

Relationship Between Width of Greater Trochanters and Width of Iliac Wings in Trochanteric Bursitis

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Abstract

Trochanteric bursitis is a common disorder that is characterized by inflammation of the bursa, superficial to the greater trochanter of the femur, leading to pain in the lateral hip, and often occurs because of acute trauma or repetitive friction involving the iliotibial band, the greater trochanter, and the bursa.

In the study reported here, we hypothesized that the increased incidence of bursitis may be the result of the increased prominence of the trochanter in relation to the wings of the iliac crest.

Distances between the outermost edges of trochanters and iliac wings were measured in 202 patients from the University of North Carolina Health Care System—101 without a known diagnosis and 101 with a clinical diagnosis of trochanteric bursitis. To determine significance, *t* tests for nonpaired data were used.

Mean (SD) difference between trochanter and iliac wing widths was 28 (20) mm in the group diagnosed with trochanteric bursitis and 17 (18) mm in the control group. The difference between the groups in this regard was significant ($P < .00005$). In addition, mean (SD) ratio of trochanter widths to iliac wing widths was 1.09 (.06) in the bursitis group and 1.05 (.06) in the control group. The difference between these groups was significant ($P < .0005$) in this regard as well.

Having trochanters wider in relation to iliac wings was associated with the diagnosis of trochanteric bursitis.

Trochanteric bursitis is a common disorder that is often caused by pressure and trauma to the trochanter, as well as exaggerated movement of the fascia lata over the lateral surface of the trochanter. Repetitive flexion of the hip and direct pressure are known to aggravate the condition.¹ Patients typically

report lateral hip and thigh pain and difficulty in walking. Depending on degree of inflammation and swelling, symptoms range from mild morning pain and stiffness and intolerance to sleeping on the affected side to severe limp and use of crutches.²

The incidence of greater trochanteric pain is reported to be 1.8 in 1000 patients per year, with prevalence higher in women and in patients with coexisting low back pain, osteoarthritis, iliotibial band tenderness, and obesity.³ It has been suggested that increased prevalence in women may be the result of altered biomechanics associated with differences in size, shape, and orientation of the pelvis, and with the relationship between the pelvis and the iliotibial band.³ It seems likely that the etiology in women, to some extent, involves larger pelvis width relative to general body width, and therefore, relatively larger prominence of trochanters. This situation would subject trochanters to more frequent casual trauma (bumping into objects) and increased pressure lying on the side.

We hypothesized that some patients whose trochanters are significantly wider than their iliac wings may be more susceptible to bursitis, as the trochanters would be even more prominent on the body and would tension the iliotibial band more tightly over the trochanter. This phenomenon could be quantified with the ratio of trochanter width to iliac wing width. A high ratio would be expected to correlate with the diagnosis of trochanteric bursitis.

PATIENTS AND METHODS

This study was approved by the ethics committee at the University of North Carolina at Chapel Hill (UNC) and included patients aged 18 years to 87 years. Radiographic exclusion criteria included pelvic hardware or a noticeable pelvic anatomy abnormality, such as scoliosis or leg-length inequality. All radiographs were obtained using standard clinical technique by trained radiologic technologists.

Through a manual record search for *International Classification of Diseases, Ninth Revision (ICD-9)* code 726.5, we identified 101 patients (81 women, 20 men) given the primary diagnosis of trochanteric bursitis at the UNC Orthopedic Clinic between January 1, 2000 and December 31, 2007. We also searched for their anteroposterior (AP) pelvic radiographs. For the

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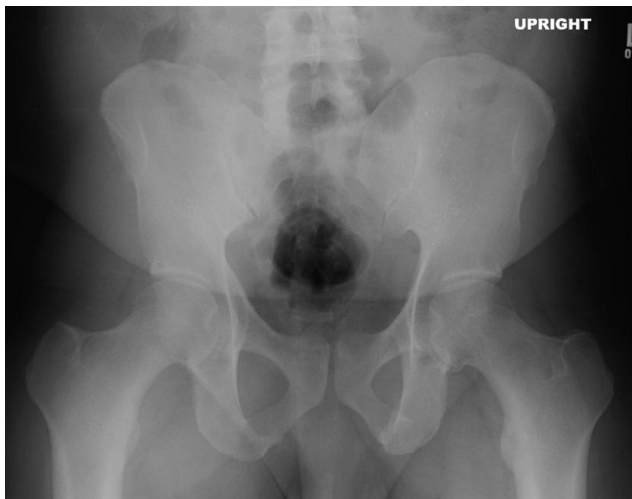


Figure 1. Unmeasured radiograph shows patient with trochanters unusually wide relative to iliac wings.

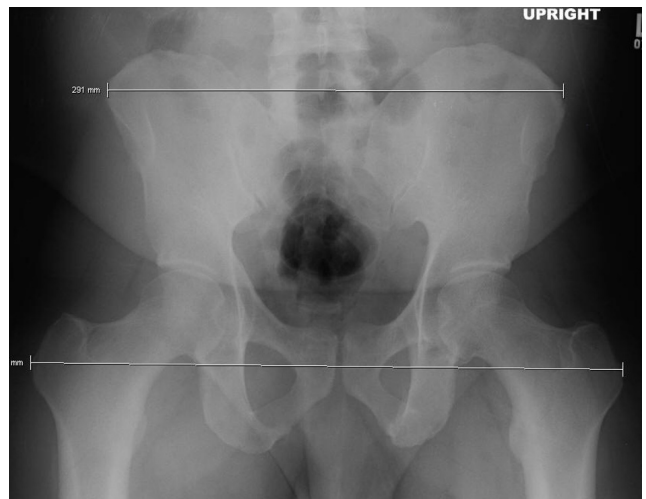


Figure 2. On same radiograph, Picture Archiving and Communication System measurements show 130% ratio of trochanter widths to iliac wing widths.

patient group, age range at time of study was 19 years to 87 years.

The control group consisted of 101 randomly selected patients (58 women, 43 men) who were seen at hospitals or outpatient clinics between January 1, 2000 and December 31, 2007 and who had AP pelvic or kidneys–ureter–bladder (KUB) radiographs, but did not have a known diagnosis of trochanteric bursitis. For the control group, age range at time of study was 19 years to 87 years as well.

Patients' and controls' demographic information is listed in Table I.

This study was a retrospective review of AP radiographs of the pelvis. The University of North Carolina Picture Archiving and Communication System (UNC PACS) was used to digitally retrieve radiographs and make measurements. For each patient, Dr. Dahners measured the distance between the outermost edges of the greater trochanters and the distance between the iliac wings (Figure 1). Ratio of trochanter widths to iliac wing widths was calculated from these measurements and recorded for both patients and controls (Figure 2).

To evaluate the statistical significance of the differences between patients and controls, *t* test for nonpaired data was used. *P* values of .05 or less were considered significant.

Table I. Demographic Information of Patient and Control Groups

Characteristic	Patients (n = 101)	Controls (n = 101)
Sex, No.		
Female	81	58
Male	20	43
Mean (SD) age, y		
All patients	58.3 (16.0)	44.0 (14.5)
Female patients	58.8 (15.8)	42.0 (14.6)
Male patients	56.5 (17.5)	46.8 (14.1)

RESULTS

Our study results are listed in Tables II to IV. We found several statistically significant differences between patients with and without bursitis. In patients with bursitis, mean (SD) trochanter width was 362 (21) mm, and mean (SD) iliac wing width was 334 (23) mm. In control patients, mean (SD) trochanter width was 340 (23) mm, and mean (SD) iliac wing width was 324 (27) mm. Patients' widths were significantly larger than controls' (trochanter, *P* < .0005; iliac wing, *P* = < .0005). In addition, the mean difference between trochanter width and iliac wing width was significantly (*P* = < .0005) larger in patients with trochanteric bursitis, and the mean (SD) ratio of trochanter width to iliac wing width was significantly (*P* = < .0005) larger in patients, 1.09 (.06) mm, than in controls, 1.05 (.06) mm.

We separated patients by sex and found that trochanter and iliac wing widths were larger in men than in women. Differences between trochanter widths and iliac wing widths, and the ratio of these widths, were similar in men and women in the control group. Width differences remained significantly larger in patients than in controls when separated by sex. In patients with bursitis, the differences were larger in men than in women.

DISCUSSION

Trochanteric bursitis has been recognized as a distinct clinical entity for more than a century. Its clinical presentation is characterized by pain over the greater trochanter with passive adduction, active abduction, internal rotation, and prolonged sitting or lying down. The disease is believed to be caused by an acute traumatic episode or by repeated microtrauma and excessive tension within the iliotibial band, the end result being secondary inflammation of the bursa overlying the trochanter.⁴ Other studies of additional factors related to development of trochanteric bursitis identified factors such as female sex,

Table II. Summary of Results for Female and Male Patients Combined

Parameter	Patients	Controls	P Value
Mean (SD) trochanter width, mm	362 (21)	340 (23)	0.00000000076
Mean (SD) iliac wing width, mm	334 (23)	324 (27)	0.0038
Mean (SD) ratio between trochanter and iliac wing widths	1.09 (.06)	1.05 (.06)	0.00002
Mean (SD) difference between trochanter and iliac wing widths, mm	28 (20)	17 (18)	0.000043

Table III. Summary of Results for Female Patients

Parameter	Patients	Controls	P Value
Mean (SD) trochanter width, mm	358 (19)	334 (24)	0.0000000025
Mean (SD) iliac wing width, mm	333 (23)	318 (25)	0.0006
Mean (SD) ratio between trochanter and iliac wing widths	1.08 (.06)	1.05 (.05)	0.013
Mean (SD) difference between trochanter and iliac wing widths, mm	25 (19)	16 (17)	0.006

Table IV. Summary of Results for Male Patients

Parameter	Patients	Controls	P Value
Mean (SD) trochanter width, mm	380 (19)	349 (20)	0.00000024
Mean (SD) iliac wing width, mm	339 (22)	332 (26)	0.23
Mean (SD) ratio between trochanter and iliac wing widths	1.12 (.06)	1.05 (.06)	0.0003
Mean (SD) difference between trochanter and iliac wing widths, mm	41 (18)	17 (20)	0.00006

iliotibial band tenderness, knee osteoarthritis, knee pain, and lower back pain.⁵ The present study is the first to evaluate anatomical relationships and their possible link to the syndrome.

Limitations of this study include a randomly selected control group that, though not diagnosed with trochanteric bursitis, might indeed have had the condition. Instead, the control group included randomly selected patients with AP pelvic or KUB radiographs who simply did not “coincide” with patients in the study group. In addition, absent a “gold standard” for diagnosis, we relied on clinicians’ use of the *ICD-9* code for trochanteric bursitis to identify patients with the disease; these patients could have been incorrectly diagnosed with bursitis, and their lateral hip and thigh pain might have had a different cause. However, it must be pointed out that such errors would presumably have made the differences between groups smaller rather than larger. We did not differentiate between patients with acute traumatic bursitis, who might be expected to have normal ratios, and patients with chronic bursitis, who might reasonably be expected to have more abnormal ratios. This would be an important consideration for future studies of this disease. In addition, our sample of 202 patients, though relatively large, is small for a population study. Members of both groups also might have had undiagnosed bone deformities or degeneration, which could have affected width measurements and symptoms. Despite these limi-

tations, we found marked, statistically significant differences between our bursitis and control populations.

Our results support previous findings that trochanteric bursitis is more common in women and in older patients.³ We also found that patients diagnosed with trochanteric bursitis in our clinic had wider trochanters and, in women, wider iliac wings compared with those in our randomly selected control group. In addition, the difference between trochanter width and iliac wing width, and the ratio of the former to the latter, was significantly larger in patients than in controls. Men with trochanteric bursitis also had a larger mean difference between trochanter width and iliac wing width, and a larger ratio, compared with women in the patient group and men and women in the control group.

Our findings suggest that having a wider pelvis, and therefore wider trochanters, predisposes patients to developing trochanteric bursitis. In addition, in patients with trochanters relatively wider than iliac wings, the predisposition is increased, presumably because of “bowstringing” of the iliotibial band over the prominent trochanter. A recently proposed operative treatment, reported to have favorable outcomes in patients with recalcitrant trochanteric bursitis, involves reducing the prominence of the greater trochanter by 5 mm to 10 mm.⁶ Our findings support such a surgical procedure, which attempts to reduce the width of the trochanters. Our results show that trochanters are about 28 mm

wider than iliac wings in patients with trochanteric bursitis and 17 mm wider in controls—a difference of about 11 mm. Thus, even reducing the width of the greater trochanters by a mere 6 mm on each side would result in a smaller difference, more in the range of that of the control patients. However, we wonder if, with further study, it may prove to be wise to consider such trochanteric reduction surgery only in patients with relatively wide trochanters, rather than in all with lateral hip pain.

To our knowledge, this is the first study of the interaction of trochanteric bursitis and pelvic anatomy. Our findings may be useful not only in clinical care but also in generating hypotheses for mechanistic studies or therapeutic trials to benefit patients with trochanteric bursitis.

CONCLUSION

There appears to be an anatomical correlation between relative widths of greater trochanters and iliac wings in patients with trochanteric bursitis. Patients with trochanteric bursitis have wider trochanters relative to iliac wings or, in other words, a larger ratio in comparison with controls. The difference between trochanter widths and iliac

wing widths is larger in men with trochanteric bursitis than in women with trochanteric bursitis. Thus, we can conclude that patients (particularly men) with significantly wider trochanters than iliac wings are more likely to develop trochanteric bursitis.

AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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