

Evaluation of Clinical Tests to Diagnose Iliopsoas Tendinopathy

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Abstract

Background Diagnosing iliopsoas tendinopathy is challenging because of nonspecific pain patterns and clinical signs overlapping with those of other hip conditions. Although peritendinous anesthetic injections provide the best diagnostic accuracy, they are invasive and resource intensive. Conventional clinical tests largely focus on hip flexion, potentially overlooking the diagnostic contribution of the muscle's secondary function—external rotation. A newly described hip–external rotation–flexion-ceiling (HEC) test combines the primary function (hip flexion) with the secondary function (external rotation) of the iliopsoas, potentially offering enhanced diagnostic reliability.

Questions/purposes This study aimed to (1) determine the diagnostic accuracy of the HEC test and 10 conventional

physical examination tests for iliopsoas-related groin pain; (2) detect “good” and “poor” tests for diagnosing iliopsoas tendinopathy based on three diagnostic performance criteria before and after anesthetic injection (mean pain reduction, optimal cutoff value for pain reduction, and area under the curve [AUC]); and (3) rank all tests, based on the same criteria, to identify the best diagnostic tool.

Methods In this retrospective study at a high-volume arthroplasty community hospital, we reviewed 48 consecutive fluoroscopy-guided iliopsoas tendon injections performed for persistent groin pain between October 2023 and May 2024. After excluding four patients without any data on the clinical tests performed, a population of 44 participants (mean age 48 ± 15 years; 34% male) remained, which included both native hips (52%) and patients who had undergone THA (48%). Eleven clinical tests—including the novel HEC test and 10 conventional tests (such as resisted hip flexion seated and straight leg raise [SLR] in neutral and external rotation)—were performed before and after a fluoroscopy-guided iliopsoas injection, with an improvement in their characteristic groin pain serving as the diagnostic gold standard. A test was considered “good” if it met all three criteria: (1) a significant mean VAS pain score reduction of ≥ 3 points after injection, (2) a significant optimal cutoff value for pain reduction of ≥ 4 , and (3) a significant AUC of ≥ 0.80 . A test meeting none of these three criteria was considered “poor.” Using the same three criteria, each clinical test with at least 30 valid observations received a ranking position for each criterion, and these three ranks were summed to produce a total score. The test with the lowest total score was deemed the best, followed by the tests with higher scores. Statistical analysis involved estimating sensitivity, specificity, AUC, and optimal cutoff values using receiver operating characteristic curves and the Youden J statistic. **Results** In 82% (36 of 44) of patients who experienced pain reduction after injection and who were diagnosed with iliopsoas tendinopathy, the following tests had the most clinically important pain reduction after infiltration: the HEC

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test (6.0 ± 2.1 ; $p < 0.001$), resisted hip flexion (seated) (5.1 ± 1.3 ; $p < 0.001$), and SLR in exorotation (4.9 ± 1.4 ; $p < 0.001$). The HEC test demonstrated a sensitivity of 94%, specificity of 88%, and an AUC of 0.99, with a high cutoff (VAS score reduction of 5) outperforming conventional tests. Three tests—including the HEC test, resisted hip flexion (seated), and resisted hip external rotation (seated)—met all three criteria to be classified as “good” tests, whereas the Thomas test, SLR in neutral, and the snapping hip test were deemed “poor” tests. The HEC test was ranked best to detect iliopsoas tendinopathy, followed by the resisted hip flexion (seated), SLR in exorotation, and resisted hip external rotation (seated).

Conclusion The HEC test is an accurate diagnostic maneuver for iliopsoas tendinopathy offering improved sensitivity and specificity compared with conventional tests. Surgeons should consider incorporating the HEC test into routine evaluations of patients with groin pain to enhance diagnostic precision and optimize treatment strategies. Future studies should focus on interobserver reliability and assess the test’s performance across diverse patient populations.

Level of Evidence Level III, diagnostic study.

Introduction

Iliopsoas tendinopathy is common in both native hips and those after THA. In native hips, overuse, injury, or anatomic variants can predispose the tendon to excessive stress and subsequent inflammation [6, 31]. After THA, surgical scarring, component malposition, retained cement, screws penetrating the ilium, a prominent femoral collar and impingement (as the tendon courses over the anterior acetabular edge) often lead to irritation, with an incidence of iliopsoas tendinopathy of 2.2% to 4.4% postoperatively [4, 20, 21, 25, 35]. In a direct anterior approach to THA, younger age and previous spine fusion are the most important identified risk factors [37]. Iliopsoas tendinopathy is frequently recalcitrant and hard to treat, with options including physical therapy, antiinflammatory oral medications and local injections, and even surgery, underscoring the necessity for a clinical diagnosis.

Despite its prevalence, diagnosing iliopsoas tendinopathy remains challenging because of its nonspecific pain pattern and the overlap of clinical signs with those of other intraarticular hip conditions (such as labral injury, chondral injury, and femoroacetabular impingement) [14, 26, 33]. Patients typically report groin pain during hip flexion, particularly with getting in or out of bed or a car [6, 35]. Numerous clinical maneuvers have been proposed to establish a diagnosis, such as resisted hip flexion in the seated position, resisted straight leg raise (SLR), the psoas stretch (Thomas test), or observation of snapping hip [1, 7, 39].

Furthermore, internal snapping hip syndrome (coxa saltans interna) is not consistently painful or invariably present [22, 39]. To date, no single maneuver—or combination of maneuvers—has demonstrated definitive diagnostic accuracy [2, 18]. Similarly, imaging modalities such as ultrasound and MRI have shown low sensitivity and specificity [18]. In contrast, an iliopsoas peritendinous anesthetic injection currently offers the best diagnostic accuracy [2, 9, 10, 13, 34, 36]. However, this procedure is time consuming, can expose patients to ionizing radiation, and carries risks such as temporary femoral nerve numbness, as well as potential adverse effects from contrast agents (and sedation) [3, 15].

Notably, conventional tests primarily assess hip flexion. A novel hip–external rotation–flexion-ceiling (HEC) test, however, combines the primary function (hip flexion) with the secondary function (external rotation) of the iliopsoas muscle, potentially offering enhanced diagnostic reliability [30].

Accordingly, our study aimed to (1) determine the diagnostic accuracy of the HEC test and 10 conventional physical examination tests for iliopsoas-related groin pain; (2) detect “good” and “poor” tests for diagnosing iliopsoas tendinopathy based on three diagnostic performance criteria before and after anesthetic injection (mean pain reduction, optimal cutoff value for pain reduction, and area under the curve [AUC]); and (3) rank all tests, based on the same criteria, to identify the best diagnostic tool.

Patients and Methods

Study Design and Setting

This retrospective study was conducted at a high-volume arthroplasty community hospital. The study evaluated 11 physical examination maneuvers for diagnosing iliopsoas tendinopathy in patients presenting with unilateral groin pain and hip flexion pain who had received over 3 months of physiotherapy without substantial improvement. These patients subsequently underwent a fluoroscopy-guided iliopsoas injection, with improvement (satisfied versus unsatisfied) in their characteristic groin pain serving as the diagnostic gold standard. During clinical tests, the principal investigator (FJV), measured pain scores using the numeric pain rating scale before and after injection [19].

Participants

We conducted a retrospective search of the electronic medical record (EMR) system (Hix-Chipsoft) to identify 48 consecutive fluoroscopy-guided iliopsoas tendon injections performed for persistent groin pain by a single

investigator (FJV) between October 2023 and May 2024. Demographic data, including age, sex, and history of prior hip surgery, were extracted. Injections were administered in the iliopsoas groove, just medial to the inferior anterior iliac spine and lateral to the pubic eminence. Two hours after the injection, participants used a binary scale to rate whether their characteristic groin pain had improved (satisfied versus unsatisfied). Before and after injection, the principal investigator (FJV) performed 11 clinical tests in an order that was not predetermined.

Eight percent (4 of 48) of patients were excluded because of the absence of a VAS assessment for clinical tests in the EMR, yielding a final study population of 92% (44) of participants. Incomplete VAS forms resulted in missing data for certain tests.

Descriptive Data

Of the 44 patients included in the study, 34% (15) were male, and the group had a mean age of 48 ± 15 years. Fifty-two percent (23) of participants had native hips, all without severe signs of osteoarthritis on radiography (Tönnis classification 0 or 1), and 48% (21) had undergone THA. Because the iliopsoas tendon retains its function in both settings and the diagnostic challenges associated with tendinopathy remain similar, we pooled these subgroups. This approach aligns with that of previous studies, such as Haskel et al. [18], which also did not differentiate between native hips and arthroplasty. Moreover, no additional prior hip surgeries were recorded.

Diagnostic Test Being Evaluated: The HEC

During the HEC test, patients lie supine and flex the ipsilateral knee while externally rotating, flexing, and abducting the hip. This configuration creates a “figure 4” with the ipsilateral ankle adjacent to the contralateral knee in neutral position, which is similar to the Faber test [38]. The patient is then instructed to lift the ipsilateral foot toward the ceiling (Fig. 1). We have provided images illustrating the 11 clinical tests for hip pain (Supplemental Fig. 1; <http://links.lww.com/CORR/B423>). A positive HEC test was defined as the reproduction of groin pain (VAS score > 3) during the maneuver (Video 1; <http://links.lww.com/CORR/B424>).

Conventional Clinical Tests

In addition to the HEC test, the following 10 conventional clinical tests were conducted (Supplemental Fig. 1; <http://links.lww.com/CORR/B423>): the SLR in both neutral and maximal external rotation, flexion-adduction-internal



Fig. 1 The HEC test with the ipsilateral foot lifted toward the ceiling from a “figure 4” position.

rotation (FADIR), snapping hip, scour test, Thomas text, hyperextension-external-rotation (HEER), resisted hip flexion (seated), resisted hip exorotation (seated), and palpation medial to the hip [11, 16, 28, 38].

Gold Standard for Diagnosis: Peritendinous Iliopsoas Injection

While ultrasound imaging is commonly used to localize the peritendinous region because of its real-time soft tissue visualization, accurate injection can be challenging in patients with anatomy that makes localization difficult, such as those with obesity [3, 23]. Therefore, a fluoroscopy-guided iliopsoas injection was chosen for its reliable, reproducible needle placement by visualizing bony landmarks (Fig. 2); this was performed by one investigator (FJV) following the protocol described in a previous study [37].

Primary and Secondary Study Outcomes

Our primary study goal was to address the accuracy of the HEC test and 10 conventional tests for groin pain in

diagnosing iliopsoas tendinopathy. To achieve this, we analyzed the results of a fluoroscopy-guided iliopsoas injection using a binary scale (satisfied versus unsatisfied) and the numeric pain rating scale to determine sensitivity, specificity, and AUC.

Our secondary study goal was to detect “good” and “poor” tests for diagnosing iliopsoas tendinopathy. A test was considered “good” if it met all three criteria: (1) a mean VAS pain score reduction of ≥ 3 points after injection, (2) an optimal cutoff value for pain reduction of ≥ 4 , and (3) an AUC of ≥ 0.80 . A test meeting none of these three criteria was considered “poor.”

Our third study goal was to rank all tests. Using the same three criteria (mean VAS pain score reduction, optimal cutoff value, and AUC), each clinical test with at least 30 valid observations received a ranking position for each criterion, and these three ranks were summed to produce a total score. The test with the lowest total score was deemed the best, followed by the tests with higher scores. This method provided a comprehensive and straightforward comparison of diagnostic performance.

Ethical Approval

We obtained ethical approval for this study from the Ethics Committee of Ziekenhuis Oost Limburg (CTU nr Z-2022130). Written informed consent was obtained from all patients or their guardians for the publication of identifiable images, including photographs and videos, and all patients were informed of the potential uses of these images.

Statistical Analysis

Statistical analyses were performed using JMP Pro 17 with a significance level (α) of 0.05. For 11 clinical tests, we estimated diagnostic accuracy measures, including sensitivity, specificity, AUC, and receiver operating characteristic (ROC). A clinical test with a mean pain reduction of ≥ 3 points was considered significant based on previously published minimum clinically important difference studies [12, 18, 24]. In patients diagnosed with iliopsoas tendinopathy, mean pain reduction, for all clinical tests with at least 30 valid observations, was assessed using a one-sided t-test with a test value (μ) of 3. A Benjamini-Hochberg correction was applied in all tests.

The Shapiro-Wilk test was reserved for assessing normality. Missing data were handled by excluding participants who lacked pre- or postinjection VAS scores for a given test, following the principle of “missing completely at random.”

For all clinical tests, an optimal cutoff value for pain reduction was determined by constructing an ROC curve and calculating sensitivity and specificity at various threshold values. The threshold that maximizes the Youden J statistic (defined as $J = \text{sensitivity} + \text{specificity} - 1$) was considered optimal, as it provides the best balance between sensitivity and specificity. The Fisher exact test assessed the significance of the association between initial pain score and pain reduction at this cutoff.

For the optimal cutoff, the AUC was used to evaluate each test’s ability to differentiate iliopsoas tendinopathy from other conditions, with an AUC of 0.50 representing

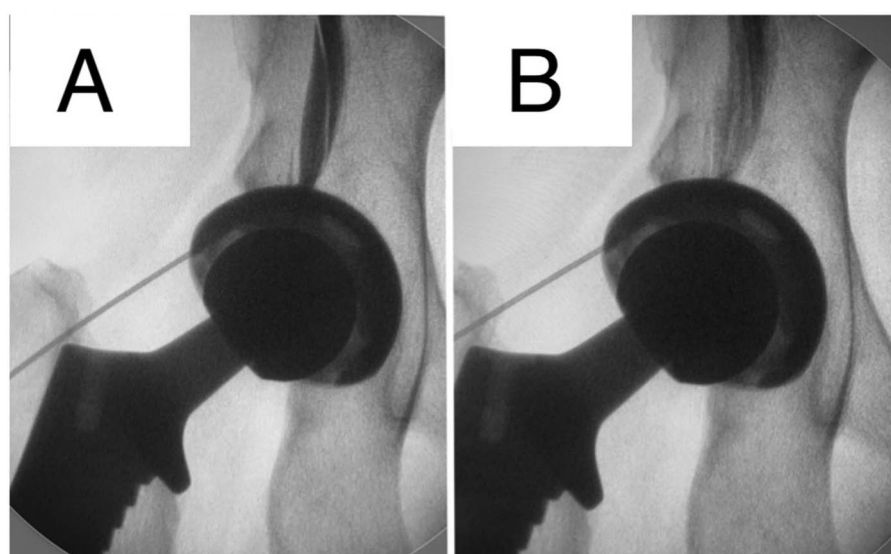


Fig. 2 Right hip with a fluoroscopy-guided infiltration of the peritendinous iliopsoas. (A) After applying contrast in the psoas groove. (B) Addition of marcadine and corticosteroids.

a test performing no better than chance and an AUC of 1.00 representing perfect accuracy.

We employed a nonparametric bootstrap method to estimate the 95% confidence intervals (CIs) for the AUC associated with each exercise. This approach involved resampling the patient observations with replacement, thereby generating multiple bootstrap samples. For each exercise, we performed 50,000 such bootstrap iterations, calculating the AUC for each resampled data set. Subsequently, we derived the 95% CIs by determining the 2.5th and 97.5th percentiles of the bootstrap AUC distribution.

Given our objective to identify an effective test and the challenges associated with collecting enough peritendinous injections, we calculated our sample size ($N = \frac{Z_{\alpha/2}^2 \times p(1-p)}{d^2}$) based on an expected AUC of 0.85, with $Z_{\alpha/2} = 1.96$ and an acceptable error margin (d) of 0.10, obtaining $n = 49$. Given the relatively small sample size, a detailed sex-disaggregated analysis was omitted.

Results

Diagnostic Accuracy of All Clinical Tests

Using fluoroscopy-guided marcadine injection, 82% (36 of 44) of patients had satisfiable pain reduction after an injection in the psoas groove and were subsequently diagnosed with iliopsoas tendinopathy, whereas the remaining 18% (8) were unsatisfied; among these, 16% (7) responded favorably to an intraarticular anesthetic injection and were diagnosed with a labral tear via arthrogram MRI, while one patient was diagnosed via MRI with an avulsion of the direct head of the rectus femoris. No adverse events were reported from either the index tests or the fluoroscopy-guided injection.

In patients with iliopsoas tendinopathy, the following tests had clinically important pain reduction after infiltration: the HEC test (6.0 ± 2.1 ; $p < 0.001$), resisted hip flexion (seated) (5.1 ± 1.3 ; $p < 0.001$), SLR in exorotation (4.9 ± 1.4 ; $p < 0.001$), SLR neutral (3.8 ± 1.5 ; $p < 0.001$), and resisted hip external rotation (seated) (3.5 ± 2.0 ; $p = 0.046$) (Table 1).

The HEC test demonstrated a sensitivity of 94%, a specificity of 88%, and an AUC of 0.99 (95% CI 0.98 to 1.0), with a high cutoff (VAS score reduction of 5), outperforming conventional tests (Table 2). Resisted hip external rotation (seated) had a sensitivity of 96%, a specificity of 81%, and an AUC of 0.98 (95% CI 0.92 to 1.00). Resisted hip flexion (seated) had a sensitivity of 94%, a specificity of 89%, and an AUC of 0.96 (95% CI 0.88 to 1.0) (Fig. 3).

What Is a Good Test to Detect Iliopsoas Tendinopathy?

Three tests met all three criteria to be considered a good test: the HEC test, resisted hip flexion (seated), and resisted hip external rotation (seated). The Thomas test and HEER test were deemed poor tests as they did not meet any of the criteria.

What Is the Best Test to Detect Iliopsoas Tendinopathy?

All tests are ranked based on their results for pain reduction, AUC, and optimal cutoff (Table 3). The best test to detect iliopsoas tendinopathy was the HEC test, followed by the resisted hip flexion (seated), SLR in exorotation, and resisted hip external rotation (seated).

Discussion

The lack of reliable clinical tests for diagnosing iliopsoas tendinopathy represents an important gap in both diagnosis and treatment. Using fluoroscopy-guided marcadine injection as the reference standard, our study aimed to determine the diagnostic accuracy of 11 physical examination tests for iliopsoas-related groin pain. We found that the HEC test, resisted hip flexion (seated), SLR in external rotation, and resisted hip external rotation (seated) aid in the clinical diagnosis of iliopsoas tendinopathy. Moreover, the HEC test outperformed other conventional tests, and this novel clinical test may help surgeons in diagnosing iliopsoas-related groin pain.

Limitations

Several limitations of the current study must be acknowledged. First, a positive response to an iliopsoas injection may not be specific to iliopsoas tendinopathy given that the iliopsoas bursa communicates with the native hip in up to 15% of the population [5, 27, 32]. In these situations, an injection in the psoas groove will also reduce articular pain. Moreover, a clinical examination of articular pain coming from labrum tears is still considered difficult and inconclusive [38]. Also, after THA, capsular deficiency may cause a continuum between joint and psoas tendon. However, a local injection in the psoas groove is considered the gold standard for diagnosing iliopsoas tendinopathy for native hips and after THA. Second, marcadine has a small molecular weight and can diffuse through the joint capsule. However, patients underwent clinical tests for a period ranging from 10 to 30 minutes after injection in the psoas groove. This duration appears quite short for the marcadine to

Table 1. Pain reduction for each clinical test

Clinical test	Number	Mean VAS reduction (95% CI)	Corrected p value ($\mu > 3$) ^a
SLR neutral	36	3.8 (3.4-4.2)	< 0.001
SLR exorotation	36	4.9 (4.5-5.3)	< 0.001
Tenderness medial to the joint	36	3.1 (2.7-3.5)	0.4
HEC	36	6.0 (5.5-6.5)	< 0.001
FADIR	33	0.8 (0.4-1.1)	> 0.99
Snapping hip	5	4.4 (2.3-6.4)	0.12 ^a ; 0.32 ^b
Scour test	33	3.2 (2.9-3.6)	0.15
Thomas test	33	1.2 (0.8-1.7)	> 0.99
HEER	35	2.6 (2.2-3.0)	> 0.99
Resisted hip flexion (seated)	36	5.1 (4.7-5.4)	< 0.001
Resisted hip external rotation (seated)	32	3.5 (3.0-4.0)	0.046

^at-test with Benjamini-Hochberg correction.^bUncorrected Shapiro-Wilk test to assess normality.

adequately diffuse through the capsule. Two hours after the infiltration, patients were asked if the effect was satisfactory in alleviating their characteristic groin pain. If not, an intraarticular infiltration was scheduled and administered another day. Except for one patient, all individuals dissatisfied with the psoas infiltration reported relief after the intraarticular injection, making an effect of marcadine diffusion unlikely. The one exception was eventually diagnosed via MRI with an avulsion of the direct head of the rectus femoris. Third, the patients in this study had refractory groin pain and ultimately agreed to an injection, which may indicate that they represent a particularly severe subset. Consequently, it remains uncertain whether the same results would apply to patients with less painful psoas disorders.

In addition, the HEC test seems relatively complex as it combines the execution of two distinct movements. This

complexity may pose challenges for patients with limited mobility or diminished motor-cognitive capacity. Although all patients in our study successfully completed the test, we consider the combination of seated resisted hip flexion and seated resisted external rotation a viable alternative to diagnose iliopsoas tendinopathy when the HEC test is not feasible.

We also note that intraobserver and interobserver variability in performing the HEC test may cause different results, and further research should focus on this topic. Additionally, the retrospective design of the study implies that only patients with suspected iliopsoas tendinopathy were scheduled for infiltration. This is reflected in a small control group, and it pushes the numbers of sensitivity, which makes statistical significance less likely. Nevertheless, a calculated sample size for the HEC test

Table 2. Receiver operating characteristics for each clinical test

Clinical test	Number	AUC (95% CI)	Optimal cutoff ^a	Sensitivity,%	Specificity, %	Corrected p value ^b
SLR neutral	43	0.72 (0.53-0.88)	5	80	50	0.21
SLR exorotation	42	0.88 (0.72-0.98)	6	78	80	0.03
Tenderness medial to the joint	43	0.87 (0.72-0.98)	4	100	63	< 0.001
HEC	44	0.99 (0.98-1.00)	5	94	88	< 0.001
FADIR	41	0.84 (0.73-0.93)	4	100	78	0.26
Snapping hip	9	0.72 (0.30-1.00)	5	100	33	0.33
Scour test	40	0.80 (0.62-0.95)	5	79	77	< 0.001
Thomas test	41	0.70 (0.46-0.92)	3	100	44	0.19
HEER	43	0.65 (0.49-0.81)	3	100	31	0.03
Resisted hip flexion (seated)	44	0.96 (0.88-1.00)	5	94	89	< 0.001
Resisted hip external rotation (seated)	40	0.98 (0.92-1.00)	4	96	81	< 0.001

^aYouden J statistic.^bFisher exact test with Benjamini-Hochberg correction.

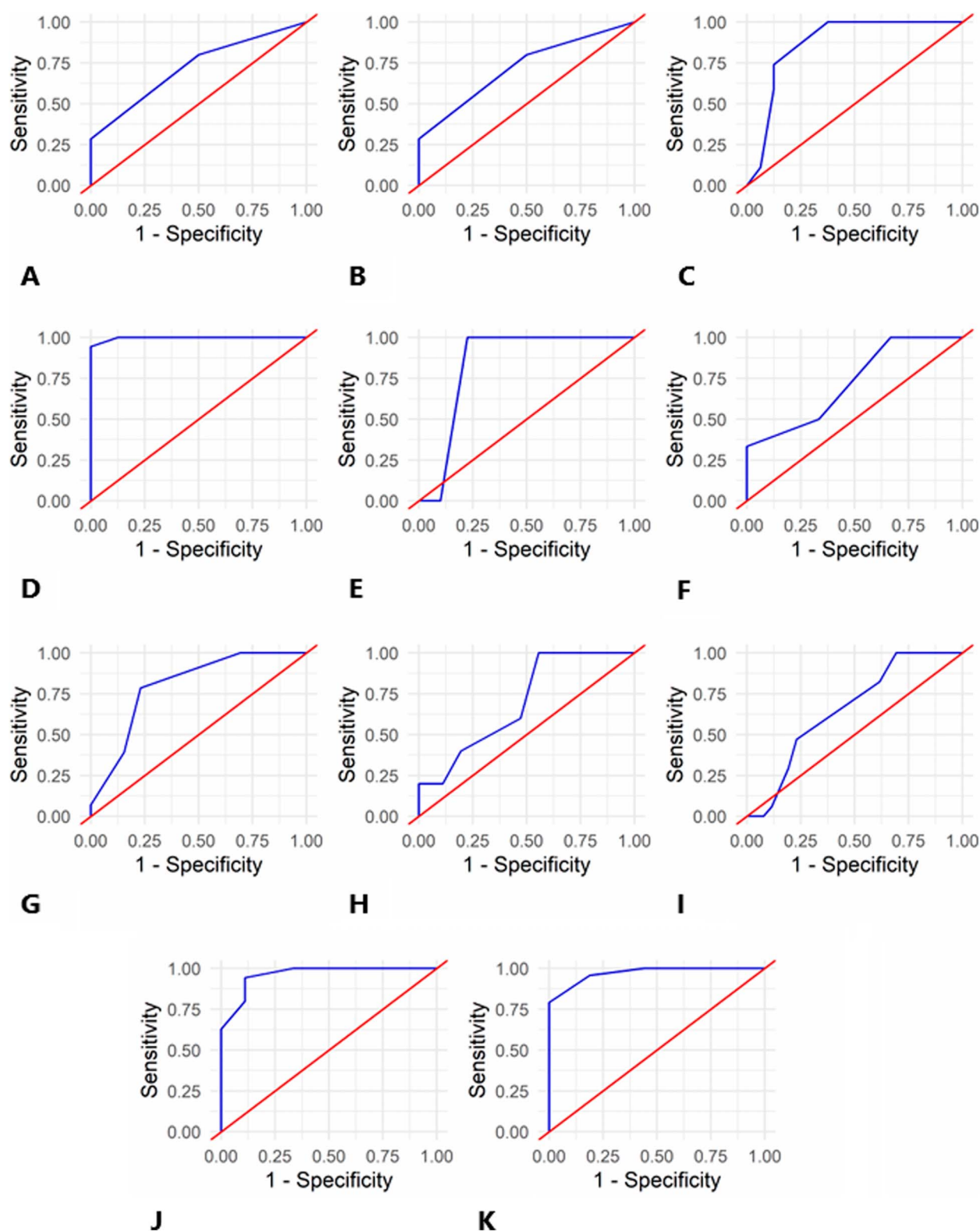


Fig. 3 The ROC curves for (A) SLR neutral, (B) SLR exorotation, (C) tenderness medial to the joint, (D) HEC, (E) FADIR, (F) snapping hip, (G) scour test, (H) Thomas test, (I) HEER, (J) resisted hip flexion (seated), and (K) resisted hip external rotation (seated).

Table 3. Ranking of tests

Clinical test	Mean VAS reduction (95% CI)	Rank VAS	Optimal cutoff	Rank cutoff	AUC	Rank AUC	Total score rank	Rank position
HEC	6.0 (5.5-6.5)	1	5	2	0.99 (0.98-1.00)	1	4	1
Resisted hip flexion (seated)	5.1 (4.7-5.4)	2	5	2	0.96 (0.88-1.00)	3	7	2
SLR exorotation	4.9 (4.5-5.3)	3	6	1	0.88 (0.72-0.98)	4	8	3
Resisted hip external rotation (seated)	3.5 (3.0-4.0)	5	4	7	0.98 (0.92-1.00)	2	14	4
SLR neutral	3.8 (3.4-4.2)	4	5	2	0.72 (0.30-1.00)	8	14	4
Scour	3.2 (2.9-3.6)	6	5	2	0.80 (0.62-0.95)	7	15	6
Tenderness medial to the joint	3.1 (2.7-3.5)	7	4	7	0.87 (0.72-0.98)	5	19	7
FADIR	0.8 (0.4-1.1)	10	4	7	0.84 (0.73-0.93)	6	23	8
Thomas test	1.2 (0.8-1.7)	9	3	10	0.70 (0.46-0.92)	9	28	9
HEER	2.6 (2.2-3.0)	8	3	10	0.65 (0.49-0.81)	10	28	9

(AUC of 0.99, $Z_{a/2} = 1.96$, error d of 0.05) showed that a population of 16 patients was needed to guarantee the reliability of the study [17]. We also acknowledge that a sex-disaggregating analysis was omitted because of a small sample size. However, this could yield valuable insights, and we recommend that future studies with larger sample sizes incorporate such analyses. Finally, we used the Youden J statistic to determine the optimal cutoff value for each test in this study. This approach gives equal weight to both specificity and sensitivity when establishing the cutoff value. However, a highly sensitive test such as resisted hip flexion (seated) or tenderness medial to the hip can be very effective in ruling out iliopsoas tendinopathy.

Diagnostic Accuracy of All Clinical Tests

High diagnostic accuracy of the HEC test, resisted hip flexion (seated), SLR in exorotation, and resisted hip external rotation (seated) may be attributed to the function of the iliopsoas muscle, which primarily facilitates hip flexion and secondarily supports external rotation [8, 29, 31]. In the “figure 4” position, the ipsilateral lesser trochanter is positioned anteriorly to the femur shaft. By lifting the ipsilateral foot to the ceiling, one performs hip flexion while remaining in external rotation. In the hip, the sartorius muscle functions primarily as an external rotator and secondarily as a flexor. In the seated position, disorders of the

sartorius are likely to cause more pain during resisted external rotation than during flexion, whereas the reverse would be expected in patients with iliopsoas tendinopathy. Although sartorius conditions are rare, the muscle can induce groin pain and thereby complicate the diagnosis of iliopsoas tendinopathy by affecting VAS scores in clinical tests. Notably, the only other study that examined clinical tests for iliopsoas tendinopathy, that of Haskel et al. [18], neither determined an optimal cutoff value for pain reduction nor evaluated the HEC test. In contrast, our study provided these parameters, thereby adding considerable value to the diagnostic approach.

What Is a Good Test to Detect Iliopsoas Tendinopathy?

Our study showed that the HEC test—which combines hip flexion with external rotation—is an accurate tool for diagnosing iliopsoas-related groin pain, outperforming traditional tests, with a sensitivity of 94%, specificity of 88%, and an AUC of 0.99. The resisted hip flexion (seated) and resisted exorotation test (seated) were also considered good tests. Johnston et al. [22] suggested that the Thomas test is most suitable for detecting iliopsoas tendinopathy. However, this test lacks both active flexion and rotation, and based on our results, it is classified as a “poor” test. Furthermore, the SLR test in neutral position does not involve rotation, and Haskel et al. [18] reported a sensitivity

of 62% and a specificity of 25%. Our results demonstrated a clear reduction in pain scores, with a sensitivity of 80% but a relatively low specificity of 38% for diagnosing iliopsoas tendinopathy, and no association between initial pain scores and pain reduction was observed for this test. Moreover, the SLR also elicits groin pain in patients with labral tears, which were common in our control group [18]. For detecting an internal snapping hip, Haskell et al. [18] found a low sensitivity of 24% and a specificity of 82%, whereas our study yielded a sensitivity of 100.00% and a specificity of 33.33% in the nine patients in whom a painful snapping hip was present. Therefore, the SLR and the snapping hip are also considered poor tests for diagnosing iliopsoas tendinopathy.

What Is the Best Test to Detect Iliopsoas Tendinopathy?

The HEC test demonstrated excellent diagnostic performance in the diagnosis of iliopsoas tendinopathy. This novel test adds considerable value to the diagnostic approach and should be considered in routine evaluations of patients with groin pain.

Conclusion

Our study showed that the HEC test—which combines hip flexion with external rotation—is the most accurate tool for diagnosing iliopsoas-related groin pain, outperforming traditional tests. The resisted hip flexion (seated) and the resisted exorotation test (seated) were also considered good tests, whereas the Thomas test, SLR, and the snapping hip were considered poor tests. In practical terms, surgeons should consider incorporating the HEC test in their routine evaluations of patients with groin pain, as it provides a clearer, more objective diagnosis that can reduce reliance on more invasive or costly procedures; however, future trials should assess interobserver reliability and performance in diverse patient populations to confirm its real-world utility.

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