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Insertional Achilles Tendinitis and Haglund's Deformity

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ABSTRACT

Background: **Haglund's deformity is an enlargement of the posterosuperior prominence of the calcaneus, which is frequently associated with insertional Achilles tendinitis. To our knowledge, no study has been done successfully correlating the characteristics of a Haglund's deformity with insertional Achilles tendinitis. The purpose of our study was to analyze the characteristics of a Haglund's deformity in patients with and without insertional Achilles tendinitis to see if there was a correlation.** ***Methods:*** **The study was a retrospective radiographic review of a single surgeon's patients with insertional Achilles tendinitis from 2005 to 2008. Our study population consisted of 44 patients, 48 heels (22 male, 22 female) with insertional Achilles tendinitis, with a mean age of 52 (range, 23 to 79) years. Our control population consisted of 50 patients (25 males, 25 females) and 50 heels without insertional Achilles tendinitis with a mean age of 55.6 (range, 18 to 89) years. We introduced two new measurements of the Haglund's deformity in this study: the Haglund's deformity height and peak angle. A standing lateral foot or ankle radiograph was analyzed for each patient and the following measurements were made: Haglund deformity height and peak angle; Bohler's angle; Fowler-Philip angle; and parallel pitch sign. We also looked for the presence of calcification in the study group and the length and width of the calcification. Unpaired t-test was used to analyze the measurements between the groups. Ten patients' radiographs were re-measured and correlation coefficients were obtained to assess the reliability of the measuring techniques.** ***Results:*** **For the insertional Achilles tendinitis group, the mean Haglund's deformity height was 9.6 (range, 5.3 to 15.3) mm and the mean Haglund's deformity peak angle was 105 (range, 87 to 123) degrees. Calcification was present in 35 of 48 or (73%) of patients with a mean length of 13.3 (range, 3.2 to 41.9) mm and mean width of 4.5 (range, 1.0 to 10.4) mm. In the control group, the mean Haglund's deformity height was 9.0 (range, 5.2 to 12.1) mm and the peak angle was 105 (range, 91 to 124) degrees. Bohler's angle and Fowler-Philip angle were also similar between the groups and the positive parallel pitch sign was actually more prevalent in the control group (60% versus 41.7%). None of the differences in measurements between the groups achieved statistical significance.** ***Conclusion:*** **A Haglund's deformity was not indicative of insertional Achilles tendinitis and was present in asymptomatic patients. Also, a majority of the insertional Achilles tendinitis patients had calcification at the tendon insertion. We believe it is possible removing the Haglund's deformity may not be necessary in the operative treatment of insertional Achilles tendinitis.**

Level of Evidence: III, Retrospective Comparative Study

Key Words: Insertional Achilles Tendinitis; Haglund's Deformity; Tendon Disorders

INTRODUCTION

Haglund's deformity was first described by Swedish orthopaedic surgeon Patrick Haglund in 1928 as a painful hindfoot syndrome characterized by an abnormally prominent posterosuperior calcaneal process which he believed to be caused by wearing shoes with rigid heels.[7] A Haglund's deformity has been thought to cause posterior heel pain via mechanical impingement of the retrocalcaneal bursa. Insertional Achilles tendinitis was first described by Clain and Baxter,[3] as an overuse phenomenon causing inflammation and degeneration of the Achilles tendon insertion. Schepsis and Leach,[11] in their study of long-distance runners, noted the association of Haglund's deformity and retrocalcaneal bursitis with Achilles tendinitis.

Historically, there have been several different measuring techniques introduced to in an attempt to predict which Haglund's deformities would be symptomatic. However, to our knowledge, none of these methods have been consistently or reliably associated with symptomatic Haglund's deformities or insertional Achilles tendinitis. Our objectives were to

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examine the prevalence and characteristics of a Haglund's deformity in patients with and without insertional Achilles tendinitis and to assess the efficacy of two new Haglund's deformity measuring methods in predicting associated insertional Achilles tendinopathy.

MATERIALS AND METHODS

The study is a retrospective radiographic review of a single surgeon's patients with insertional Achilles tendinitis from 2005 to 2008. The inclusion criteria for the study consisted of patients at least 18 years old with a diagnosis of insertional Achilles tendinitis. This diagnosis was made by the senior author based on his clinical examination as well as radiographic review. Positive findings on physical examination included tenderness or swelling at the Achilles insertion as well as thickening of the Achilles tendon at its insertion. As a primarily radiographic study, other physical exam findings, such as gastrocnemius tightness, were not specifically considered. However, it should be noted that the senior author routinely examines every patient for gastrocnemius contracture, which he defines as an inability to dorsiflex the ankle above neutral with the knee fully extended. According to this definition, none of the patients were deemed to have a tight gastrocnemius based on a thorough chart review. Additionally, no patients were noted to have a history of Charcot-Marie-Tooth disease or a cavus foot deformity on radiographic and clinical evaluation. Standing radiographs were obtained to look for calcification at the Achilles tendon insertion, which would indicate chronic injury to the tendon. Patients were excluded from the study group if they were younger than 18 years old, had previous Achilles tendon surgery, or had non-insertional Achilles tendinitis.

A control group consisted of patients at least 18 years old without any hindfoot pathology. Patients were excluded from the control group if there was radiographic evidence of calcification at the Achilles tendon insertion as it was felt this was indicative of subacute or asymptomatic insertional Achilles tendinitis.

Our study population consisted of 44 patients with 48 heels with insertional Achilles tendinitis. There were 22 males and 22 females, and the mean age was 52 (range, 23 to 79). Our control population consisted of 50 patients: 25 males and 25 females with a mean age of 56 (range, 18 to 89) years. Six patients were excluded from the control group due to the presence of calcification at the Achilles tendon insertion.

A standing lateral foot or ankle radiograph was analyzed for each heel and the following various measurements were made: Bohler's angle (Figure 1) Fowler-Philip angle (Figure 2),[5] and parallel pitch sign (Figure 3).[10] We also introduced two new measurements of the Haglund's deformity in this study—the height (Figure 4) and peak angle (Figure 5)—to determine whether they were useful in predicting the presence of insertional Achilles tendinitis. Finally, we looked for the presence of calcification in the study group and the length and width of the calcification (Figures 6 and 7).

Fig. 1: Bohler's angle[1] was measured at the intersection of a line drawn between the posterior superior aspect of the calcaneal tuberosity to the highest point of the posterior articular facet and another line drawn from this point to the anterior process of the calcaneus. It is normally between 25 and 40 degrees.

Fig. 2: The Fowler-Philip angle[5] was measured between an inferior line which was tangent to the inferior margin of the calcaneocuboid joint and the plantar tuberosity of the calcaneus and a superior line which was tangent to the posterior prominence at the insertion of the Achilles tendon. Normal range is between 44 and 69 degrees. Values greater than or equal to 75 degrees were thought to be consistent with a Haglund's deformity.

Statistical analysis

An unpaired t-test was used to analyze the measurements between the groups with the p value set at 0.05 for statistical significance. Furthermore, as there was only one individual performing the measurements, the reliability was assessed by re-measuring ten patients' radiographs and calculating correlation coefficients between the two sets of measurements.

Fig. 3: The Parallel Pitch lines[8] were obtained by first drawing the inferior line from the inferior margin of the calcaneocuboid joint to the plantar tuberosity of the calcaneus. Then the superior line was drawn parallel to the inferior line beginning at the posterior margin of the subtalar joint. If the posterior calcaneal prominence was located above the superior line, it was considered abnormal and consistent with a Haglund's deformity.

Fig. 4: The Haglund's deformity height was obtained by first drawing a line at the base of the posterosuperior calcaneal prominence and then measuring the height of the Haglund's deformity perpendicular to that line.

RESULTS

The results between the study and control group did not show any significant differences. For the insertional Achilles tendinitis group the mean Haglund deformity height was 9.6 mm and the mean peak angle was 105.2 degrees. These values were similar for the control group: mean Haglund deformity height 9.0 mm and mean peak angle 105.2 degrees. Furthermore, the Bohler's angle (34.9 degrees versus 33.3 degrees) and Fowler-Philip angle values (62.1 degrees versus 61.0 degrees) between the two groups showed very little difference. Interestingly, the positive parallel pitch sign was more prevalent in the control group compared to the study group (60% versus 41.7%) (Table 1).

Fig. 5: The Haglund's deformity peak angle was measured between tangential lines along the anterior and posterior slope of the bony prominence.

Fig. 6: Calcification length was measured from the insertion to most cephalad tip of calcification.

Calcification at the Achilles tendon insertion was present in 73% (35 out of 48) of heels with insertional Achilles tendinitis. The average dimensions of the calcification were 13.3 (range, 3.2 to 41.9) mm in length by 4.5 (range, 1.0 to 10.4) mm in width (Table 1).

Correlation coefficients for all measurements were at least 0.90, if not greater. Statistical significance was not reached by any of the measuring parameters, however the differences in Haglund deformity height between the study and control group had a p value of 0.10, possibly suggesting a trend for an association.

DISCUSSION

Historically, there has not been a successful measuring method for Haglund's deformities and predicting insertional Achilles tendinitis.[2] In the past, the Fowler-Philip angle and parallel pitch lines techniques have been most frequently

Fig. 7: Calcification width was measured at the greatest anterior-to-posterior diameter.

used to characterize the Haglund's deformity; other techniques include the superior calcaneal angle,[13] the calcaneal inclination angle[13] and the Chauveaux-Liet angle.[2] However, the relationship between these measuring techniques and symptomatic posterior heel pain has not been clear. In 2007, Lu CC, et al.[9] evaluated the effectiveness of the Fowler-Philip angle and the parallel pitch lines in 37 heels with symptomatic Haglund's syndrome and in 40 asymptomatic heels. They found no statistically significant difference between the two groups concerning these measuring methods. Our results show that none of the measurements, including the two new measuring techniques we introduced, showed statistical significance between the groups. In addition, our data reveal that the parallel pitch lines method is not a reliable way to diagnose symptomatic Haglund's deformity and that a large majority of the patients with insertional Achilles tendinitis have calcification present at the tendon insertion.

Although we introduced two new measurement methods in our study, they did not show statistically significant association with insertional Achilles tendinitis. In fact, the mean Haglund deformity (HD) peak angle measurements between the study and control groups were identical. The HD height measurement showed a possible trend for an association with insertional Achilles tendinopathy with a p value of 0.10. However, given that the difference in the mean HD height measurement between symptomatic and asymptomatic individuals was less than 1 mm, this finding most likely is not clinically relevant.

Many surgeons, including the senior author, routinely resect the Haglund's deformity when surgically treating insertional Achilles tendinitis.[7,8] In his 1998 study, Sella[12] even demonstrated how to radiographically determine the amount of bone removal necessary. However, our results show that removing the Haglund's deformity may not be necessary since it is present to the same degree in asymptomatic patients. This is not to say that patients with insertional Achilles tendinitis will not benefit from surgery. In fact, our senior author's practice is to not only resect the Haglund's deformity as well as the retrocalcaneal bursa, but also to detach, debride, and re-attach the Achilles insertion, as we believe there is always a degree of degeneration at the tendon insertion. On the other hand, the absence of association between the Haglund's deformity and the insertional Achilles tendinitis disease process in our study calls into question whether the bone resection needs to be a part of the operative treatment. Although the presence of a significant Haglund's deformity may play a role in causing insertional Achilles tendinopathy, our study shows that there are likely other contributing factors. Perhaps some individuals are more genetically prone to develop insertional Achilles tendinitis or it may possibly be related to increased activity levels.

Our study was limited by the fact that it is a retrospective radiographic review. Although recent literature[6] has shown a possible association between gastrocnemius tightness and insertional Achilles tendinitis, this was not specifically investigated in our study. This matter is further complicated by the fact that there is no consensus amongst authors as to what constitutes a gastrocnemius contracture. DiGiovanni's 2002 study[4] defined a gastrocnemius contracture as ankle dorsiflexion equal to or less than ten degrees with the knee extended, while our senior author defines gastrocnemius tightness as an inability to dorsiflex the ankle above neutral with the knee extended. Nevertheless, a review of all our patients' charts showed that none had a gastrocnemius contracture as determined by our senior author (D.B.T.).

Table 1: Measurement Results: Insertional Achilles Tendinitis Versus Control

Measurements	Insertional Achilles tendinitis	Control	Correlation coefficient	p value
HD height (mm)	9.6	9.0	0.90	0.10
HD peak angle (deg)	105.2	105.2	0.92	0.99
Bohler's angle (deg)	34.9	33.3	0.98	0.21
Fowler-Philip angle (deg)	62.1	61.0	0.91	0.36
Positive Parallel Pitch (%)	41.7	60.0	1.00	–

It would be interesting to be able to prospectively follow asymptomatic individuals with a prominent posterosuperior calcaneal prominence to see which, if any, went on to develop insertional Achilles tendinopathy. Also, it would be useful to correlate the activity levels of individuals with the onset of insertional Achilles tendinitis. Other topics worth consideration include assessing clinical outcomes of insertional Achilles tendinitis patients who have a Haglund's deformity resection versus those who do not as part of their operative treatment and analyzing the prevalence of gastrocnemius tightness in patients with insertional Achilles tendinitis.

CONCLUSION

We found Haglund's deformity was not indicative of insertional Achilles tendinitis and was equally present in asymptomatic patients. We also found a majority of insertional Achilles tendinitis patients to have calcification at the tendon insertion. Finally, it may be worthwhile for future studies to compare outcomes for patients who have a Haglund deformity resection versus those who do not.

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