

Clinical Efficacy of Ultrasound-guided Iliopsoas Corticosteroid Injection for Hip Pain

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ABSTRACT

Introduction. Iliopsoas bursitis and tendinopathy are common causes of hip pain and major contributors to snapping hip syndrome, which affects 5-10% of the general population. These conditions often are treated with conservative measures, including corticosteroid injections into the iliopsoas bursa. However, the clinical effectiveness of such injections has not been well studied. Through this study, the authors evaluated the efficacy of ultrasound-guided corticosteroid injections into the iliopsoas bursa.

Methods. The study included 68 patients diagnosed with iliopsoas tendinopathy, iliopsoas bursitis, or snapping hip syndrome (coxa saltans), all of whom received corticosteroid injections into the iliopsoas bursa as a standard treatment. A single-sample, non-experimental design was employed, with participants completing assessments of pain, mechanical symptoms, physical function, activity level, and total hip score at baseline, and again at three- and six-month post-injection. Data were collected from January 1, 2023, to April 1, 2024, and changes in the outcome measures were analyzed using repeated measures ANOVA.

Results. Participants showed significant improvements in pain, mechanical symptoms, physical function, and activity level at both three-month and six-month follow-ups. Additionally, overall hip scores improved statistically by the end of the study.

Conclusions. Our data suggest that ultrasound-guided corticosteroid injections into the iliopsoas bursa can effectively improve physical function, enhance the ability to perform daily activities and physical tasks, and reduce disability associated with iliopsoas tendinopathy. Further research with a longer follow-up period and more rigorous controls is warranted to confirm these findings and assess the long-term benefits and potential risks of the procedure.

INTRODUCTION

Coxa saltans, also known as snapping hip syndrome, affects 5-10% of the general population.^{1,2} The iliopsoas tendon, a primary hip flexor, often is implicated in this condition, and iliopsoas tendinopathy is increasingly recognized as a cause of anterior hip pain and snapping hip.^{2,3} Corticosteroid injections into the bursa surrounding inflamed tendons have been shown to be beneficial both pathologically and clinically for patients.^{1,3}

Typical conservative treatments for tendonitis include oral and topical NSAIDs, physical therapy focusing on the hip flexion kinetic chain, instrument-assisted soft tissue massage, and activity modification.³ Second-line therapy may include ultrasound-guided corticosteroid injections for cases that do not respond to conservative treatments.⁴ Previous research has mainly focused on iliopsoas tendon injection after total hip arthroplasty as a post-operative pain adjunct, with longitudinal data showing improvement in about 75% of patients.^{4,5} However, there are limited data on the longitudinal effect of interventions in non-operative patients. Ultrasound-guided corticosteroid injections have been shown to be more effective than the previous standard of fluoroscopic-guided injections, with the added benefit of no radiation exposure.^{4,6}

We evaluated the efficacy of ultrasound-guided corticosteroid injections into the iliopsoas bursa in patients with iliopsoas tendinopathy. We assessed immediate and long-term efficacy using the Nonarthritic Hip Score⁷ and the patients' ability to return to previous activity levels at spaced intervals after the injection.

METHODS

Study Design and Participants. The authors employed a single-sample, nonexperimental design to compare baseline (before injection but after diagnosis), three-month post-ultrasound-guided iliopsoas corticosteroid injections, and six-month follow-up using validated outcome measures for pain, mechanical symptoms, physical function, activity level, and total hip score.⁷ The Nonarthritic Hip Score inventory assesses hip function and evaluates hip pain across four dimensions: pain, mechanical symptoms, physical function, and activity level. Participants rated their hip function and pain on a five-point scale (0 = extreme difficulty, 4 = no difficulty). Scores for the four questions in each dimension were summed, with lower scores indicating greater difficulty in hip function and higher levels of pain. The overall hip score was calculated by summing the scores from all four dimensions and multiplying the raw total by 1.25, resulting in a possible score range from 0 to 100. Higher scores reflect minimal difficulty experienced due to hip pain within the past 48 hours.

This study was conducted at the University of Kansas School of Medicine-Wichita Sports Medicine Program at Ascension Via Christi, using a convenience sample of 68 adult English-speaking patients diagnosed with iliopsoas tendinopathy. All participants underwent corticosteroid injections into the iliopsoas bursa as a standard treatment. Each participant received an iliopsoas bursa corticosteroid injection using 3 mL lidocaine 1% without epinephrine and 1 mL 40 mg/mL triamcinolone. Participants completed a seven-minute surveys (baseline, three-month, and six-month follow-up). The study protocol for human subject research was approved by the University of Kansas Medical Center and Ascension Via Christi Institutional Review (IRB) Boards.

Procedure. Participants completed the survey at three different time points: before the procedure, at three-month post-ultrasound-guided iliopsoas corticosteroid injection, and at the six-month follow-up.

Surveys were conducted using SurveyMonkey®, a secure web-based survey system, accessible via a quick response (QR) code printed on flyers distributed to participants. Participants also had the option to complete the survey on paper or over the phone after the initial online survey via QR code. Each survey included validated measures of pain, mechanical symptoms, physical function, and activity level to assess participants' pain levels, mechanical symptoms related to the hip, physical function, and ability to engage in other various activities as detailed by Christensen et al.⁷ The baseline survey also included demographic questions (Table 1). Data collection took place from January 1, 2023 to April 1, 2024.

Table 1. Participants' characteristics at baseline.

Characteristics	Measure (N = 68)
Age	
Mean (SD), y	40.3 (16.1)
Median	38.5
Biological sex at birth, no. (%)	
Male	22 (32.4)
Female	46 (67.6)
Marital status, no. (%)	
Never married	25 (36.8)
Married	38 (55.9)
Divorced	3 (4.4)
Widowed	2 (2.9)
Body Mass Index	
Mean (SD)	27.4 (5.9)
Median	26.6
Minimum	17.0
Maximum	42.9
Employment status, no (%)	
Employed Full-time	37 (54.4)
Employed Part-time	11 (16.2)
Not employed, seeking employment	2 (2.9)
Not employed, not seeking employment	18 (26.5)
Race, no. (%)	
White or Caucasian	59 (86.8)
Black or African American	1 (1.5)
Hispanic or Latino	3 (4.4)
American Indian or Alaska Native	1 (1.5)
Two or more race	2 (2.9)
Decline to not answer	1 (1.5)
Other (please specify)	1 (1.5)

Statistical Analysis. We used standard descriptive statistics to create the demographic information, and repeated measures ANOVA to estimate the effect of the ultrasound-guided iliopsoas corticosteroid injections for hip pains on the outcome variables. All analyses were two-sided with α of 0.05. All survey questions were analyzed using IBM

SPSS® Statistics Version 29 (Armonk, NY). A sample size of 30 was calculated as necessary for adequate power (>0.80) to detect significant group differences among the variables with 0.25 effect size and $p < 0.05$.⁸

RESULTS

Participant Characteristics. All 68 participants completed the baseline survey, with 30 (44.1%) providing data in the post-intervention (three months) survey and 32 (47.1%) in the follow-up survey (six months). The average age was 40.3 (SD = 16.1); 67.6% were female and 86.8% identified as Caucasian (Table 1).

Outcome Measures. Table 2 displays the participants' scores on each subscale item at the three-month and six-month surveys, showing increases from baseline. Specifically, participants experienced statistically significant improvements in pain ($F[2, 50] = 17.05$; $p = 0.002$; $\eta^2_p = 0.41$), mechanical symptoms ($F[2, 50] = 7.61$; $p = 0.001$; $\eta^2_p = 0.23$), physical function ($F[2, 46] = 10.37$; $p < 0.001$; $\eta^2_p = 0.31$), and activity level scores ($F[2, 46] = 3.43$; $p = 0.043$; $\eta^2_p = 0.13$) over the past 48 hours by the end of the study. Additionally, the participants' overall hip score showed a statistically significant improvement ($F[2, 50] = 7.23$; $p = 0.002$; $\eta^2_p = 0.22$). Post hoc pairwise comparisons revealed significant improvements across all measures between baseline and the six-month follow-up (Table 2).

DISCUSSION

Corticosteroid injections are known to provide relief for other musculoskeletal pathologies for up to 24 weeks following injections.⁹ However, the duration of effect in iliopsoas tendinopathy has been less clear. Our study revealed positive effects on pain from the injection lasting up to 24 weeks. Additionally, we found that patients were more active following the injection. This was an important finding because increased exercise and general activity have been shown to be beneficial for pain in various musculoskeletal conditions,¹⁰ which favors a positive prognosis for patients who become more active following the injection.

The technique used by the authors also has been shown to be safe, with no reported adverse events during the study. Corticosteroid injections have been effective in treating numerous musculoskeletal conditions,¹¹ including iliopsoas tendinopathy.^{4,5} While these previous studies focused on post-operative pain management following hip surgery, our study focused on the effectiveness of corticosteroids for iliopsoas tendinopathy, irrespective of prior hip procedures.

Iliopsoas tendinopathy is an underrecognized cause of anterior hip pain affecting both active and sedentary individuals. Our findings suggest that ultrasound-guided iliopsoas bursa corticosteroid injection can be an effective treatment modality for iliopsoas tendinopathy. This study demonstrated improvements in pain, mechanical symptoms, physical function, and activity levels. Firstly, the significant reduction in pain highlights the effectiveness of the ultrasound-guided iliopsoas bursa corticosteroid injection in alleviating discomfort associated with iliopsoas tendinopathy. The large effect size ($\eta^2_p = 0.41$) indicates that this intervention had a substantial impact on reducing pain, which is a critical factor in enhancing patients' quality of life.¹²

The improvement in mechanical symptoms suggested that the injection not only alleviated pain but also addressed the underlying mechanical dysfunctions that contributed to the symptomatology of

Table 2. Outcomes scores at each survey with comparison to baseline.

Scale (Possible Range)	Time Point ^a			Change, ^b Mean Difference (95% CI)	F	η^2_p
	Baseline (N = 68)	Three Months (N = 30)	Six months (N = 32)			
Pain ^c (0-20)	10.8 (9.9-11.6) -	13.9 (12.7-15.1) [<.001]	13.3 (12.1-14.6) [<.001]	2.5 (0.8-4.3) [0.002]	17.05	0.41
Mechanical symptoms ^d (0-16)	9.7 (8.9-10.4) -	12.1 (11.1-13.0) [<.001]	11.1 (9.9-12.3) [0.008]	1.4 (-0.1-2.9) [0.001]	7.61	0.23
Physical function ^e (0-20)	12.1 (11.1-13.2) -	14.2 (12.8-15.7) [<.001]	14.0 (12.6-15.4) [<.001]	1.9 (-0.2-3.9) [<.001]	10.37	0.31
Activity level ^f (0-24)	11.4 (10.2-12.7) -	14.1 (12.1-16.0) [0.007]	12.7 (10.5-14.9) [0.109]	1.3 (-1.4-4.0) [0.043]	3.43	0.13
Hip score ^g (0-100)	54.9 (51.1-58.9) -	66.7 (59.9-73.5) [<.001]	62.9 (56.0-69.7) [0.005]	8.0 (-0.9-16.7) [0.002]	7.23	0.22

^aValues shown are mean score (95% CI) [P value]. P values were calculated with the repeated measures ANOVA and denote the significance of F value.

^bChange from baseline to six months (95% CI) [P value].

^cHigher scores indicate less pain experienced in the past 48 hours.

^dHigher scores indicate fewer symptoms experienced in the past 48 hours.

^eHigher scores reflect minimal difficulty caused by hip pain in the past 48 hours.

^fHigher scores indicate reduced non-arthritic hip pain in the past 48 hours.

^gHigher scores reflect minimal difficulty due to hip pain in the past 48 hours.

iliopsoas tendinopathy. The moderate effect size ($\eta^2_p = 0.23$) supported the clinical relevance of this finding.^{13,14}

The increase in physical function ($\eta^2_p = 0.31$) demonstrated that participants were better able to perform daily activities and engage in physical tasks following the intervention. This significant enhancement in physical function is essential for improving overall well-being and reducing the disability associated with iliopsoas tendinopathy.¹⁰ Similarly, the improvement in activity level scores indicated that participants were more active following the injection. Although the effect size is smaller ($\eta^2_p = 0.13$), this finding is still meaningful, as increased activity levels are associated with better overall health outcomes.¹⁵⁻¹⁷

Lastly, the overall hip score ($\eta^2_p = 0.22$) showed a statistically significant improvement, reflecting comprehensive benefits of the intervention on hip-related symptoms and function. This broad improvement underscores the potential of corticosteroid injections as an effective treatment option for iliopsoas tendinopathy.¹⁷

Limitations. There are several limitations to this study. First, there was no control or comparison group, so we cannot infer causality. Secondly, the authors' institution is a referral center for various injections, including the iliopsoas bursa, for outside health care professionals. Consequently, many patients were referred for an iliopsoas injection by orthopedic surgeons and other providers not involved in the study, leading to a lack of standardization in pre- and post-injection therapies. Additionally, some patients underwent various surgical procedures, such as hip arthroplasty, which could have influenced the number of participants in the post-interventions and associated results.

During the study, a national shortage of triamcinolone required the use of methylprednisolone in some patients, and a comparison of the steroids used was not included in the analysis. Data collection was managed by Sports Medicine Fellows, leading to missed data collec-

tion between the graduation of one class and the start of the next, resulting in some patients missing the three-month follow-up.

Moreover, there was over a 50% attrition rate between baseline and six-month follow-up, limiting result reliability. The study's short duration prevented conclusions about the long-term effectiveness of the procedure and its impact on avoiding surgery or further interventions. Additionally, the non-arthritic hip score used is validated for a younger population, potentially limiting the generalizability of the results to older populations with more degenerative hip pathology as in our study.

Lastly, the study did not set population-based inclusion or exclusion criteria, limiting the ability to report specific findings on subsets of the population based on varying activity levels, ages, BMI levels, gender, or race.

CONCLUSIONS

In summary, these data provide evidence supporting the effectiveness of ultrasound-guided iliopsoas bursa corticosteroid injections in improving pain, mechanical symptoms, physical function, and activity levels in patients with iliopsoas tendinopathy. These results suggest that this intervention can significantly enhance patients' quality of life and functional abilities. However, further research with a longer follow-up period and more rigorous controls is warranted to confirm these findings and assess the long-term benefits and potential risks of the procedure.

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