CHAPTER **36**

HAGLUND'S DEFORMITY AND POSTERIOR HEEL PAIN: A Retrospective Analysis of Treatment

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The two most common osseous abnormalities that cause symptomatology at the posterior aspect of the heel are Haglund's disease and posterior calcaneal exostosis (step defect). Either condition can be associated with retrocalcaneal bursitis and/or dystrophic calcification within the Achilles tendon. Prominence of the posterosuperior process (bursal projection) of the calcaneus, due either to structural hypertrophy or protrusion or due to positional prominence related to an increase in calcaneal inclination (CIA greater than 21 degrees), is termed Haglund's deformity. Haglund's disease is used to describe inflammatory symptomatology related to the Haglund's deformity, and is almost always associated with retrocalcaneal bursitis.[1]

The point of maximum tenderness, edema, and cutaneous compromise in Haglund's disease is situated posterosuperolaterally on the heel, and is often referred to as a "pump bump." On the other hand, the posterior calcaneal exostosis, or step defect, is localized distal to the posterosuperior prominence and occurs at the attachment of the tendoAchillis to the posterior aspect of the os calcis. The exostosis is commonly associated with dystrophic calcification at the insertion of the heel cord, and is usually seen in cases of longstanding disease. Methods for the treatment of posterior heel pain, either Haglund's disease or posterior exostosis, range from heel elevation and counter padding, stretching and physical therapy, administration of anti-inflammatory medication, and supportive immobilization, as well as surgical remodeling of the posterior aspect of the calcaneus, and debridement of the heel cord. A retrospective analysis was undertaken to try and make generalizations about treatment options, comparisons between patients requiring operative intervention versus those who responded satisfactorily to conservative care, and to develop a hierarchy of treatment intervention.

BACKGROUND AND SIGNIFICANCE

Previous review[2] has detailed the historical efforts made toward our current understanding of the recognition, evaluation, and treatment of posterior calcaneal symptomatology. It is well understood that a prominent posterosuperior aspect of the calcaneus will protrude into the constant retro calcaneal bursa, situated between the distal portion of the Achilles tendon and the calcaneus, during ankle dorsiflexion. Repetitive wear-and-tear of the tendoAchillis, retrocalcaneal bursa, and enveloping connective tissues that become confluent with the periosteum of the calcaneus, effects chronic inflammation and progressive degeneration that ultimately leads to the development of dystrophic calcification and posterior exostosis formation.

There continues to exist some question as to the clinical significance and relationship of various radiographic measurements of the posterior aspect of the calcaneus,[3] and recent interest in the measurement of parallel pitch lines (PPL) continues to lead to some confusion with respect to the indication for surgical intervention.[3] It is also common to observe a relatively low or normal Fowler and Philip angle (FPA), in the presence of a symptomatic and prominent calcaneal bursal projection (posterosuperior process) when there coexists an abnormally high calcaneal inclination angle (CIA).[4] Moreover, concern also exists as to whether or not local infiltration of corticosteroid should be used at or near the insertion of the Achilles tendon, and whether or not immobilization of the ankle is warranted as an adjunct treatment modality whenever steroid infiltration is used about the tendon. Still other areas of concern involve the degree to which the tendoAchillis should be reflected when progressive degeneration has led to the development of a large posterior calcaneal exostosis, with or without degenerative calcification within the Achilles tendon at or near its insertion.[5]

TREATMENT PROTOCOL AND TECHNIQUE

In this study, 31 patients with 34 symptomatic posterior heels were evaluated and treated by the author over a two-year period. The evaluation involved assessment of the patient's age, sex, body mass index, side of symptomatology, activity level, onset and duration of symptoms, the presence or absence of bursitis, degree of pre- and post-treatment pain, the presence of antalgic gait; radiographic measurement of the Fowler and Philip angle (FPA), calcaneal inclination angle (CIA), Ruch's total angle, and parallel pitch lines (PPL); length of treatment and follow-up period, complications encountered during the course of treatment, and the type of treatment required to satisfactorily alleviate the patient's pain.

Weight-bearing activity was classified as sedentary, wherein the patient was never on their feet more than one hour consecutively; partial weight bearing, wherein the patient was required to stand between 1 and 4 hours; and constant, wherein the patient was required to stand for greater than four hours at a time, regularly. Pain was graded using an analog scale with zero representing no pain; and one, two, and three representing mild, moderate and severe pain, respectively, and four representing excruciating pain. Conservative and surgical treatment options were organized into a hierarchy (Table 1).

The heel lift was fabricated of sponge rubber or a cork-latex composite material, while the heel counter pad was made of soft plastazote with an aperture situated around the most prominent surface of the heel. Application of a cool compress after strenuous activity, or before retiring for the evening, was routine; as was administration of non-steroidal anti-inflammatories (NSAIDs) early on (unless contraindicated for other medical reasons). Flexibility exercises consisted of calf and pedal arch stretching, reinforced with written and oral instructions and demonstration. Orthoses were initially commercially available, and subsequently converted to custom molded devices on an as-needed basis. Moreover, the use of more potent NSAIDs, or methylprednisolone, or prednisone orally, was undertaken if symptoms persisted after Stage I therapy.

The decision to move on to the next stage of treatment was made after 6 to 8 weeks of less than 50% to 60% improvement using the preceding treatment regimen. Guidelines for progression to the next level of treatment varied, and depended significantly on individual patient needs and expectations. The use of a roller sole (running shoe

Table 1

TREATMENT HIERARCHY FOR HAGLUND'S DEFORMITY AND POSTERIOR HEEL PAIN

THERAPY	STAGE I	STAGE II	STAGE III	STAGE IV
MECHANICAL	Heel Lift, Counter Pad Orthoses	Orthoses, Roller Sole	Immobilize, NWB	Immobilize, NWB
PHYSICAL	Ultrasound, Cold, Flexibility	Flexibility, Cold, (Utrasound)	Flexibility, Cold, (Ultrasound)	Flexibility, Cold
PHARMACOLOGICAL	NSAID	Indomethacin, Oral Steroid, NSAID	Local Steroid	NSAID
SURGICAL	N/A	N/A	N/A	Bursectomy, Exostectomy, Debride Tendon

or tapered roller) was encouraged, as this has been shown to decrease tension in the plantar fascia and heel cord during late midstance and propulsion. Local infiltration of corticosteroid (1 to 2 cc of methylprednisolone acetate) into the inflamed retrocalcaneal bursa was only undertaken in conjunction with adjunct ankle immobilization and reduced weight bearing over a 2 to 3 week period. Weight bearing would be allowed with the use of a rigid, removable cast boot (velcro closure); whereas non-weight bearing would be advised in conjunction with a gel-cast and surgical shoe. Patients failing to satisfactorily respond to non-surgical treatment were offered a surgical approach with appropriate consent.

The surgical management of Haglund's disease and posterior calcaneal exostosis involved varying degrees of reflection of the tendoAchillis, remodeling of the posterior aspect of the calcaneus; followed by repair of the tendon and closure, after which rehabilitation would ensue.

Generally speaking, patients were positioned either prone or in the contralateral decubitus attitude, and anesthetized with local anesthetic combined with intravenous sedative. The surgery was usually performed without the use of a tourniquet, and dilute epinephrine (1:200,000) was used unless contraindicated medically. Dissection was carried out using a variety of incisions, including lateral paratendinous, lazy-S, and double paratendinous. A tendon splitting incision was preferred when intra-tendinous calcification and a large posterior exostosis were present. Care was taken to resect only as much of the posterior aspect of the os calcis as was necessary. Following thorough lavage, the tendon was re-attached as necessary, either using suture closure of the fibrous retenacular expansion (Haglund's disease) or a tendon anchoring device (the author prefers PEBA, Orthopedic Biosystems, Ltd., Scottsdale, AZ.) directly into the tendon and bone.

Postoperative immobilization and weight-bearing activity varied with the degree of tendon detachment. Preservation of the primary attachment of the tendoAchillis warranted compressive dressing and cast/brace immobilization for 1 to 3 weeks in a weight-bearing attitude. Disruption and repair of the primary attachment of the tendon warranted 5 to 6 weeks of non-weight bearing immobilization.

ANALYSIS OF TREATMENT AND RESULTS

The results of the retrospective analysis are depicted in Table 2. There was no evidence of heel cord rupture or soft tissue or bone compromise secondary to local infiltration of corticosteroid in this set of patients. Two of the five patients requiring operative intervention displayed significant postoperative disability. One patient, a 31-year-old moderately overweight and markedly busy female with bilateral, posterior heel pain, developed persistent edema in the postoperative phase that did not satisfactorily subside until she initiated regular use of an Achilliotrain (Bauerfeind, USA, Inc., Kennesaw, GA). She also displayed a very large posterior exostosis, and underwent extensive heel cord reflection and complete remodeling of the posterior os calcis. Only one patient suffered with recurrent moderate pain (2/4, analog scale), and she never displayed malingering, drug-seeking behavior, or signs of reflex sympathetic dystrophy syndrome (RSDS).

DISCUSSION AND CONCLUSIONS

The diagnosis of Haglund's deformity, and/or posterior calcaneal exostosis, is made based primarily on clinical judgment. Radiographic inspection can yield helpful information, however the diagnosis of a prominent bursal projection is not necessarily confirmed simply by assessing the lateral radiograph. It is interesting to note that PPLs do not correlate with the need to go to the operating room as much as does the combined presence of a large FPA in conjunction with increased CIA. It was also observed that extensive reflection of the tendoAchillis at its insertion, with extensive osseous remodeling, led to persistent edema postoperatively. Moreover, it appears as though posterior heel pain caused by posterior osseous and soft tissue abnormality is less likely to respond to conservative care than is plantar calcaneal spur syndrome. Nonetheless, the majority of posterior heel pain patients do not require operative intervention for treatment.

In summary, this retrospective analysis of the treatment of 34 painful heels in 31 patients presenting with Haglund's disease and/or posterior calcaneal exostosis, attests to the effectiveness of a

Table 2

TREATMENT OF HAGLUND'S DISEASE AND POSTERIOR CALCANEAL EXOSTOSIS (N=34 HEELS IN 31 PATIENTS)

AGE	33.3 ± 8.6 Years
SEX	24 (77.4%) Female, 7 (22.6%) Male
BMI	28.01 ± 6.04 Female, 30.04 ± 4.33 Male
SIDE	15 (48.3%) Right, 13 (41.9%) Left, 3 (9.7%) Bilateral
ACTIVITY	10 (32.3%) Constant, 16 (51.6%) Partial, 5 (16.1%) Sedentary
ONSET	29 (93.5%) Insidious, 2 (6.5%) Acute
DURATION	9.1 ± 4.8 Months (STAGE V Therapy 8.8 ± 4.1 Months)
BURSITIS PRESENT	All heels initially, 2/5 (40%) of surgical cases
PAIN (PRE-)	3.3 ± 0.59 (0-4 Analog Scale)
PAIN (POST-)	0.61 ± 0.61 (0-4 Analog Scale)
ANTALGIC GAIT	18 (58.1%)Yes, 13 (41.9%) No
PROMINENT PSP	31 Patients, 34 Heels (100%)
FP ANGLE	74.O ± 4.1O (Nonsurgical), 76.8O ± 3.90 (Surgical)
CI ANGLE	25.40 ± 4.10 (Nonsurgical), 28O ± 1.8O (Surgical)
TOTAL ANGLE	89.80 ± 3.80 (Nonsurgical), 98.40 ± 2.30 (Surgical)
PPL	14 (41.2%) Positive, 20 (58.8%) Negative
FOLLOW-UP	7.9 ± 3.9 Months
STAGE OF Tx	11 (32.4%) Stage I, 12 (35.3%) Stage II, 5 (14.7%) Stage III, 5 (14.7%) Stage IV

(BMI=Body Mass Index, FP=Fowler & Philip, CI= Calcaneal Inclination, PPL=Parallel Pitch Lines)

rigorous course of non-surgical care. The mean average follow-up period for the 31 patients was 8.9 months. Posterior heel pain was observed to affect primarily middle-aged individuals that were not excessively overweight, and whose duties required primarily weight-bearing activities. Females out numbered males 3:1, and this is thought to correlate with more frequent use of a high-heeled shoe with a rigid heel counter. Posterior heel pain was noted to usually develop insidiously secondary to repetitive strain, and to exist for approximately nine months prior to the patient seeking professional treatment. There was no observed difference in the outcome of treatment between the group of patients undergoing surgical treatment and those who satisfactorily responded to non-surgical care, based on the duration of conservative care provided prior to making the decision to operate in an effort to alleviate recalcitrant pain.

A clinically palpable posterior calcaneal prominence was observed in all 34 painful heels. The Fowler and Philip angle, the CIA, and Ruch's total angle, were observed to be significantly higher in those patients requiring operative intervention in order to alleviate pain, while measurement of parallel pitch lines was less clinically relevant. Overall, 85.3% of patients responded satisfactorily to nonsurgical therapy, and the combined rate of success for both non-surgical and surgical management was 94.1%.

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