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Original Research Article

Endoscopic management of retrocalcaneal pain: a prospective observational study

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ABSTRACT

Background: In an effort to reduce morbidity and complications of open surgery, an endoscopic technique was used for the management of the conditions leading to retrocalcaneal pain. With this purpose, the current study was undertaken to evaluate results of endoscopic management of retrocalcaneal pain using American orthopaedic foot and ankle score (AOFAS).
Methods: 20 patients (26 heels) in the age group 18-80 years presenting with retrocalcaneal pain not responding to conservative management underwent endoscopic decompression of the retrocalcaneal bursae and excision of bony spurs. Two portals were created, one laterally and one medially, over the posterosuperior portion of the calcaneus to gain access to the retrocalcaneal space. The inflamed bursal tissue was identified and removed, and the prominent bone was resected. The functional outcome was evaluated pre and postoperatively with the AOFAS.
Results: 70% patients have retrocalcaneal bursitis, 20% Haglund's deformity as confirmed on lateral view of ankle X-ray and only 10% of non-insertional tendinosis. Mean operative time was 54.95 minutes. Mean duration of hospital stay was 3.90±0.64 and the mean follow-up was 66 days (range 30-180 days). The average AOFAS score improved from 65.60 points pre-operatively to 96.80 points at final follow-up. There were fifteen excellent results, seven good results, two fair results and two poor results.
Conclusions: Endoscopic procedure for retrocalcaneal bursitis and Haglund deformity seemed to be a safe and efficacious option for surgical treatment of retrocalcaneal pain.

Keywords: Non-insertional Achilles tendinosis, Retrocalcaneal bursitis, Haglund deformity, Endoscopic procedure

INTRODUCTION

Retrocalcaneal pain, a common foot problem, may be due to retrocalcaneal bursitis, Haglund's deformity, Achilles tendonitis, or plantar fasciitis. Retrocalcaneal bursitis is a chronic debilitating condition characterized by pain which lies between the anterior aspect of the tendon and the posterosuperior aspect of the calcaneum.[1] Haglund's deformity first described by Patrick Haglund is bony enlargement on the posterosuperior border of the oscalcis and represents a painful heel condition caused by mechanically induced inflammation of the retrocalcaneal or supra calcaneal bursae, which become inflamed, hypertrophied, and adherent to the underlying tendon.[2,3] Dorsiflexion of the ankle revealed tenderness on either side or anterior aspect of the tendoachilles. The lateral view radiograph of the ankle joint shows posterosuperior bony prominence and intra tendinous calcification that

confirms the diagnosis. Various modalities of conservative treatment have been recommended for retrocalcaneal pain, including change of footwear, use of heel pads, moist heat, stretching exercises, local steroid injections, and extracorporeal shock wave therapy.[4-6] Surgery may be indicated where conservative treatment fails. Several methods of surgical treatment have been described previously including excision of the retrocalcaneal bursa, calcaneal osteotomy, and endoscopic decompression of the retrocalcaneal space.[7-9] The study was done to evaluate the efficacy of arthroscopic decompression of retrocalcaneal bursa and posterosuperior bony spur.

METHODS

This prospective study was conducted in department of orthopaedics from September 2016 to March 2018. Ethical approval was obtained from the Institute Ethics Committee and written consent was taken from the participants after explaining the study purpose. 20 patients (26 heels), 14 females and 6 males were studied. Patient's with history and physical examination suggestive of retrocalcaneal bursitis, Haglund deformity causing mechanical impingement, failure of conservative management (like modified footwear, non-steroidal anti-inflammatory agents and physical therapy of 6-36 months) and Non-insertional Achilles tendinosis were included in the study. Patients suffering from marked calcified Achilles tendinosis, Infection, Insertional Achilles tendinosis, and having previous hind foot surgery were excluded from study. All Patients were evaluated with preoperative history, clinical examination, routine blood investigations, and x-ray lateral view of calcaneum to fulfil inclusion criteria. In cases of bilateral involvement only the heel with more severe involvement was operated.

The patients were taken for the surgery after routine investigation and after obtaining anaesthetic fitness towards surgery. The consent for surgery was also taken from the patient and attendants after explaining the procedure and possible complications. Limb was shaved from knee to foot 1 day before the surgery.

Scoring

The American orthopaedic foot and ankle society (AOFAS) ankle-hindfoot scale was used to evaluate patients preoperatively and post-operatively at 3 weeks, 6 weeks and 6 months.[10] The AOFAS score evaluates pain (40 points), function (50 points), and alignment (10 points).

Operative technique

The endoscopic procedure was performed with the patient in a prone position, with the foot hanging down the table, under spinal anaesthesia and tourniquet control after injection tetanus toxoid and antibiotics (injection ceftriaxone 1gm i/v and injection gentamicin 80mg i/v) were given 1 hour preoperatively. All bony prominences were well padded, and the operative leg was supported on a pad to allow the foot to lie in a neutral position. The other leg was lowered down approximately 20° compared to operative leg (Figure 1). Dorsiflexion of the foot can be manipulated by placement of the surgeon's body against the foot. Thus, both hands were free to manipulate the arthroscope and the surgical instruments.

Figure 1 (a and b): Patient positioning.

One imaginary horizontal line from the tip of lateral malleolus to perpendicular to the Achilles tendon and two lines were drawn parallel to the medial and lateral border of Achilles tendon. The portals were made at the intersection point of these lines, inferior to the horizontal line and lateral to the border of Achilles tendon Figure 2 (a and b). The incision was slightly anterior to Achilles tendon and posterior to sural nerve. A blunt trocar was inserted through lateral incision. The 4 mm arthroscope (Stryker, San Jose, California) is introduced into this formed space, which can be confirmed fluoroscopically. Under direct vision a spinal needle is next introduced just medial to the Achilles tendon at approximately the same level as the lateral portal. The medial portal was similarly established just anterior to Achilles tendon. The medial portal acted as working portal while the lateral portal was used for visualisation (Stryker endoscopy video system and 30° scope). A 4.0 mm arthroscopic shaver was introduced into the medial portal (Figure 3) and the inflamed bursal tissue was removed. Once working space had been created to access the posterior calcaneus and Achilles tendon attachment.

Figure 2 (a and b): Marking and making port.

Figure 3: Surgical setting for retrocalcaneal endoscopy.

Depending on the quality of the bone, either the arthroscopic shaver or a 4.0 mm arthroscopic burr or both were used to re-sect the posterosuperior calcaneal prominence. Then a needle was inserted through the tendo Achilles and visualized it through the arthroscope. It helped us to find the orientation of retrocalcaneal space (Figure 4). The hooded portions of the instruments were kept toward the needle tip to protect the tendon. Bone resection was done systematically usually from a posterior to anterior direction. The resection was carried out both medially and laterally into the sulcus of the calcaneus and down to the attachment of the Achilles tendon. The location of the tendoachilles was confirmed by needle insertion from outside. Adequate exposure and resection of the osseous prominence were generally possible with visible, tactile guidance and a needle passing through the tendoachilles. Damaged or diseased Achilles tendon was selectively removed with the arthroscopic shaver. An arthroscopic probe was inserted into the retrocalcaneal space to confirm attachment of the Achilles tendon. The foot was taken through a range of motion to visualize any last site of impingement. The fragments were irrigated and suctioned from the wound.

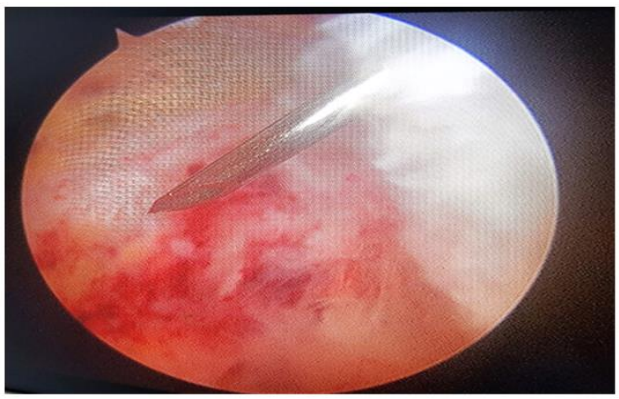

Figure 4: Needle passing through the Achilles tendon and pointing towards retrocalcaneal space.

Wound closure was done with 4-0 nylon in a single layer and below knee slab was applied in 10-15° planter flexion for 2 weeks. Postoperatively weight bearing was not allowed for two weeks. However, all patients were instructed to elevate the foot as long as they are not mobile, at least for the first 5 days. Patients were allowed to walk with modified footwear for three months, followed by normal footwear. Complications of post-operative neuralgia and swelling and scar tenderness were noted in some patients.

Statistical analysis

Statistical analysis was performed using the statistical package for social sciences (SPSS) for windows, version 17.0. Continuous variables were presented as mean ±SD and categorical variables were presented as absolute numbers and percentage. Continuous variables over time within the groups were analysed using repeated measures analysis of variance (ANOVA) followed by Bonferroni's post hoc testing to compare the pre-operative and post-operative scores (3 weeks, 6 weeks and 6 months). P≤0.05 was considered statistically significant.

RESULTS

Out of 20 patients (26 heels), 14 (70%) were female while 6 (30%) were male with a mean age of 45.24±9.51 years (range 28-65 years) (Table 1) and the mean duration of the nonoperative treatment before the surgery was 13.85±6.11 months (range 6-30 months) (Figure 5).

Table 1: Demographic profile of patients.

Variables	No of patients	%
Age (in years)		
<25	00	0
26-35	04	20
36-45	08	40
46-55	05	25
56-65	03	15
Gender		
Female	14	70
Male	06	30
Total	20	100

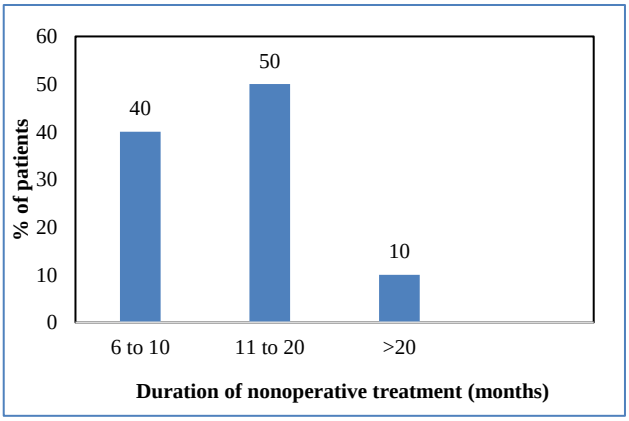

Figure 5: Mean duration of non-operative treatment.

Table 2: Average AOFAS score.

Variables	N	Pre-operative	Post-operative		
			3 weeks	6 weeks	6 months
Mean ±SD	20	65.60±8.33	80.60±6.94	93.25±7.93	96.80±6.83
P value			<0.001	<0.001	<0.001

70% patients diagnosed as suffering from retrocalcaneal bursitis, 20% Haglund deformity confirmed on lateral view of ankle X-ray and only 10% of non-insertional tendinosis (Figure 6). Mean operative time was 54.95 minutes. Mean duration of hospital stay was 3.90±0.64 day and the mean follow-up was 66 days (range 30-180 days). In our study of 20 heels, mean preoperative AOFAS SCORE was 65.6±8.33, and 80.60±6.94 at 3 weeks, 93.25±7.93 at 6 weeks and 96.8±6.83 at final follow up of 6 months (Table 2). The differences were significant across all periods with p value <0.001 as per ANOVA.

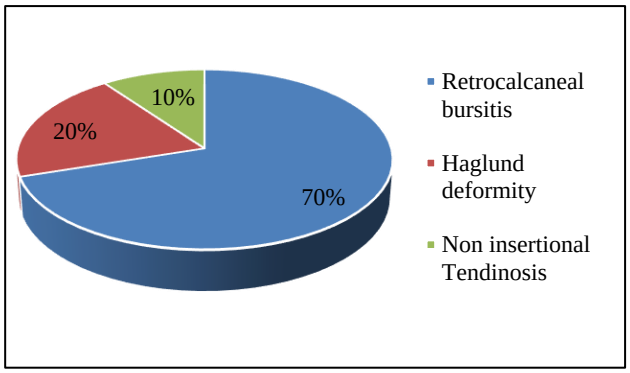

Figure 6: Distribution of participants as per the etiology of pain.

DISCUSSION

Retro calcaneal pain is a disabling foot problem which is multifactorial and the causes include retrocalcaneal bursitis, insertional tendinosis, non-insertional tendinosis, superficial retro-calcaneal bursitis, and gastrocnemius contracture.[11] In this study we dealt with retrocalcaneal pain caused due to Haglund deformity, retrocalcaneal bursitis and non-insertional tendinosis. Non-operative treatment is always recommended first. Our patients underwent prolonged conservative treatment, including use of heel lifts, non-steroidal anti-inflammatory agents, open-back shoes, physical therapy, avoidance of high-impact activities, and night splinting, with minimal improvement. The average duration of the nonoperative treatment before the surgery was 13.85±6.11 months (range 6-30 months). Steroid injection can be used when conservative treatments fail, although repeated applications may cause Achilles tendon rupture.[12] For this reason, no steroid injections were applied to any of our patients. Myerson and Clement reported success rates of 85% to 95% with conservative treatment.[13,14] Leitze et al reported that approximately 10% of their patients remained symptomatic following a period of conservative treatment and sought operative treatment.[15] Conversely, Sammarco and Taylor reported a failure rate of 65% (39 heels in 65 cases) with conservative treatment for an average of 62 (range: 4 to 260) weeks.[16]

Patients who do not respond to conservative treatment are candidates for operative intervention. The aim of surgery in Haglund deformity and retrocalcaneal bursitis is to remove the posterosuperior calcaneal prominence and to decompress the inflamed surrounding soft tissues. It can be achieved either by open surgery or endoscopic method. The advantages of using endoscopic technique instead of open surgery are a decreased prevalence of approach-related complications and technical efficiency. The endoscopic approach required less operative time. The improved visualization of the tendon-bone relationship with endoscopic inspection allows precise debridement and evaluation for residual impingement of Achilles tendon. The smaller access allows easier closure and less extensive postoperative care.[17]

The success rates for patients undergoing an open calcaneal resection have been reported to be between 50% to 100%. Angermann et al in a series of 40 heels that had open resection of the calcaneus, reported that 70% of the patients believed they were cured or improved.[18] within that series, 20% were unchanged and 10% were worse. There were several minor complications including superficial infection, hematoma, and delayed healing of the skin. Pauker et al published a series of 19 patients over 20 years who had open resection of the calcaneal prominence and did not have the retrocalcaneal bursa removed.[19] Fifteen of the 19 patients had good results. The two fair and two poor outcomes resulted from insufficient bone removal. Better results occurred in those patients who had enough resection to prevent impingement when the foot was maximally dorsiflexed.

Methods to determine how much bone should be removed have been described. Leitze et al used pre-operative radiographic measurements and intraoperative fluoroscopy to determine the angle of resection of the posterior prominence of the calcaneus.[20] These measurements were done for patients who had an open or endoscopic procedure. The postoperative angle of resection averaged 51 degree for both groups. There was no association with improved outcome and angle of resection. Within our series of patients, resection was carried out until there were no areas of impingement of the Achilles tendon as seen with the endoscope. Pre-operative and post-operative radiographs were done in all patients

and no attempt made to correlate the amount of radiographic bone resection and patient's outcome.

Endoscopic decompression has been shown to be an effective method of treating Haglund deformity and retrocalcaneal bursitis. Dijk et al had 19 good to excellent results in their series of 20 patients. There were no operative complications or postoperative infections.[21] Morag et al treated four patients with endoscopic calcaneoplasty and after an average follow up of 2 years, no complications, pain, decrease in range of motion or disability were reported.[22] In the report of Jerosch and Nasef in 2003, ten patients were treated with the endoscopic calcaneoplasty approach and after a mean follow up of 5.2 months, three patients rated good results and seven excellent, based on Ogilvie-Harris score.[23] Leitze et al in 2003 compared endoscopic decompression with the standard open technique. Patient outcomes and recovery times were similar, but there were fewer complications and a better cosmetic appearance with the endoscopic technique.[24]

In our study of 20 heels, mean preoperative AOFAS SCORE was 65.6±8.33, and 80.60±6.94 at 3 weeks, 93.25±7.93 at 6 weeks and 96.8±6.83 at final follow up of 6 months. The differences were significant across all periods with P value <0.001 as per ANOVA. Hence there was significant improvement in immediate postoperatively AOFAS score and the improvement continue till even 6 months after the surgery. Hence, patient should be counselled some subjective improvement after surgery is progressive and can continue at least 6 months. Our result was comparable to other studies (Table 3). We could not segregate the outcome into excellent, good and poor, since we did not used Oglivie-Harris score and AOFAS score does not categorizes patient into these categories.

Table 3: AOFAS score of our study when compared to other studies.

Studies	Pre-operative AOFAS score	Final AOFAS score
Our study	65.6±8.33	96.8±6.83
Ortmann et al[14]	62±12.7	97±6.1
Kaynak[32]	52.6*	98.6*
Leitze et al[52]	61.8±12.9	87.5±15.0
Kondreddi et al[54]	57.9±6.224	89.08±5.267
Wu et al[64]	63.3±11.9	86.8±10.1

*SD not mentioned.

Surgery can be performed in supine or prone position. Most of the workers have used supine position in their series. Although supine position is preferable in patients with co morbidities like obesity and cardiovascular problems, while using the supine position, frequently the scope and shaver touch the edge of the operating table. We used prone position with lowering down of normal leg approximately 20° compared to operative leg to be comfortable. It allowed uninterrupted visualisation and instrumentation of the affected region. An alternative to perform a retrocalcaneal endoscopy is to use a 2.7mm scope instead of 4.0 mm scope. We used 4.0 mm scope, since this gives a better flow.

There is a steep learning curve with the endoscopic procedure. The first procedures performed in this study took approximately one and half hour, whereas the surgical time in last patient was twenty-four minutes. This is consistent with other findings, confirming that when performed by experienced surgeons, endoscopic calcaneoplasty is not time consuming and can be much faster than traditional open procedures.[25] Marking the superior aspect of the calcaneus under fluoroscopic control with a marker pen may be useful for surgeons who are new to this endoscopic technique. A surgeon who decides to try this technique should plan accordingly for the time that it will take and should be prepared to convert to an open procedure if necessary

One complication of posterior prominence resection of the calcaneus is Achilles tendon rupture. Based on anatomical dissections and biomechanical testing, it has been shown that when performing partial resections of the Achilles tendon as much as 50% of the tendon may be resected safely superiorly to inferiorly. However intraoperatively it is difficult to judge the depth of resection. We inserted a needle through tendoachilles and visualized it through the arthroscope. This gave us an orientation of the location of tendoachilles. We kept the shaver blade or burr facing in opposite direction while doing bony resection and debridement of retrocalcaneal space. This may be the reason that we did not encounter any tendoachilles rupture in this series. Moreover, we applied below knee slab for two weeks to protect tendoachilles. Ortmann et al noted one tendoachilles tear in his series, since that patient was ambulating without a prescribed protective walker boot.[26]

We had complication in two patients 10%. One patient had post -operative neuralgia following surgery, which recovered in six weeks with tab methyl cobalamin. One patient had swelling and scar tenderness, which resolved within three weeks. Donnewerth and roukis reported in their systematic review of 5 articles that complications occurred in 17 of 452 ankles 3.8% of 452 patients who underwent hindfoot endoscopy.[27] These included 5 cases with wound healing problems, 4 with recurrent symptoms, 3 with neuritis of the medial calcaneal nerve, 3 with transient incisional anaesthesia and 1 each with traumatic sural neuroma and transient superficial peroneal neuritis. Nickish and colleagues found a complication rate of 8.5% in their review.[28]

Limitation

There are few limitations associated with the study. Firstly, the results demonstrate the capacity for the technique to relieve pain but it does not accurately distinguish between tendinopathy and retrocalcaneal bursitis. Secondly, the exact number of patients who had significant tendon

debridement during the endoscopic procedure could not be determined. And lastly, the short follow up period adds up to the study limitation.

CONCLUSION

In conclusion, endoscopic calcaneal resection is a proven alternative to open resection, with fewer complications and some advantages. A surgeon who is comfortable with arthroscopic techniques may find that this procedure is quicker and easier and allows better visualization. The small incision minimizes the potential for wound dehiscence, a painful scar, and nerve entrapment in scar tissues, and it provides a cosmetically superior result. The level of postoperative pain and the time to recovery are similar to those after the open procedure.

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