The Achilles heel of adults and children
Wiegerinck, J.I.

Citation for published version (APA):
THE APPEARANCE OF THE PRE-ACHILLES FAT PAD AFTER ENDOSCOPIC CALCANEOPLASTY

J.I. Wiegerinck, R. Zwiers, M.N. Sterkenburg, M. Maas, C.N. van Dijk

Knee Surgery Sports Traumatology Arthroscopy 2014 March 1
ABSTRACT

Purpose: To evaluate whether the imaging features of the retrocalcaneal recess normalizes on a conventional radiograph after surgery for retrocalcaneal bursitis and evaluate whether it can be re-used if complaints reoccur.

Methods: Patients who underwent an endoscopic calcaneoplasty at least two years before were eligible for inclusion. A lateral conventional radiograph of the surgically treated hind-foot was made to assess the retrocalcaneal recess and pre-Achilles fat pad; images were analysed, clinical complaints were registered and evaluated. Radiographs were evaluated by two experienced observers (one orthopaedic surgeon one musculoskeletal specialized radiologist), these scored the images either as “normal” (no obliteration of retrocalcaneal recess and pre-achilles fat) or as “abnormal”.

Results: Thirty patients (34 heels: 28 asymptomatic, 6 recurrent complaints) were included in this study. Observer one rated 12 images as “normal” (2 symptomatic heels, 10 asymptomatic); 22 “abnormal”. Observer two rated 9 “normal” (1 symptomatic heels, 8 asymptomatic); 25 “abnormal”. No correlation between the radiographic appearance and complaints (n.s.) was found. Cohen’s kappa for inter-observer agreement was low (0.11 n.s.).

Conclusion: The appearance of the retrocalcaneal recess on a lateral radiograph cannot be used as a reliable diagnostic criterion for retrocalcaneal bursitis in patients who previously underwent endoscopic calcaneoplasty. This studies clinical relevance is based upon the conclusion that a lateral radiograph cannot be used after endoscopic calcaneoplasty, whereas previous work reported the diagnostic value of a lateral radiograph for retrocalcaneal bursitis prior to surgery.
INTRODUCTION

Conventional radiographic examination is generally confined to the detection of bony pathology. Changes in shape, size and transparency of non-bony tissues on conventional radiographs can aid in the diagnosis of soft tissue pathology. One of these soft tissue configurations is the pre-Achilles fat pad or Kager’s triangle; a mass of adipose tissue occupying pre-Achilles fat pad. Normally this fat pad, as seen on a lateral standing radiograph of the ankle, is a radiolucent triangle with sharp borders (fig. 1). The appearance of pre-Achilles fat pad has been used for many years as a diagnostic criterion for abnormal conditions involving the posterior ankle area. A recent study demonstrated that, in combination with clinical signs, the appearance of the retrocalcaneal recess is a reliable diagnostic criterion for the diagnosis of a chronic retrocalcaneal bursitis on a digital lateral standing radiograph of the ankle. It is known that, especially after open surgery, complaints recur in the years following resection of the bursa and posterior prominence. In these cases the diagnosis can again be made clinically. Weeks after endoscopic treatment the pre-Achilles fat pad is disturbed due to irrigation fluid and clearance of reactive processes (fig. 4). It is unknown whether the pre-Achilles fat pad normalizes on the long term, and if the appearance on a conventional radiograph returns.

Fig.1. (A) Right ankle with a normal pre-Achilles fat pad on conventional lateral radiography. (B) The borders of the pre-Achilles fat pad are schematically drawn: posteriorly it is confined by the Achilles tendon (AT), anteriorly by the flexor hallucis longus (FHL), and inferiorly by the calcaneus (CA). The retrocalcaneal recess is marked with an asterisk.
Chapter 4

Fig. 3. (A) Lateral standing radiograph of the right hindfoot of a 41-year old male patient with complaints of a retrocalcaneal bursitis. Note the obliteration of the retrocalcaneal recess of the pre-Achilles fat pad which now has a white foggy appearance. (B) The inflamed bursa is circled for clarification of (A).

Fig. 2. Schematic drawing of the hindfoot; AT= Achilles tendon, K= Kager’s triangle (or pre-Achilles fat pad); CA= calcaneus; bu= bursa. (A) Normal situation. A thin bursa (bu) as indicated with arrow is present in the retrocalcaneal recess. (B) Situation in case of a retrocalcaneal bursitis (red), where the inflamed bursa impinges between the Achilles tendon and the posterosuperior part of the calcaneus.
The appearance of the pre-Achilles fat pad after endoscopic calcaneoplasty

Materials and Methods

After analysis of patient files, 42 patients were retrieved who underwent an endoscopic calcaneoplasty in our institute between 1995 and 2009, after the diagnosis retrocalcaneal bursitis was made. To rule out any possible postoperative swelling of the soft tissue patients who underwent surgery of the hindfoot in the last two years were excluded. Patients with a recent trauma to the hindfoot were also excluded. Pregnant patients were not allowed to participate in this study because of radiation exposure. Patients were asked to visit our outpatient clinic, where they were questioned if they were pain-free or regained symptoms of retrocalcaneal bursitis. Demographics such as age, gender, affected side, preoperative

Fig. 4. Radiographs of the left hindfoot of a 50- year old ex- professional athlete. (A) Pre-operative situation, with on x-ray a posterosuperior calcaneal prominence and obliteration of the pre-Achilles fat pad. (B) The situation 2 weeks postoperative. The pre-Achilles fat pad is still showing a white, foggy appearance, likely due to the presence of irrigation fluid and postoperative healing processes.
radiographic findings (Table 1.1), medical history years after endoscopic calcaneoplasty were recorded (Table 1).

Radiographic Obliteration of retrocalcaneal recess

A conventional lateral standing radiograph was made of each patient’s surgically treated hindfoot to assess postoperative situation of the retrocalcaneal recess. Two experienced observers, a musculoskeletal radiologist and an orthopaedic surgeon evaluated the radiographs. A fully visible sharply outlined radiolucent retrocalcaneal recess, without any obliteration; indication of any fluid infiltration or any other disturbances in the pre-Achilles fat pad was rated as “normal radiographic findings”. The observers scored the radiographs as “normal” (no abnormalities or obliterations and not suspicious for retrocalcaneal bursitis) or “abnormal” (image shows obliterations; suspicious for retrocalcaneal bursitis). The observers were blinded to whether the subject had complaints at the time the radiograph was made. This trial (nr. MEC 08/090-08170597) was approved by the Medical Ethical Committee of the Academic Medical Center, University of Amsterdam. Informed consent was obtained from each patient prior to participation.

Statistical analysis

SPSS (IBM) version 18.0 was used to perform the analysis. The sample size was 34 treated limbs in 30 patients. Descriptive statistics on the patient’s demographics were performed. Due to small sample sizes and skewed distributions, Mann Whitney U tests were performed to test differences in median age and follow-up time between patients with and without complaints. To measure correlation Fisher’s exact tests were performed. Inter-observer agreement is measured by calculating a Cohen’s kappa coefficient.

RESULTS

The study population consisted of 30 patients with 34 treated heels. Of the 34 heels, 28 were completely asymptomatic; six heels improved substantially but still had some discom-
Table 2. Assessment of radiographs scored by observer A. Correlation between symptoms and appearance was calculated by Fisher’s exact test. P-value = 1.0

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>Symptomatic</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>22</td>
</tr>
</tbody>
</table>

Table 3. Assessment of radiographs scored by observer B. Correlation between symptoms and appearance was calculated by Fisher’s exact test. P-value = 1.0

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Symptomatic</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 4. Inter-observer agreement. Cohen’s kappa value = 0.11 (p-value = 0.45)

<table>
<thead>
<tr>
<th>Observer B</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Abnormal</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>25</td>
</tr>
</tbody>
</table>

During prolonged activity, the discomfort never resulted in cessation of the respective activity. Median age at postoperative visit of the 30 subjects was 48.0 years (range 19.0-73.4). 16 patients were male and 14 were female. Median (range) time between endoscopic calcaneoplasty and visit was 6.0 (2.0-13.6) years. Differences in median age and follow-up time between the symptomatic and asymptomatic subjects were not significant (Table 1). Observer A found that the retrocalcaneal recess was normal (thus negative for RB) in 12 radiographs and in 22 radiographs they were scored as abnormal. Among these 12 normal radiographs, two were of symptomatic heels and ten radiographs were of asymptomatic heels (Table 2). Observer B rated nine radiographs as normal radiographic findings; 25 radiographs showed abnormalities with an obliterated (positive for RB) defiant retrocalcaneal recess or pre-Achilles fat pad (Fig. 5). Of the nine normal radiographs, one subject was somewhat symptomatic; eight were completely asymptomatic (Table 3). These results were analyzed dichotomously because of small numbers, using the Fisher’s exact test. No correlation between the appearance of the retrocalcaneal recess of pre-Achilles fat pad and pain complaints (n.s. for both observers) could be found. The Cohen’s kappa value of 0.11 indicates a low inter-observer agreement (n.s.) (Table 4).
The most important finding of the present study was that the retrocalcaneal recess or pre-Achilles fat pad cannot be used as a diagnostic criterion if patients already underwent endoscopic surgery for retrocalcaneal bursitis in their history. The majority of radiographic images show no recovery of the normal appearance of retrocalcaneal recess or pre-Achilles fat pad several years after a successful treatment. Thus, a conventional lateral radiograph of the retrocalcaneal recess cannot be used to support clinical suspicion of a retrocalcaneal bursitis in the postoperative situation. An important finding was the low Cohen’s kappa value of 0.11, indicating a (very) low interobserver agreement. Regardless of the preoperative radiographic findings, this shows that the postoperative radiographic images cannot be interpreted equivalently by different observers. This strengthens the conclusion that the retrocalcaneal recess or pre-Achilles fat pad cannot be used as a diagnostic criterion after endoscopic surgery for retrocalcaneal bursitis. Hitherto the retrocalcaneal recess and pre-Achilles fat pad was studied as a diagnostic tool only before surgical treatment. (3,7,10,16) After Pavlov et al. and Heneghan et al. found an aberrant appearance on the lateral radiograph, van Sterkenburg et al showed that the digital lateral radiograph is a useful diagnostic tool for chronic retrocalcaneal bursitis prior to any surgery in that area. (3,7,10,16) The interobserver agreement of the preoperative radiographic images, studied previously, proved to be high, furthermore indicating the difference between the pre- and postoperative images after endoscopic calcaneoplasty. (16) Due to the low interobserver agreement it is not reliable to draw any conclusion regarding the possible correlation between the aspects of the retrocalcaneal recess and patient’s complaints as well as the

**Fig. 5.** Example of obliteration in pre-Achilles fat pad and retrocalcaneal recess: radiograph of the left hindfoot of a 20 year old female patient five years after she underwent endoscopic calcaneoplasty for retrocalcaneal bursitis. Four months after the procedure she was pain free, she did not report any discomfort ever since. The pre-Achilles fat pad is still showing a white, foggy appearance (white arrows). In addition the retrocalcaneal recess is obliterated.
correlation between follow-up time and the aspects of the retrocalcaneal recess. We found aberrant retrocalcaneal recesses in the majority of radiographic images. It is unsure what the exact cause of the obliteration is. It is known that the peroperatively used irrigation fluid will be absorbed through the blood circulation in the area over a period of weeks or months. Because the retrocalcaneal recess is the working space during arthroscopic procedures, formation of scar tissue is expected. We therefore assume that scar tissue formation causes the persisting obliteration of the retrocalcaneal recess. It appears that this tissue does not regenerate entirely to its original structure and the sharp contour therefore does not recur. Although some (six) patients had minor complaints none of the images showed an osseous (enlarged posterior calcaneal exostosis) cause for the symptoms; the obliteration was based on soft tissue infiltration. The major cause of persistent complaints after endoscopic exostosis removal is due to an inadequate resection.\(^\text{1,4-6,13,15}\) The chance of an inadequate resection can be minimized by the use of intraoperative fluoroscopy, the literature advocates this especially for surgeons less experienced with endoscopic calcaneoplasty.\(^\text{4-6,9,13,15}\)

Even though a lateral radiograph is not useful to support clinical suspicion of retrocalcaneal bursitis in the postoperative situation, it can be an important tool to exclude other pathologies in the hindfoot. In suspicion of a recurrence of the chronic retrocalcaneal bursitis, we would advise to make use of Magnetic Resonance Imaging (MRI) or Computer Tomography (CT) dependent on the radiographic findings. The authors’ advice MRI in case of symptomatic residual inflammation.

Possible limitations of this study include the size of the evaluated population. Not all patients who underwent endoscopic calcaneoplasty participated in this study. This may have lead to a selection bias, as it is unclear which patient (symptomatic or asymptomatic) will respond positively to an invitation for long-term follow-up study. In this study only patients who underwent endoscopic calcaneoplasty were included. However, as the pre-Achilles fat pad is manipulated significantly in open procedures for chronic retrocalcaneal bursitis or any other hindfoot procedure (open or endoscopic), it is expected that these also reveal obliterated radiographs long term postoperatively.\(^\text{11,12}\)

CONCLUSION

Based on the current study, it can be concluded that in case of a clinically suspected retrocalcaneal bursitis in patients who already underwent endoscopic calcaneoplasty for the same pathology, the appearance of the retrocalcaneal recess on a conventional lateral standing radiograph cannot be used as a reliable diagnostic criterion.
REFERENCES