



Physician and patient based outcomes following surgical resection of Haglund's deformity

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Calcaneal ostectomy is the benchmark for definitive surgical treatment in patients with Haglund's syndrome, despite conflicting and unpredictable study results. The current study's hypothesis is that when adequate bone is resected and outcomes are evaluated using validated scores, calcaneal ostectomy can give reliable and predictable results. Thirty six consecutive patients (39 feet) underwent calcaneal ostectomy for Haglund's deformity between 1998 and 2002. All patients were evaluated with the AOFAS score and SF-36v2 questionnaire. The mean time to follow-up was 51 months. The mean AOFAS score following surgery was 86/100 points ; the mean SF-36v2 score following surgery was 144/152. Six of the 36 patients interviewed, however, would not recommend the procedure to others, citing mainly prolonged recovery time. Calcaneal ostectomy achieves good-to-excellent results in the treatment of Haglund's deformity when appropriate amounts of bone are excised. However, patients must be made aware of the necessary time to recovery, between 6 months and 2 years.

Key words : calcaneus ; Haglund ; ostectomy ; outcome.

INTRODUCTION

Haglund's deformity, first described in 1928, is a common cause of posterior heel pain (6). In this condition, a posterosuperior calcaneal eminence causes mechanical inflammation of the soft-tissue

at the insertion of the Achilles tendon, affecting the retrocalcaneal bursa, the supracalcaneal bursa, and the Achilles tendon. It is a major, although not universally attributable, cause of Haglund's syndrome, the painful, thickening of the soft-tissue of the hind-foot characterised clinically by the appearance of a painful "pump bump", a radiographically identifiable exostosis.

Conservative treatment has been routinely advocated as first-line therapy and many cases respond well to modalities aimed at minimising pressure over the osseous ridge (3, 4, 7, 11, 20). In cases where conservative treatment fails, surgery may be indicated. Several methods of surgical treatment have been described previously including excision of the retrocalcaneal bursa, calcaneal osteotomy, and cal-

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calcaneal ostectomy with Achilles tendon debridement (1, 5, 9, 12, 15). The results of surgical treatment, however, have been varied and inconsistent, adding to confusion as to when surgery is indicated and what procedures result in optimal clinical outcomes (8, 14, 21). The purpose of the current study was to determine, through the use of standardised and validated outcome analysis, whether calcaneal tuberosity resection and Achilles tendon debridement is an appropriate treatment for refractory Haglund's syndrome.

PATIENTS AND METHODS

Between 1995 and 2003, 44 consecutive calcaneal ostectomies including Achilles tendon debridement were performed by a single surgeon on 40 patients with symptomatic Haglund's deformity. All patients' charts were reviewed and data was analysed using contemporary statistical software (SPSS 12.5 Chicago, IL). Thirty-six patients (81%) with 39 procedures were available for follow-up. Two patients were deceased and two patients could not be contacted for review. Twenty-seven patients were female and 9 patients male (43%). The mean age of the patients was 49 years (range : 19 to 81) and mean follow-up time was 51 months (range : 15 to 109). Four (9%) patients had bilateral operations performed, 3 of whom were available for follow-up. Two patients underwent revision surgery following calcaneal ostectomies performed at other institutions. Exclusion criteria included those patients who had a tendon splitting approach or who had concomitant surgery.

Both the AOFAS ankle-hindfoot scale and Short Form 36 (SF-36v2) scores were employed to evaluate the patient's outcome. The AOFAS ankle-hindfoot score evaluates pain (40 points), function (50 points), and alignment (10 points). It was collected prior to surgery and at the latest post-operative follow-up. The SF-36v2 is a general health survey with a mental and physical component that has been both internally and externally validated (22). It has been used previously as a summary outcome score in orthopaedic outcome analysis and has been validated in foot and ankle hindfoot surgery (10). In addition, patients were asked if they would under-

go the procedure again ; and if they would recommend the procedure to others experiencing the same preoperative symptoms.

Regression analysis was used to evaluate whether there was an association between gender, age, laterality, duration of symptoms, and outcome.

Data was entered and analysed, using contemporary statistical software (SPSS 12.5, Chicago, IL). Correlation was expressed as the coefficient of determination and assigned r^2 . Two-tailed p values were used to establish significance. A p value of < 0.05 was considered significant.

Surgical procedure

Surgery was performed when it was clear that conservative methods of treatment had failed. The mean duration from onset of symptoms to surgical intervention was 13 months (range : 4 to 22). Surgery was performed with the patient in a supine position. A medial incision was made on 4 patients and the remainder of patients had a lateral incision. The decision as to where to make the incision was based primarily on the patient's symptoms. The majority of patients complained of posterior-lateral pain. Careful attention was paid to evaluating the exact location that was bothersome to the patient and this was marked on the skin prior to surgery. All inflamed retrocalcaneal bursae were resected and sub-periosteal dissection was then carried out at the insertion of the Achilles tendon on to the tuber of the calcaneus. Electrocautery was avoided in resecting the periosteal flap ; rather periosteum was incised with a sharp 15 gauge blade and elevated with a periosteal elevator. The excess periosteum was resected to avoid bony proliferation from the cambial layer following surgery. The prominence of the calcaneal tuber was removed with a 1 cm osteotome ; the size of the fragment was determined by pre-operative evaluation of radiographs. In all cases the dorsal ostectomy was carried out initially (fig 1). This exposed the remaining posterior fragment, which was subsequently resected and rasped to remove sharp edges. Any peritendonitis or calcifications in the Achilles tendon were also removed. If significant resection of the posterior fragment was thought to have compromised



Fig. 1. — Preoperative radiograph demonstrating large calcaneal tuber prominence.

the Achilles tendon insertion, it was augmented using Mitek bone anchors with n° 1 braided Dacron suture to avoid avulsion during the healing period (fig 2). Following surgery, patients were placed in a short leg cast with the ankle placed in 15° plantar flexion. Two weeks following surgery the cast was replaced with a cast in a neutral ankle position. Patients were not permitted to bear weight for the first 4 weeks following surgery. At that time a walking heel was placed on the cast and patients were then permitted to weight bear increasingly over the next two weeks. Six weeks following surgery, patients were placed in a walking boot for a further two weeks. Thereafter patients were encouraged to ambulate as tolerated without the assistance of walking aids. Physical therapy included Gastroc Soleus muscle strengthening and stretching exercises. Patients were evaluated in the office at 6 weeks, 3 and 6 months following surgery.

RESULTS

The mean AOFAS score at follow-up was 86/100 (range : 55 to 100), an improvement of 32 points from the mean pre-operative score. The mean physical component score of the SF-36v2 was 49 (range : 34 to 63), while the mean mental component score was 54 (range : 26 to 64). There was a correlation between the AOFAS score and the SF-36V2 score ($r^2 = 0.62$). Thirty-one of the



Fig. 2. — Intraoperative fluoroscopic picture demonstrating resected calcaneal prominence.

36 patients reported that they would repeat the procedure, if necessary and 30 patients indicated that they would recommend the surgical procedure to others with similar pre-operative symptoms. Six patients would not recommend the procedure to others of which five patients would not repeat the procedure themselves (table I).

Table I. Summary of outcomes following surgery

Summary of Results	Percentage of 36 patients
AOFAS Score	86/100
Would repeat the procedure	86%
Would recommend procedure	82%

Of the five patients that declined to repeat or recommend the procedure, 1 patient reported mild, occasional pain and 3 patients reported moderate, daily pain at 1 year following surgery. The final patient was pain free but reported a 3-year recovery period from symptoms (table II). As a group, the patients that both declined to recommend and to repeat the procedure had a mean AOFAS score of 72 (range : 51 to 100), mean SF-36v2 physical component score of 46 (range : 36 to 59), and mean SF-26v2 mental component score of 47 (range : 24 to 61). There was no statistically significant difference noted between these patient's AOFAS scores and SF-36v2 scores and the group as a whole ($p = 0.77$). Of the six patients that described continued pain, all patients described the pain as localised to

Table II. Patients who would not have the procedure again

	Number of Patients of 36
Patients declining to repeat the procedure	5
Mild to moderate pain at 1 year after surgery	1
Moderate to severe pain at 1 year after surgery	3
Prolonged recovery greater than 3 years after surgery	1

their heel in the same location at which it had occurred preoperatively. Four of these six patients felt their pain to be improved from that of the preoperative period, although not substantially enough to have warranted the procedure.

Of the six patients identified who would not have the procedure again, regression analysis did not demonstrate any association between age, gender, laterality, radiographic grade nor time of symptoms and poorer outcomes ($p > 0.05$ for all). Furthermore, the four patients who required tendon suture anchors all would repeat the procedure and had complete pain relief, absolving the degree of tendon resection at time of surgery as implicated in poorer outcomes.

There were no major complications reported in the current series. There were two superficial wound infections that were treated with antibiotics and healed without further incident.

DISCUSSION

The treatment of Haglund's syndrome resultant from Haglund's deformity remains a significant orthopaedic challenge. Many patients do not respond to conservative treatment, leaving surgery as a last alternative. The various surgical methods described to treat this syndrome have, however, produced mixed results, making it difficult for physician and patient alike to decide under what circumstances and with what methods to intervene surgically (1, 5, 9, 12).

The results of the current study suggest that calcaneal ostectomy produces outcomes that justify surgical intervention in cases of Haglund's syndrome recalcitrant to conservative therapy. Mean AOFAS scores for patients in this study were

86/100. The SF-36v2 scores were 49 and 54 for the physical and mental components respectively, which compares with standardised norms for healthy age matched controls in the general population (22). Furthermore, 86% of the patients interviewed responded that they would repeat the procedure, and 82% responded that they would recommend the procedure to others suffering from Haglund's deformity related heel pain.

The results presented are similar to outcomes previously reported by Sammarco *et al* (16) using the Maryland foot score and Sella *et al* (19) using the AOFAS score. The results presented by the current investigators and by both Sammarco *et al* (16) and Sella *et al* (19) are in contradistinction to other studies, including those of Nesse *et al* (14) and Schneider *et al* (18) that suggest the resection of calcaneal exostosis does not result in consistent symptomatic relief for patients. The discrepancy between the two opinions may be multifactorial, reflecting both time to follow-up, outcome evaluation tools, and surgical procedure.

Time to follow-up is critical in evaluating patients with calcaneal ostectomy. In the study by Nesse *et al* (14), the minimum time to follow-up was just one year and in that by Schneider *et al* (18), the minimum time to follow-up was just 18 months. In the current study, a majority of patients felt that recovery time was longer than anticipated, results consistent with Schneider *et al* (18) and Chen *et al's* (2) suggestion that patient satisfaction correlates with expectations regarding time to recovery. Using a time to follow-up of less than 12 months in the current study would clearly have influenced the results negatively. However, the current study's results with a mean follow-up time of 51 months suggest that time to follow-up in future studies should probably be set to exceed 24 months to ensure that results truly reflect patient satisfaction.

Further confounding previous reports of calcaneal ostectomy, the tools used to evaluate both physician and patient based outcomes are not standardised and many have not been validated. In contrast, the current study uses contemporary and standardised outcome analysis. The AOFAS hind-foot score has been previously validated with both

internal and external reliability and the SF-36 score has also been established as a validated outcome assessment tool in hind-foot surgery (10). As such, data can be compared with previous studies without bias.

The current authors' method of calcaneal osteotomy may also have contributed to the satisfactory outcomes reported. A preoperative assessment is critical to determine the site of greatest pain. Usually, this is not midline but rather posterior-medial or posterior-lateral and, as such, the surgical exposure should be directed towards this site. Careful periosteal dissection over the calcaneal prominence may also reduce the incidence of post-operative neuromas from small periosteal nerves and from bony proliferation from the periosteum itself (17).

Adequate bony resection is also critical to satisfactory outcomes. Enough bone should be resected to allow decompression of the tendon and the retrocalcaneal bursa itself. This has previously been established as a critical step in obtaining long term pain relief (19). The current authors have found that this can only be achieved with a two step osteotomy. The initial osteotomy removes the dorsal prominence, uncovering the posterior prominence. After this has been resected the current authors close the skin and feel for any prominence through the skin. If any is present it is resected with a small rongeur. This, the authors believe is a critical step in eliminating symptoms.

Although the current authors are encouraged by recent reports on the use of arthroscopic resection of Haglund's deformity there is little evidence to date to suggest that this method of treatment has any significant benefit over that of traditional open resection (13). Of greatest concern is the possibility of neuroma formation from traumatic periosteal resection. Furthermore, the bony debris generated at the time of resection may cause long term irritation to the soft tissues unless meticulous irrigation is obtained. Further refinements of the arthroscopic approach are demonstrating improved techniques and outcomes. Until such techniques are perfected however, the authors believe that the current method of traditional surgical resection presented in the present study, may represent the benchmark

of treatment to which future studies of endoscopic resection may be compared.

Certain confounding variables were identified in this study. It is a retrospective review and as such has inherent bias. In an effort to reduce bias the senior authors did not collect data, and all data was collected from consecutive patients to avoid selection bias. The retrospective nature of this study and the recollection of patients as to the length of time to recovery however only underscore the message of this investigation; patients were concerned mostly about the lengthy time to recovery.

Haglund's deformity is a challenging condition to treat. This study adds to the evidence that calcaneal osteotomy can be an effective treatment for those suffering from chronic heel pain for whom conservative therapy fails. Patients should be made aware however that there is a significant period of recovery required before they will obtain maximum benefit.

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