Radiological characteristics of the calcaneal spurs in psoriatic arthritis

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ABSTRACT

Objective. Inflammation at the entheses is a distinguishing feature of psoriatic arthritis (PsA). Enthesitis at the heel is the most common location at the Achilles and plantar fascia insertions on the calcaneus. This study aimed to 1) describe the morphological features and measurements of plantar calcaneal spurs in subjects with PsA and controls and 2) determine radiological features that differentiate between inflammatory and non-inflammatory calcaneal spurs.

Methods. Weight bearing lateral foot radiographs of 101 subjects with PsA and 38 control subjects without inflammatory arthritis were examined for plantar calcaneal and Achilles spurs. Three measurements were taken from each radiograph: plantar spur base, mid-segment, and length in millimeters. The differences in radiographic measurements, and the presence of fluffy periostitis of the plantar spurs were then compared between PsA patients and controls.

Results. Of the 101 subjects with PsA, 76 (75%) had at least one plantar calcaneal spur and 32 (31.5%) had at least one Achilles tendon spur, compared to 18 (47%) and 3 (8%) respectively in control group (p=0.004). Fluffy plantar periostitis was identified in 14 PsA subjects and none of the controls (p=0.01). The dimensions of plantar spurs were significantly different between groups – longer mid-segment distinguished patients with PsA from controls.

Conclusion. Calcaneal spurs are more common in subjects with PsA than controls. Longer mid-segment measurement was associated with PsA. This study indicates that the presence of fluffy plantar periostitis and broad based and longer mid-segment dimensions are radiological features for inflammatory spurs.

Introduction

Inflammation at the enthesis is a distinguishing feature of psoriatic arthritis (PsA) (1). Enthesitis at the heel is the most common location occurring at either the Achilles or plantar fascia insertion on the calcaneus, and presenting with irregular spiculated bony proliferation. It has been suggested that the presence of erosions, and the often exuberant appearance of the calcaneal spurs, helps to distinguish inflammatory spurs which occur in spondyloarthritis including PsA, from those seen in patients with diffuse idiopathic skeletal hyperostosis (DISH) and osteoarthritis (OA) (2). Since patients with PsA may also have coexistent OA and DISH, it is important to identify differentiating features which would help to recognise those spurs related to the inflammatory process. There is little information on the characteristics of spurs occurring among patients with PsA.

This study therefore aimed to:
1. describe the morphological features and measurements of plantar calcaneal spurs on weight bearing lateral foot radiographs in subjects with PsA and controls
2. determine radiological features that differentiate between inflammatory and non-inflammatory calcaneal spurs.

Methods

Patient selection

Patients with PsA followed at the University of Toronto PsA clinic were recruited. Patients are followed at the clinic at 6–12 month intervals at which time a complete history, physical examination and laboratory assessments are carried out. Radiographs are taken every 2 years, including weight bearing lateral foot radiographs. Patients who were recorded as having spurs were identified.

Controls were patients without inflammatory arthritis who had foot radiographs taken for other indications. These included patients with osteoarthritis or orthopedic conditions.

Assessments

Weight bearing lateral foot radiographs were performed and examined for plantar and Achilles spurs. The presence of spurs was recorded by one observer (MA) who was instructed by DS, a musculoskeletal radiologist. A reliability study was not performed as it has been shown that spurs are recognised reliably by rheumatologists (3). Three measurements were taken from each radiograph: plantar spur base, mid-segment length, and length of the

Competing interests: none declared.
entire spur in millimeters as shown in Figure 1. The presence of fluffy periostitis was documented.

**Statistical analysis**
The differences in radiographic measurements, and the presence of fluffy periostitis of the plantar spurs were then compared between PsA patients and controls using t-tests and Chi-squared analysis.

**Results**
One hundred and one patients with PsA and 38 controls were included. Their characteristics are described in Table I. Of the 101 subjects with PsA, 76 (75%) had at least one plantar calcaneal spur and 32 (31.5%) had at least one Achilles tendon spur, compared to 18 (47%) and 3 (8%), respectively in control group (p=0.004). The presence of fluffy plantar periostitis was identified in 14 PsA subjects but in none of the controls (p=0.01) (Table II). The dimensions of plantar spurs were significantly different between groups (Table II). The base and mid segment of the spurs in PsA patients was wider than that in controls.

**Discussion**
Calcanei are the most common sites for bony spurs. In a study of 121 adults from a prehistoric hunter-gatherer population calcaneal spurs were scored as present or absent on the dorsal or plantar side and analysed in regards to their relationships with age, sex, osteoarthritis, cortical index, femoral head breadth and muscle markers (4). The study demonstrated that calcaneal spurs frequencies increased with age, and there was a positive correlation with osteoarthritis in both upper and lower limbs. Associations between the presence of calcaneal spurs and sex, body mass index, radiographic measures of foot posture, self-reported co-morbidities and current or previous heel pain were explored in a study of 140 women and 76 men aged 62-94 (5). Of the 216 participants, 119 (55%) had at least one plantar calcaneal spur and 103 (48%) had at least one Achilles tendon spur. Those with plantar calcaneal spurs were more likely to have Achilles tendon spurs. There was no gender effect but plantar spurs correlated with obesity and osteoarthritis.

When spurs are identified among patients with PsA the question is whether these are related to the underlying disease or are due to concurrent conditions such as DISH or OA. A recent study documented a relationship between plantar fasciitis and calcaneal spurs (6). A study comparing patients with plantar fasciitis with healthy controls found that calcaneal spurs were common in both groups, albeit more frequent in the plantar fasciitis group (85% vs. 46%). However, plantar fascia thickness and fat pad abnormalities resulted in the best group differentiation (p<0.0001) with sensitivity of 85% and specificity of 95% for plantar fasciitis (7). Our study provides further evidence that calcaneal spurs are associated with PsA. Although the frequency of spurs in the controls was high (at least one plantar spur occurred in 31.5% of the patients, it was significantly higher among the patients with PsA at 75%, similar to the differences noted by Osborne et al. who compared patients with plantar fasciitis to those without the clinical complaint (7). There was also a
Calcaneal spurs in PsA / D.D. Gladman et al.

Table I. Demographic features of patients and controls.

<table>
<thead>
<tr>
<th>Variable</th>
<th>PsA</th>
<th>Controls</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD) or frequency (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>n=101</td>
<td>n=38</td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>65 (64.4%)</td>
<td>15 (39.5%)</td>
<td>0.008</td>
</tr>
<tr>
<td>Females</td>
<td>36 (35.6%)</td>
<td>23 (60.5%)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>41.1 (10.8)</td>
<td>49.2 (14.7)</td>
<td>0.003</td>
</tr>
<tr>
<td>Obesity</td>
<td>42 (44.7%)</td>
<td>6 (46.1%)</td>
<td>0.92</td>
</tr>
<tr>
<td>DISH</td>
<td>4 (4.0%)</td>
<td>0 (0.0%)</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Table II. Spurs and their measurements in PsA and controls.

<table>
<thead>
<tr>
<th>Variable</th>
<th>PsA</th>
<th>Controls</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD) or frequency (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantar Spurs</td>
<td>n=101</td>
<td>n=38</td>
<td></td>
</tr>
<tr>
<td>Bilateral</td>
<td>76 (75.0%)</td>
<td>18 (47%)</td>
<td>0.0024</td>
</tr>
<tr>
<td>Unilateral</td>
<td>56</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Fluffy Plantar Spur</td>
<td>14 (8.4%)</td>
<td>0 (0.0%)</td>
<td>0.013</td>
</tr>
<tr>
<td>Achilles Spurs</td>
<td>32 (31.5%)</td>
<td>3 (8%)</td>
<td>0.004</td>
</tr>
<tr>
<td>Right Base</td>
<td>0.76 (0.30)</td>
<td>0.43 (0.14)</td>
<td></td>
</tr>
<tr>
<td>Left Base</td>
<td>0.70 (0.31)</td>
<td>0.54 (0.19)</td>
<td></td>
</tr>
<tr>
<td>Base*</td>
<td>0.71 (0.28)</td>
<td>0.46 (0.15)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Right Mid</td>
<td>0.52 (0.23)</td>
<td>0.23 (0.08)</td>
<td></td>
</tr>
<tr>
<td>Left Mid</td>
<td>0.49 (0.26)</td>
<td>0.26 (0.12)</td>
<td></td>
</tr>
<tr>
<td>Mid*</td>
<td>0.49 (0.22)</td>
<td>0.23 (0.09)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Right Length</td>
<td>0.45 (0.24)</td>
<td>0.46 (0.18)</td>
<td></td>
</tr>
<tr>
<td>Left Length</td>
<td>0.45 (0.24)</td>
<td>0.42 (0.17)</td>
<td>0.57</td>
</tr>
</tbody>
</table>

*Base, Mid and Length is based on the unilateral measurement and if bilateral then an average of the left and right measurement was taken.

References
4. WEISS E: Calcaneal spurs: Examining etiology using prehistoric skeletal remains to understand present day heel pain. Foot (Edinb) Online 2012/05/03.