic challenge. Although aseptic loosening and infection remain the main sources of pain after THA, when these etiologies are ruled out, less common causes must be considered. Pain after THA includes extrinsic factors such as heterotopic ossification, stress fractures, spinal pathology, vascular lesions, referred pain from the retroperitoneum and abdomen, and soft tissue inflammation such as tendinopathies or bursitis [2, 3, 8–10, 13, 15–18, 20, 22].

Iliopsoas impingement is an uncommon cause of pain after THA, but reportedly occurs in up to 4.3% of patients [1, 4, 7]. Anatomically, the iliopsoas bursa and tendon can potentially be irritated by a prominent anterior edge of the acetabular component, which may exceed the margins of the native acetabulum or be malpositioned (lateral with increased offset or decreased anteversion) [4]. Additional causes of pain related to the acetabular component include fixation screws protruding through the ilium and into the iliacus muscle or extruded cement debris around the anterior rim of the cup [4, 5, 21]. Characteristically, patients have a brief pain-free postoperative period of several months before experiencing an insidious onset of groin pain during active hip flexion, passive hip extension, and external rotation [5, 12, 24]. Nonoperative management includes rest, activity modifications, nonsteroidal anti-inflammatory medications, physical therapy, and iliopsoas bursa injections. The literature suggests a limited role for nonoperative treatment in the management of iliopsoas tendonitis, and thus, most authors have focused on the outcomes after surgical intervention [7, 11, 12, 19].

Our purposes were to determine (1) if selective corticosteroid and anesthetic injections into the iliopsoas bursa can improve groin pain and functional outcomes for patients with presumed iliopsoas tendonitis after THA; (2) if there are differences in component positioning in patients who responded to injections and those who did not; and (3) whether surgery relieves the pain if the injections do not.

Patients and Methods

We retrospectively reviewed the charts of all 27 patients who underwent THA who were diagnosed with iliopsoas tendonitis by clinical examination and referred for an iliopsoas bursa injection between 2002 and 2007. In this study there were 12 males and 15 females with a mean age of 59.7 years (range, 31–84 years). Of the 19 patients who had a primary THA, there were 18 patients with an uncemented press-fit acetabular component and only one patient with a cemented acetabular component. Of the eight patients who previously underwent a revision THA, there were six uncemented press-fit acetabular components and two cemented components (Table 1). We considered the diagnosis in patients who had groin pain that increased with hip flexion against resistance and resisted straight leg raise (Stinchfield test [14]) and passive hyperextension of the hip. Six of the 27 patients had documented snapping of the iliopsoas tendon with provocative testing. All patients had a workup for infection and component loosening before referral. No patient with painful THA referred for iliopsoas bursa injection, for iliopsoas tendonitis, was excluded from this study. Twenty-one of the 27 patients

were instructed to take nonsteroidal anti-inflammatories for 6 to 8 weeks. Eighteen patients were referred for physical therapy before being referred for injections. Physical therapy focused primarily on passive stretching of the hip flexor musculature, especially the iliopsoas. No patient in this study had bilateral THAs with iliopsoas tendonitis. The mean time from arthroplasty to injection was 27.7 months (range, 5–86 months). We had prior Institutional Review Board approval.

Prospectively, we asked each patient to fill out a short pain assessment questionnaire (Appendix 1; supplemental materials are available with the online version of CORR) indicating the location and severity of pain before the injection, and this questionnaire was carefully reviewed by the radiologist before initiating the procedure. All patients underwent a fluoroscopically guided iliopsoas bursal injection by the same musculoskeletal radiology department, by one of six musculoskeletal radiologists using the same treatment protocol, and under the supervision of the senior radiologist (LG) who trained all of these musculoskeletal radiologists and who also performed all of the quality assurance evaluations after the iliopsoas injections. Each patient's pain rating was recorded on the pain assessment questionnaire by the musculoskeletal radiologist immediately before and immediately after the injection. The injection was performed with the patient supine on the fluoroscopy table with the affected hip elevated approximately 30° off the table to enable rotation of the image intensifier from frontal to high oblique positions to be able to profile the anterior surface of the acetabulum. A 22-gauge spinal needle was advanced under intermittent fluoroscopic guidance to the level of the iliopsoas bursa directly over the midportion of the projected superior margin of the metallic acetabular component and lateral to the femoral artery. We injected a small amount of 43% iohalamate meglumine (Conray-43; Mallinckrodt Chemical Company, Hazelwood, MO) to confirm correct positioning before final injection. This was demonstrated by a rectangular collection of contrast material passing vertically toward the iliac fossa from the midportion of the acetabular component in the frontal view (Fig. 1A). In the posterior oblique position viewing from lateral to medial, the contrast material outlines the anterior surface of the acetabulum and iliac bone (Fig. 1B). Once the correct location was determined, the iliopsoas bursa was injected with a combination of 1 mL depo steroid (Kenalog-40) (40 mg/mL), 1 mL of bupivacaine 0.25%, and 1 mL of a 2:1 mixture of Conray-43 and 0.25% bupivacaine or 1% lidocaine. The injection was monitored with intermittent fluoroscopy to ensure adequate fill of the bursa, and these images were recorded for documentation of the procedure. There were no cases in which the injection of the contrast material communicated directly with the intraarticular space during the procedure. At the conclusion

Table 1. Patient demographics

Patient number	Age (years)	Gender	Acetabular component	Months to injection after THA	Acetabular inclination on anteroposterior pelvis (degrees)	Anteversion on crosstable lateral (degrees)	Component overhang on crosstable lateral (mm) (uncovered component is positive)	Leg length measurement on anteroposterior pelvis (mm) (long is positive)
1	76	M	Cemented revision	12	44	28	0	-2
2	67	F	Uncemented primary	10	45	-2	0	-1.5*
3	84	F	Cemented primary	13	50	22	6	4
4	54	F	Uncemented primary	86	44	25	2	-2*
5	46	M	Uncemented primary	26	38	29	-4	-2.5
6	69	M	Uncemented primary	10	48	33	-2	13.5
7	70	F	Uncemented primary	7	67	23	4	0*
8	34	F	Uncemented primary	10	46	23	2	1
9	49	F	Uncemented primary	30	39	32	-4.5	0
10	53	M	Uncemented primary	22	64	6	9	0*
11	41	F	Uncemented primary	12	46	22	0	-6
12	76	M	Uncemented primary	66	35	12	5	-4
13	55	M	Uncemented primary	25	42	18	4	-2
14	61	M	Uncemented revision	24	47	14	7	11*
15	47	F	Uncemented primary	27	50	8	8	2*
16	73	F	Uncemented primary	29	42	5	7	1.5
17	70	F	Uncemented primary	14	67	7	9	12
18	41	F	Uncemented revision	5	24	22	0	-13.5*
19	68	F	Uncemented revision	40	53	23	5	-4
20	79	M	Uncemented revision	47	46	32	0	1.5
21	59	F	Cemented revision	49	41	16	0	-4
22	31	F	Uncemented primary	41	53	30	-6	3.5
23	50	M	Uncemented primary	11	57	32	-3	-8.5*
24	40	F	Uncemented primary	31	34	40	0	8.5*
25	81	M	Uncemented primary	60	32	14	6.5	2.5*

Table 1. continued

Patient number	Age (years)	Gender	Acetabular component	Months to injection after THA	Acetabular inclination on anteroposterior pelvis (degrees)	Anteversion on crosstable lateral (degrees)	Component overhang on crosstable lateral (mm) (uncovered component is positive)	Leg length measurement on anteroposterior pelvis (mm) (long is positive)
26	78	M	Uncemented revision	16	54	12	4	0
27	49	M	Uncemented revision	24	46	16	3	-5

* Patient has bilateral total hips; M = male; F = female.

Fig. 1A–B (A) The frontal view is shown with slight right posterior obliquity, with early deposit of contrast. Arrows outline the contrast. The needle tip is placed over the midportion of the acetabular component superiorly and is lateral to the femoral artery. (B) With about 30° of right posterior obliquity, a few seconds later with more contrast deposited (arrows) the contrast passes from the edge of the acetabular component cephalad into the iliac fossa.

of the procedure, approximately 2 to 15 minutes after the injection, the patient was asked to stand and move the hip to determine if there was any difference noted from the original presenting symptoms. Each patient was also asked to reassess his or her pain using the same short questionnaire and these results were recorded. Confirmation of the final diagnosis was determined by immediate improvement within the 15 to 30 minutes that the patient was monitored after the fluoroscopic-guided injection of the iliopsoas bursa.

We retrospectively reviewed the office charts for each patient and documented their Harris hip scores (HHSs) before and after injection(s), the number of injections, and if any surgical interventions were required. A telephone questionnaire (Appendix 2; supplemental materials are available with the online version of CORR) was conducted by one senior-level resident (JPW) independent of the treating surgeons using an Institutional Review Board-approved standardized telephone script and questionnaire. Each patient was asked to complete the questionnaire to determine the long-term response to the injection and if any additional treatments had been performed for this problem. Of the original 27 patients, we attempted to contact four by telephone but a family member or the patient answered the

phone and refused our offer to participate in the telephone questionnaire or answer any questions about the patient's hip pain; four patients were lost to followup. The questionnaire was administered to the remaining 19 patients, including the six patients who required surgical intervention, at an average of 44.6 months (range, 25–68 months) after their first injection. The telephone questionnaire consisted of questions about functional activities of daily living, including ascending and descending stairs, sitting, standing, rising from a chair, bending down to pick up an object from the floor, and getting in and out of bed. The patients were asked to grade their level of activity for each of these functional domains at three time points: before THA, just before hip injection, and at the current time period.

As part of each patient's initial evaluation, we obtained standard AP pelvis and crosstable lateral radiographs of the affected hip. We measured the acetabular component inclination on the AP radiograph and the acetabular component anteversion and bony coverage or uncoverage on the crosstable lateral image (Fig. 2A–B).

We used the Wilcoxon signed rank test to compare the HHSs and the pain scale values recorded on the short questionnaire administered by the radiologist immediately

Fig. 2A–B (A) Anteroposterior radiograph of a 76-year-old man who had THA performed on his left hip 1.5 years before developing iliopsoas tendonitis pain. The acetabular inclination is 32°. (B) Crosstable lateral radiograph shows the acetabular component with 14° of anteversion and 6.5 mm of bony uncoverage along the anterior rim.

before and after the injection. We determined differences in functional outcomes of activities of daily living using the telephone questionnaire data and comparing the three time periods (before THA, preinjection, and postinjection) using Fisher's exact test.

Results

The mean pain improved ($p < 0.001$) after the injection: mean 6.4 (range, 3–10) before injection and 2.9 (range, 0–8) after injection (Table 2). The average HHS improved ($p < 0.001$) from 61 preinjection to 82 postinjection. Of the 19 patients completing the telephone questionnaire, all reported improvements in their functional activity levels after iliopsoas injections. When patients were questioned about their difficulty ascending stairs, we found that 16 of 19 patients (84%) were limited to some capacity before injection and this decreased to nine of 19 (47%) at a minimum of 2 years after the injection. We observed

Table 2. Pain score immediately before and immediately after (within 30 minutes) the fluoroscopically guided steroid injections of the iliopsoas bursa

Patient number	First injection	Second injection	Third injection	Additional procedure
1	7 → 5/10			
2	4 → 2/10			
3	7 → 0/10			
4	6 → 1/10			
5	7 → 2–3/10			
6	5 → 0/10	4 → 0/10		
7	9 → 3–4/10			Revision THA
8	6 → 1/10			
9	8 → 8/10			Revision THA
10	6 → 1/10			
11	5 → 1/10	5 → 0/10		
12	8 → 1/10			
13	7 → 7/10			
14	8 → 4/10	8 → 5/10		
15	4 → 3/10	3 → 3/10		
16	5 → 3/10			
17	9 → 7/10			Revision THA
18	4 → 0/10	3 → 0/10		
19	10 → 8/10	10 → 2/10	10 → 0/10	
20	4 → 0/10			
21	8 → 4/10			
22	7 → 5/10			Psoas lengthening
23	3 → 0/10			
24	6 → 1/10	6 → 1/10		
25	5 → 2/10			Revision THA
26	9 → 5/10			
27	7 → 4/10	10 → 7/10		Psoas lengthening

improvements in all functional activities included in the telephone questionnaire, including difficulty descending stairs (74% preinjection versus 47% at a minimum 2-year followup), difficulty rising from a chair (89% versus 58%, respectively), difficulty bending over to pick up something on the ground (68% versus 53%, respectively), and difficulty getting in and out of bed (63% versus 37%, respectively). Although the majority of these activities are not specific to the iliopsoas tendon, it is likely that the steroid injection reduces the local inflammation around the tendon/bursa, which results in decreased pain around the hip and allows for improved motion and increased activity levels. Two patients (7.4%) had no relief from the injection during the immediate postinjection period (first 30 minutes), but at their 2-week postinjection clinical visit, both patients indicated some pain relief on their patient self-reported pain scale diaries. Eight patients (30%) had an additional iliopsoas injection for recurrence of groin pain at

an average of 8.2 months (range, 1–35 months) after the first injection. One patient had a third injection 3 months after her second injection. She received moderate benefit from the previous two injections and was deemed a good candidate for a third injection. At her most recent followup visits, she described her groin discomfort as manageable and has not had additional injections, medical management, or surgical intervention for her iliopsoas tendonitis. While six of the 27 patients had further surgery, in the 21 patients not having further surgery, we found that from their last documented clinical note that two had persistent symptoms requiring continued medical treatment (one patient continues to benefit from physical therapy to stretch the iliopsoas and the other patient is being treated for lumbar stenosis with epidural injections).

We observed no radiographic differences between the group that responded to injections only and those having subsequent surgery. The mean acetabular inclination for all patients was 44.9° (range, 24°–67°), mean acetabular inclination on crosstable lateral was 19.9° (range, –2° to 40°), the mean acetabular component overhang (lacking bony coverage) on crosstable lateral was 2.0 mm (range, –6 to 9 mm), and the mean leg length difference was 0.2 mm long (range, –13.5 to 13.5 mm).

Six patients (22%) underwent further surgery to treat the iliopsoas tendonitis and at latest followup all six had substantial improvement in their pain compared to preoperatively. Two patients had an iliopsoas lengthening procedure and four patients had revision of the acetabular component. Of the two patients having iliopsoas tendon lengthening, one patient had a well-positioned acetabular component but was 3.5 mm long on the operative side and had a thick, fibrous iliopsoas tendon rubbing over the anterior edge of the component. The second patient also had a well-positioned acetabular component but had a large anterior osteophyte that appeared to be irritating the tendon and was excised at the time of lengthening. In both of these cases, the hip was explored through an anterior approach. Both of these patients remain pain-free at their most recent office visit, which was at 3 years and 3.5 years, respectively, since their psoas lengthening surgery. In the four patients with component revision, three patients had acetabular components with decreased inclination (less than 45°) and reduced anteversion (less than 10°). In these patients, the acetabular components were revised to improve inclination and anteversion and at most recent followup (mean, 33.8 months; range, 25–49 months), these patients had no groin pain. The fourth patient had a loose femoral component at the time of surgery and underwent both femoral and acetabular component revision. The femoral component loosening was not appreciated preoperatively on clinical radiographs. The iliopsoas tendon was specifically explored in these four patients and in all four

was inflamed and thickened at the contact point in the area of the anterior margin of the acetabular component and capsule. We explored the anterior capsule in these four patients and found no defects or direct communications with the iliopsoas bursa. We presumed the prominence created by the combination of the acetabular component and capsule either stretched or rubbed the iliopsoas tendon causing chronic inflammation to develop. There were no immediate complications with any of these six patients, but one patient had an isolated hip dislocation 2 years after revision of his acetabular component.

Discussion

Determining the etiology of groin pain after THA can be difficult. The initial evaluation starts with a thorough history and physical examination, appropriate radiographic imaging, and a high index of suspicion for intrinsic sources of groin pain like infection and mechanical causes of prosthetic failure. Iliopsoas impingement causing bursitis/tendonitis is an uncommon source of groin pain after THA. Clinical findings of groin pain triggered by active hip flexion, hip flexion against resistance, and passive hyperextension are the most suggestive of iliopsoas tendon irritation. Most reports in the literature support initial nonoperative treatment with anti-inflammatory medications, physical therapy, and injections of the iliopsoas bursa with corticosteroids and local anesthetics, but there is limited information determining the effectiveness of selective steroid and anesthetic injections to treat iliopsoas tendonitis after THA. Our purposes were to determine if selective corticosteroid injections into the iliopsoas bursa can improve groin pain and functional outcomes for patients with presumed iliopsoas tendonitis after THA, if component position influences likelihood of response to injections, and whether further surgery relieves pain if injections do not.

The limitations of our study include the relatively small number of patients with iliopsoas tendonitis requiring injection, the retrospectively collected clinical data, and the reliance on patient recall for the telephone questionnaire. The data on the intensity and location of patient's pain were prospectively collected by the musculoskeletal radiologist performing the procedure immediately before and after the injections, but this has the potential for bias by both the radiologist to achieve better results and by the patient who may report improvement to satisfy the radiologist and surgeon. To minimize this potential for bias, the senior radiologist independently reviews the injection images and patient pain diary assessments on a regular basis to ensure quality control in an attempt to minimize injection variability and inaccurate results. In the literature,

there is some variability in the reported success after iliopsoas injections subsequent to THA and some of this variability might be related to experience of the person or persons administering the injections. Another limitation of our study is the mean length of followup of 44.6 months (range, 25–68 months) after the initial iliopsoas bursa injection. Longer followup is necessary, because one patient in our series first developed symptoms of iliopsoas tendonitis 5.5 years after his THA.

Many authors have advocated surgical treatment for iliopsoas tendonitis once nonoperative modalities fail [4, 6, 7, 11, 12, 23]. Most of these studies have reported temporary success after corticosteroid injections into the iliopsoas tendon sheath or bursa, but they have not determined the level of pain improvement or the role of multiple injections for refractory cases of iliopsoas tendonitis. Jasani et al. [12] found all nine patients in their series benefited from a CT-guided injection, but the resolution of pain was temporary in all but one patient and the mean time to recurrence of pain was 3.6 months. Dora et al. [7] reported an injection of the iliopsoas tendon sheath with corticosteroid and local anesthetic was used to confirm the diagnosis, resulting in temporary relief of pain in all 30 hips in their series. Eight of these patients were treated nonoperatively with repeat injections and hip flexor stretching exercises. Seven of the eight hips had no improvement in symptoms at a minimum of 24 months and one patient had a revision of the acetabular component. They concluded none of the hips treated with nonoperative treatment had a successful outcome. Ala Eddine et al. [1] prospectively reviewed all patients with pain after THA and found nine patients (incidence of 4.3%) had a clinical picture suggesting iliopsoas impingement. Of these patients, five of nine patients had complete or partial cessation of pain after injection and none of these five had subsequent surgery. We found similar results in our study with 21 of 27 patients (77%) experiencing complete or partial sedation of pain and no surgical intervention. Our findings were similar to O'Sullivan et al. [19] who reported the mean time from primary hip surgery to presentation with symptoms of iliopsoas tendonitis was 20 months. All but two of our patients presented with pain related to iliopsoas tendonitis 10 months or more after THA and 15 patients (55.6%) presented 2 years or longer after THA.

Owing to the small cohort of patients with variable radiographic findings treated over a long period of time, we were unable to identify any radiographic differences between the patients who were successfully treated nonoperatively and those who had subsequent surgery. Further evaluation is needed to help determine what patient factors may be important when evaluating a patient with iliopsoas tendonitis and deciding treatment options. Surgery may be necessary if there is an obvious reason for iliopsoas

impingement such as a large protruding anterior osteophyte or a malpositioned acetabular component. Surgical intervention, however, is not without consequences. Dora et al. [7] reported in their series of 29 patients that the 15 patients who underwent acetabular revision had a high rate of complications, including anterior dislocation of the hip, a trochanteric nonunion, a superficial wound infection, and five cases of trochanteric bursitis. One patient developed neuropathic pain and had multiple additional surgeries and ultimately disarticulation at the hip for deep wound infection. Another patient died at 1 year postrevision from causes unrelated to the hip. They had minimal complications in the six patients treated with a limited psoas tenotomy, but their study emphasizes the fact that greater risks are involved with surgical management of iliopsoas tendonitis than with more nonoperative management. In our study, we had a very low rate of complications in the six patients treated with surgery with only one major complication of a late hip dislocation.

When we started this project, most patients who presented with iliopsoas tendonitis were offered an initial steroid and anesthetic injection for both diagnostic and therapeutic reasons. If the pain failed to substantially improve or if the pain returned after the initial injection, then these patients were offered surgery. We had several patients who had considerable pain relief from the initial injection and desired a second injection when the same pain returned. We believed repeat injections were safer, more cost-effective, and had less risk than surgery. The fact that the majority of these patients receiving a second steroid and anesthetic injection did not require any further surgery caused us to change our treatment algorithm over the course of this study to consider offering patients multiple iliopsoas bursa injections before considering further surgical intervention. Only one of our eight patients who received multiple injections eventually underwent further surgery for the pain.

The diagnosis of iliopsoas tendonitis should be considered in any patient with groin pain who presents several months to several years following primary or revision THA. Provocative activities such as passive hip hyperextension, flexion against resistance and resisted straight leg raise test will tend to increase groin pain in these patients. Patients with presumed iliopsoas tendonitis should be initially evaluated and referred to a musculoskeletal radiologist for injection. Patients who have an improvement in their pain (partial or complete) following an initial injection and then subsequently experience a recurrence of the same pain should be considered for additional iliopsoas bursa injections prior to surgical intervention.

Iliopsoas tendonitis is uncommon after THA but should be considered in the differential diagnosis for patients presenting with groin pain. Of our 27 patients with

iliopsoas tendonitis after THA treated with injections, six patients (22%) had subsequent surgery. Eight of our patients required an additional injection and continue to have pain relief after repeat injection(s). All injections were performed by a single musculoskeletal radiology department with experience performing injections around the hip using a standardized protocol and routine quality assurance reviews. We conclude fluoroscopically guided injections of the iliopsoas bursa are safe, effective, and provide good pain relief, but sometimes more than one injection is required to relieve symptoms. Iliopsoas bursa injections should be considered part of the treatment algorithm before surgical intervention in cases of iliopsoas tendonitis after THA.

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