

Research Article

Greater Trochanter–Iliotibial Band Distance in Greater Trochanteric Pain Syndrome

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Abstract

Objectives: The aim of this study whether the greater trochanter–iliotibial band (GT–ITB) distance measured on magnetic resonance imaging (MRI) is associated with greater trochanteric pain syndrome (GTPS).

Methods: A total of 384 patients with clinically diagnosed GTPS and 384 asymptomatic controls were included and matched 1:1 by age and sex. The GT–ITB distance was defined as the shortest distance between the greater trochanter and the ITB on axial MRI at maximal trochanteric prominence. Group comparisons, sex-stratified analyses, logistic regression models, and receiver operating characteristic (ROC) analyses were performed.

Results: The mean GT–ITB distance was slightly shorter in the GTPS group compared with controls ($p=0.049$). In sex-stratified analyses, this difference was significant in women ($p=0.005$) but not in men. In adjusted logistic regression, each 1-mm increase in GT–ITB distance was associated with a modest reduction in the odds of GTPS (OR 0.964; 95% CI 0.930–0.999). The association remained significant in women but not in men. Discriminative performance was poor (AUC 0.54).

Conclusion: A shorter GT–ITB distance was weakly associated with GTPS, predominantly in women. Although not diagnostically discriminatory, this measurement may reflect a morphological factor related to peritrochanteric compression in GTPS.

Keywords: GTPS, Hip Pain, Iliotibial Band, Magnetic Resonance Imaging, Trochanteric Bursitis

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Greater trochanteric pain syndrome (GTPS) is one of the most common causes of lateral hip pain and is typically characterized by tenderness over the greater trochanter on palpation.^[1,2] Although the condition had historically been labeled “trochanteric bursitis” imaging studies using MRI and ultrasonography have demonstrated that gluteus medius and minimus tendinopathies are frequent, whereas isolated primary bursitis is less common.^[3–6] Accordingly, GTPS is currently considered an umbrella diagnosis that

includes gluteal tendinopathy, bursal reactivity, and mechanical factors related to adjacent fascial structures.^[1,6,7]

The iliotibial band (ITB) traverses the peritrochanteric region and passes over the greater trochanter. Repeated compression and friction at this level, particularly under loading patterns that increase compressive forces, have been proposed as potential mechanisms that can trigger or perpetuate symptoms.^[1,6,7] Clinical studies have reported an association between ITB tenderness and GTPS,^[2] and surgical series have

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suggested that ITB release combined with bursectomy may relieve symptoms in refractory cases.^[8–12]

To our knowledge, there are no studies yet that directly measure the anatomical distance between the greater trochanter and the ITB in GTPS. The greater trochanter-ITB (GT-ITB) distance may provide a measurable parameter for evaluating trochanteric prominence and ITB proximity. This study aimed to evaluate the association between GT-ITB distance and the presence of GTPS in an age and sex matched case control sample. It was hypothesized that the GT-ITB distance would be shorter in patients with GTPS.

Methods

A retrospective case-control study was conducted by reviewing hospital records between January 2018 and November 2025. A total of 768 individuals were included, comprising 384 symptomatic patients diagnosed with GTPS and 384 asymptomatic controls matched 1:1 by age and sex. The symptomatic side was recorded. In participants with bilateral symptoms, the clinically dominant and more painful side was selected for analysis; cases in which laterality could not be determined were excluded. In the control group, only one hip per individual was considered, and bilateral hip measurements from the same individual were not analyzed as separate observations. Individuals with hip osteoarthritis, a history of hip surgery, previous hip trauma or fracture, hip dysplasia, femoroacetabular impingement syndrome, other overt structural hip pathology, systemic inflammatory disease, or neoplastic/metabolic bone disease were excluded.

The GT-ITB distance was measured on hip MRI at the level of the greater trochanter. On the axial slice where the greater trochanter was most laterally prominent, the shortest linear distance between the lateral cortical surface of the greater trochanter and the medial surface of the ITB was measured perpendicular to the trochanteric surface. Measurements were recorded in millimeters (mm). The thickness of the ITB was not included; the measurement was made from the deep surface of the band (Fig. 1).

Statistical Analysis

Normality of continuous variables was assessed by the Shapiro-Wilk test. Data are presented as mean \pm standard deviation or median (interquartile range). Group differences were evaluated using Welch's t-test, with the Mann-Whitney U test used as a sensitivity analysis. Categorical variables were compared using the chi-square test, and effect sizes were reported as Cohen's d.

Associations between GT-ITB distance and GTPS were examined using logistic regression for age, sex, and a distance-by-sex interaction term. Statistical significance was

defined as P-value <0.05 . Statistical analyses were performed using SPSS Statistics for Windows, version 22 (IBM Corp., Armonk, NY, USA).

Results

Participant characteristics: A total of 768 individuals were included (GTPS: $n=384$; controls: $n=384$). Women accounted for 284 participants (74.0%) in each group. Mean age was 51.0 ± 12.5 years in the control group and 51.8 ± 12.4 years in the GTPS group ($p=0.344$). Baseline characteristics and GT-ITB distance are presented in Table 1.

Primary analysis (GT-ITB distance): Mean GT-ITB distance was 6.43 ± 4.07 mm in controls and 5.85 ± 3.95 mm in the GTPS group. The mean difference was 0.57 mm (95% CI 0.00–1.14). The difference reached borderline statistical significance using Welch's t-test ($p=0.049$). In the Mann-Whitney U sensitivity analysis, $p=0.056$. The effect size was small (Cohen's $d=0.14$).

Sex-stratified analyses: In women, the GT-ITB distance was shorter in the GTPS group than in controls (6.51 ± 4.14 vs. 5.57 ± 3.91 mm; $p=0.005$). In men, no significant difference was observed (6.18 ± 3.90 vs. 6.66 ± 3.97 mm; $p=0.387$) (Table 2).

Logistic regression: In the univariable model, each 1-mm increase in GT-ITB distance was associated with a small decrease in the odds of GTPS (OR 0.965; 95% CI 0.931–1.000; $p=0.049$). After adjustment for age and sex (Model 1), the association remained similar (OR 0.964; 95% CI 0.930–0.999; $p=0.043$). In the interaction model (Model 2), the distance-by-sex interaction was significant ($p=0.032$). Accordingly, the association persisted in women (OR 0.942; 95% CI 0.904–0.982; $p=0.005$) but not in men (OR 1.031; 95% CI 0.960–1.107; $p=0.401$) (Table 3).

Discriminative performance (ROC analysis): GT-ITB distance showed poor discrimination for GTPS. Overall AUC was 0.54 (bootstrap 95% CI 0.50–0.58). AUC was 0.56 (bootstrap 95% CI 0.52–0.61) in women and 0.47 in men (Fig. 2). In women, the optimal cut-off by Youden's index was approximately 5.2 mm, yielding sensitivity 54.2% and specificity 59.9%.

Table 1. Demographic characteristics and GT-ITB distance by group

	Control (n=384)	GTPS (n=384)	p
Age (years), mean \pm SD	51.0 \pm 12.5	51.8 \pm 12.4	0.344
Female, n (%)	284 (74.0%)	284 (74.0%)	1.000
GT-ITB distance (mm), mean \pm SD	6.43 \pm 4.07	5.85 \pm 3.95	0.049
GT-ITB distance (mm), median (IQR)	6.45 (3.00–9.33)	5.20 (2.90–8.40)	0.056

Values are presented as mean \pm SD or median (IQR), unless otherwise stated. GTPS: Greater trochanteric pain syndrome; GT-ITB: greater trochanter-iliotibial band.

Table 2. Comparison of GT-ITB distance by sex

	Control	GTPS	Mean difference (Control-GTPS), 95% CI	p (t-test)	p (Mann-Whitney)
Women	6.51±4.14 (n=284)	5.57±3.91 (n=284)	0.94 (0.28-1.61)	0.005	0.010
Men	6.18±3.90 (n=100)	6.66±3.97 (n=100)	-0.48 (-1.58-0.61)	0.387	0.448

GT-ITB: Greater trochanter-iliotibial band; GTPS: greater trochanteric pain syndrome; CI: confidence interval.

Table 3. Association between GT-ITB distance and GTPS: logistic regression models

Model	OR (per 1 mm increase)	95% CI	p
0 Model 0: univariable (distance)	0.965	0.931-1.000	0.049
1 Model 1: adjusted for age and sex	0.964	0.930-0.999	0.043
2 Model 2: interaction model (distance in women)	0.942	0.904-0.982	0.005
3 Model 2: interaction model (distance in men)	1.031	0.960-1.107	0.401
4 Model 2: interaction term (distance×male sex)	1.094	1.008-1.188	0.032

OR: Odds ratio; CI: Confidence interval; GT-ITB: Greater trochanter-iliotibial band; GTPS: Greater trochanteric pain syndrome.

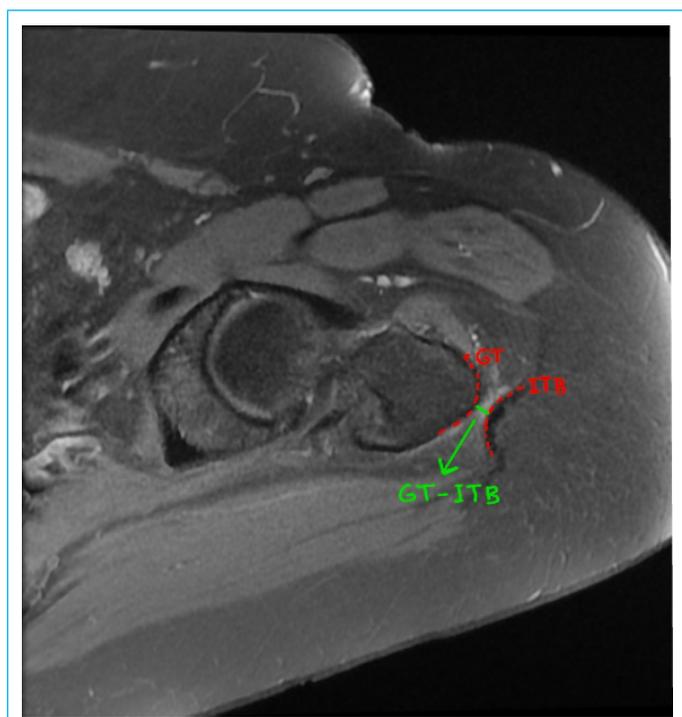


Figure 1. Schematic representation of the GT-ITB distance measurement on axial hip MRI.

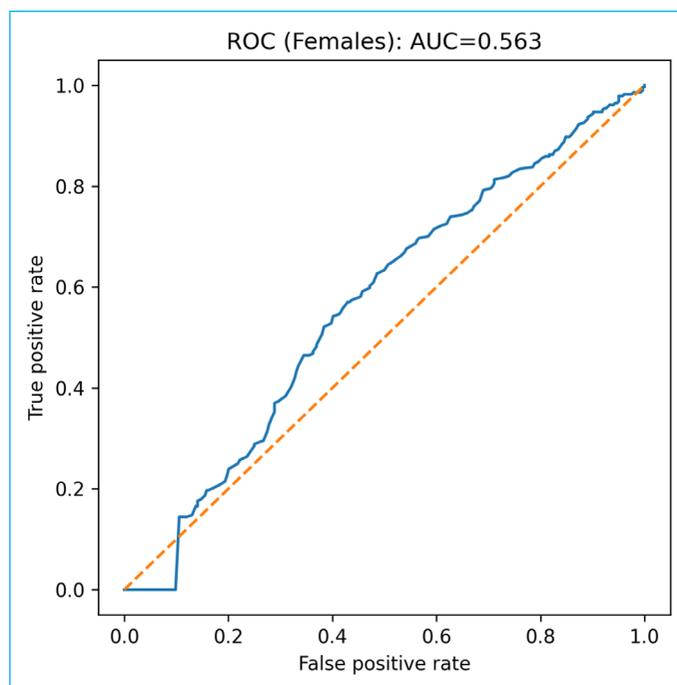


Figure 2. Receiver operating characteristic (ROC) curve for GT-ITB distance to discriminate GTPS in women (AUC=0.56).

Discussion

In this study, we examined the anatomical distance between the greater trochanter and the iliotibial band as a potential morphological factor associated with GTPS. Although the GT-ITB distance was slightly shorter in patients with GTPS compared with controls, the absolute difference was small. Importantly, this association was not uniform across sexes and was mainly observed in women.

Greater trochanteric pain syndrome (GTPS) was traditionally considered a result of trochanteric bursitis.^[3] However, MRI and ultrasonography studies have shown that gluteal tendon pathology is common, whereas isolated primary bursitis is relatively rare.^[3-5] In our study, the shorter GT-ITB distance observed in patients with GTPS suggests that increased peritrochanteric contact and compression, rather than bursal enlargement alone, may play a role in symptom development. This finding is in line with biomechanical models proposing that compressive loading, especially during hip adduction, increases stress at the gluteal tendon insertion and can cause lateral hip pain.^[6,13]

The role of the ITB in GTPS has been examined in previous studies.^[3,9] One study reported that ITB thickness was independently associated with GTPS, emphasizing the importance of ITB-related factors in lower extremity biomechanics.^[2] In addition, surgical studies have shown that ITB release performed together with bursectomy leads to symptomatic improvement in patients with refractory symptoms.^[10-12] Based on these findings, a shorter GT-ITB distance may represent a measurable anatomical correlate of these clinical observations, reflecting a reduced soft-tissue interval and potentially higher local contact pressures in the peritrochanteric region.

Despite these findings, the observed association was weak, and the discriminative performance of the GT-ITB distance remained low (AUC=0.54). This suggests that the GT-ITB distance is unlikely to be a reliable stand-alone diagnostic marker for GTPS. GTPS is a highly heterogeneous syndrome; while gluteal tendinopathy predominates in some patients, bursal reactivity or mechanical compression may be more prominent in others.^[3-5] Therefore, it is not surprising that a single anatomical measurement captures only a limited aspect of this complex pathophysiology.

The sex-dependent differences observed are noteworthy, with a significant association identified in women but not in men. The higher prevalence of GTPS in women, along with sex-related differences in pelvic morphology, hip biomechanics, and load distribution that may influence peritrochanteric compression, could help explain this finding.^[1,2,6,13] Additionally, the relatively small number of male participants may have limited the statistical power to detect a weaker association in this subgroup.

Our findings should also be interpreted in the context of previous studies examining bony morphology and ITB characteristics.^[8,9] Viradia et al.^[8] reported that a relatively wider greater trochanter in relation to iliac wing width was associated with trochanteric bursitis and proposed increased ITB-trochanter friction as a potential mechanism. Similarly, Khoury et al.^[9] suggested that increased proximal ITB thickness may contribute to recalcitrant trochanteric bursitis. Taken together, these studies indicate that peritrochanteric contact mechanics are likely influenced by a combination of bony morphology, ITB properties, and the intervening soft-tissue interval. The GT-ITB distance provides a simple and direct measure of this interval component.

This study has some limitations. The analysis is based on radiological measurements, and potentially important clinical variables such as symptom duration and severity, body mass index, and concomitant spinal or knee pathology were not available. Inter-observer and intra-observer agreement were not assessed and may have led to measurement variability.

From a clinical perspective, the GT-ITB distance can be measured in routine MR imaging without requiring additional cost or specialized imaging protocols.

However, given its low discriminative performance, it should be interpreted as an adjunctive finding rather than a diagnostic criterion. The observed association, particularly in women, supports the consideration of peritrochanteric compression and friction as contributing mechanisms in selected patients and may help guide mechanistically informed rehabilitation strategies focusing on hip abductor function, load modification, and ITB-related interventions.

Conclusion

In an age- and sex-matched case-control sample, a shorter GT-ITB distance measured on MRI was weakly associated with GTPS, with a predominantly female-specific effect. Although the GT-ITB distance demonstrated limited diagnostic discrimination, it may provide additional insight into morphological factors related to peritrochanteric compression and friction in the pathomechanics of GTPS.

Disclosures

Ethics Committee Approval: The study was approved by the institutional review board of Baltalimani Bone Diseases Training and Research Hospital in accordance with the ethical standards of the institutional and/or national research committee and the 1964 Helsinki Declaration (Date: 26.11.2025, Meeting No: 44, Decision No: 355).

Informed Consent: Informed consent was obtained from all individual participants included in the study or their legal representatives.

Authors' contributions: Concept – N.İ.; Design – N.İ.; Supervision – N.İ., A.K.; Data collection and/or processing – A.K., M.S.; Analysis and/or interpretation – N.İ., M.S.; Literature Review – N.İ., A.K.; Writing – N.İ.; Critical review – N.İ., A.K.

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