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Neuropathic pain may be common in chronic lower limb tendinopathy: a prospective cohort study

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Abstract

Background: To identify the prevalence of neuropathic pain, through the use of the painDETECT questionnaire, in a cohort of patients with chronic lower limb tendinopathy conditions.

Methods: Patients with chronic lower limb tendinopathy conditions treated within a Sport and Exercise Medicine hospital clinic were identified from clinical records. At the time of the clinical consultation, pain and painDETECT scores were recorded.

Results: In total, 282 suitable patients with chronic lower limb tendinopathy conditions were identified who had completed a painDETECT questionnaire. There was a median age of 51.9 years, 35% of patients were male and a median duration of symptoms of 24.0 months. There was a median score of 7.0/10 for self-reported 'average' pain and 8.0/10 for self-reported 'worst' pain. There was a median painDETECT score of 14.0, 28% of respondents scored 19 or higher with painDETECT (neuropathic component to pain may be likely), 29% scored 13–18 (equivocal result) and 43% of respondents scored 12 or less (neuropathic pain component was unlikely).

Conclusions: This study suggests that neuropathic pain as identified by the painDETECT questionnaire may be common in patients with chronic lower limb tendinopathy conditions. It is unclear if patients with tendinopathy who have neuropathic pain may have poorer outcomes from initial treatments, contributing to the high proportion seen in secondary care. These are results from a single hospital clinic, and comparison with a control group is currently lacking. However, on the results to date, neuropathic pain should be considered in management strategies in patients with chronic tendinopathy.

Keywords

Tendinopathy, questionnaire, chronic, diagnosis, soft-tissue

Introduction

Lower limb tendinopathy conditions are common conditions causing a great deal of patient morbidity. This review will focus primarily on four specific tendinopathy, or tendinopathy-like, conditions: greater trochanteric pain syndrome (GTPS), which is also known as 'trochanteric bursitis'; non-insertional (mid-substance) Achilles tendinopathy (Mid-AT); insertional Achilles tendinopathy (Insertion-AT); and plantar fasciitis (PF) with some information for quadriceps tendinopathy and patellar tendinopathy which are far less common conditions presenting in the United Kingdom.

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Achilles tendinopathy (AT) is a degenerative condition affecting the Achilles tendon and is thought to represent a failed healing response. Two distinct anatomical locations of AT are described, the commoner site is in the mid-portion of the Achilles tendon with maximal pain and swelling occurring between 2 and 7 cm proximal to the calcaneal attachment.[1] A less common sub-type affects the insertion of the Achilles tendon into the posterior aspect of the calcaneus.[2] Patellar tendinopathy is a similar degenerative tendinopathy affecting the patellar tendon, the terminal portion of the knee extensor mechanism group.[3–5] The processes involved in the development of tendinopathy between these two sites, and other sites, are thought to be similar.[6,7]

GTPS is thought to include components of insertional tendinopathy of the gluteal muscles at the greater trochanter, and the focus of recent work has moved away from the bursa being the primary source of pathology or pain and more towards the gluteal tendons, especially gluteus medius.[8–10]

The plantar fascia is a band of connective tissue in the sole of the foot originating at the medial process of the tuberosity of the calcaneus and inserting in slips to the proximal phalanxes, and it has a role in supporting the longitudinal arch of the foot, but also has roles in proprioception and peripheral motor coordination, containing both Pacini and Ruffini corpuscles and nerve endings.[11] The plantar fascia can develop a degenerative thickening process associated with pain, called plantar fasciitis (PF), with myxoid degeneration associated with areas of proliferation of fibroblasts and increased vascularity similar to that seen in tendinopathies.[12–15] Hence, while anatomically PF is not strictly a tendinopathy, its insertion into bone is very similar to an insertional tendon, its degenerative processes similar to those of a tendinopathy, and the effective treatments used are very similar to those in tendinopathy management and for the purposes of this review will be considered similar, if not the same, as a tendinopathy.

GTPS, AT (both non-insertional and insertional) and PF are all common conditions; GTPS and AT both have an incidence of about 1.8–2.3/1000 adults, and there may be a lifetime risk of about 10% of developing PF.[15–17] Furthermore, these conditions account for a large number of healthcare consultations in both primary and secondary care settings, with PF alone accounting for about 1 million healthcare consultations each year in the United States.[18] and trochanteric pain accounting for 20% of referrals to some orthopaedic spinal centres.[19] These four conditions most commonly affect people between 40 and 60 years, affecting women slightly more than men, and have a wide range of risk factors, including activity, or lack thereof; obesity; lower limb flexibility and multiple genetic factors.[8,20–22] While less common in sedentary populations than other tendon conditions, patellar tendinopathy is relatively common in athletes involved in sports with sprinting or jumping/landing components and was previously known as 'jumpers knee'.[4,23] Patellar and quadriceps tendinopathies are both commoner in younger populations than some other tendon conditions, with athletes in one study having a mean onset of patellar tendinopathy symptoms at age 23.8 years (range: 16–47).[24]

While many patients with these conditions will improve with conservative treatments, up to a third of patients with tendinopathy will continue with symptoms beyond 12 months.[16,25,26] While the risk factors for the development of these conditions has been studied, it is not clear from the published evidence what risks may predispose an individual to chronic symptoms.

A wide range of treatment options are available to treat these conditions, which conceptually address nociceptive pain as well as functional impairment. These may include tension night splints (TNS);[27,28] guided injections – including high-volume image-guided injections (HVIGI) and autologous blood injections (ABI);[29–31] extra-corporeal shockwave therapy (ESWT);[32] or in recalcitrant cases, surgery.[33–35]

Neuronal regulation is thought to play a vital part in tendon homeostasis and the presence of neuropathic pain in chronic tendinopathies has been proposed.[36,37] Vasculo-neural ingrowth into chronic tendinopathy has been proposed as a cause of pain, and tendinopathy has been associated with a local increase in a range of neurotransmitters, including glutamate, as well as an increase in substance-P positive nerve fibres, but mixed results have been found and no consistent answer is yet identified.[38–41] While the presence of neuropathic pain in chronic tendinopathy has been proposed, the prevalence of neuropathic pain has not yet been studied in detail in clinical populations with tendinopathy.

Neuropathic pain is a result of damage or disease affecting the somatosensory system. While questionnaires may raise the possibility of neuropathic pain, it is primarily diagnosed clinically from its typical characteristics of pain sensation and distribution and specific guidelines for the assessment of neuropathic pain have been proposed.[42–45] Neuropathic pain is associated with higher ratings of pain intensity, as well as a greater number and severity of co-morbidities; it is a predominant feature of more than a third of patients with low back pain and is often underdiagnosed in a range of musculoskeletal conditions.[42,46,47] By identifying and addressing neuropathic pain components, improved outcomes may be possible.[42,48]

The painDETECT questionnaire is a patient completed questionnaire, which is validated across a number of settings at identifying the presence of neuropathic

pain with high sensitivity, specificity and positive predictive value.[46,49,50] This gives a score between 0 and 38, with a response of 0–12 meaning that a neuropathic pain component is unlikely (<15%), a score of 13–18 giving an equivocal result and a score of 19 or more meaning that a neuropathic component is very likely (>90%). The painDETECT questionnaire alone cannot in and of itself diagnose neuropathic pain, as this is a clinical diagnosis; however, it can give a strong indication as to its presence based on the score achieved.

Currently, the prevalence of neuropathic pain in patients with chronic tendinopathy remains unknown, and this study seeks to identify the prevalence of neuropathic pain symptoms in a cohort of patients with chronic lower limb tendinopathy who are accessing a secondary care clinic.

Methods

Procedure logs were examined from a single hospital Sport and Exercise Medicine Department in order to identify patients who were referred with a chronic lower limb tendinopathy condition. These patients were being treated for symptoms that had not settled with simple conservative management options, and further treatments included various guided injection procedures, TNS (PF and mid-substance AT) and ESWT. The diagnosis of chronic tendinopathy was made by a single National Health Service (NHS) consultant specialising in musculoskeletal conditions on the basis of clinical assessment, the exclusion of other differential diagnoses and with the use of supporting investigation modalities, most typically ultrasound. At the time of the treatments conducted, patients completed a series of questionnaires about pain and function, including 0–10 self-rated figures for their 'average' pain and their 'worst' pain, as well as the painDETECT questionnaire.

Statistical analysis

Anonymised data from the procedure logs were inputted into a bespoke Excel spreadsheet (MS Excel for Mac 2011 v 14.5.8). From this group, averages (means and medians) were calculated for patients with the conditions studied, as well as overall group averages for the cohort as a whole. The majority of the data collected (age, pain score and painDETECT score) were numerical scale data. This was analysed through SPSS (v22). As the sample sizes were relatively small, the Shapiro–Wilk test was used to assess normality. The majority of the data were found not to be normally distributed; therefore, median and interquartile range (IQR) figures are displayed and non-parametric testing was used for analysis. The most common tests used were the independent-samples median test, independent-samples Kruskal–Wallis test for distribution, analysis of variance (ANOVA) testing between groups and Spearman's rho correlation testing between factors. Statistical significance was set at $p < 0.05$.

Ethics approvals

Some of the patients were participating in one or more ongoing studies within the Sports Medicine Department with necessary ethical permissions. This project, which compares anonymised data across different conditions, is registered as a clinical audit with the hospital Trust and additional formal ethics approvals were not required.

Results

Patient demographics

A total of 282 patients with chronic lower limb tendinopathy and tendinopathy-like conditions who had completed a painDETECT questionnaire were identified from interventional procedure logs at a single hospital Sports Medicine Department from September 2014 to June 2016. This cohort comprises 126 patients with PF, 36 with Insertion-AT, 31 with mid-substance (or non-insertional) AT, 10 with patellar tendinopathy, 4 with quadriceps tendinopathy and 75 with GTPS. All these patients had previously tried simple conservative management options, including physiotherapy rehabilitation exercises, and were attending further interventional procedures, including guided injections and ESWT.

The patients had a median age of 51.9 years (IQR: 44.0–61.8), and overall, 35% were male and 65% female. There appeared to be an increased proportion of male patients with both patellar tendinopathy and quadriceps tendinopathy compared to the other conditions. However, subject numbers for these two conditions make analysis unreliable and differences were calculated with this limitation identified. For the whole cohort, there was a mean duration of symptoms of 24.0 months (IQR: 12.0–36.0) at the time of baseline assessment.

The majority of patients was recreationally active only, rather than competitive athletes. Using the short-form International Physical Activity Questionnaire (IPAQ), this group was found to have median values of 0 minutes of either vigorous or moderate activity, 130 minutes of walking and 5 hours of sitting on a week-day. However, these figures represent the week before assessment and will have been influenced by their painful tendinopathy for which they were attending treatment.

Table 1. Demographic information for patient cohort.

	Number of male: female respondents	% male	Median (IQR) age	Median (IQR) duration of symptoms in months
Greater trochanteric pain syndrome (n = 75)	14:61	19%	62.0 (48.8–69.4)	30.0 (18.0–48.0)
Quadriceps tendinopathy (n = 4)	3:1	75%	36.2 (33.0–41.9)	36.0 (31.5–42.0)
Patellar tendinopathy (n = 10)	9:1	90%	41.8 (37.3–43.1)	15.5 (11.3–22.5)
Mid-substance Achilles tendinopathy (n = 31)	13:18	42%	48.3 (41.9–52.6)	21.0 (15.3–28.5)
Insertional Achilles tendinopathy (n = 36)	16:20	44%	57.1 (48.2–62.4)	18.0 (12.0–30.0)
Plantar fasciitis (n = 126)	43:83	34%	50.2 (42.7–58.0)	24.0 (15.8–36.0)
All patients (n = 282)	*98:184*	*35%*	*51.9 (44.0–61.8)*	*24.0 (12.0–36.0)*

IQR: interquartile range.

Table 2. Pain scores for patient cohort – figures are median (IQR).

	Patient's self-reported 'average' pain/10 median (IQR)	Patient's self-reported 'worst' pain/10 median (IQR)
Greater trochanteric pain syndrome (n = 75)	7.0 (5.0–8.0)	8.0 (7.0–9.0)
Quadriceps tendinopathy (n = 4)	5.0 (4.0–6.0)	7.5 (6.5–8.3)
Patellar tendinopathy (n = 10)	6.0 (5.0–6.0)	7.5 (6.3–8.4)
Mid-substance Achilles tendinopathy (n = 31)	6.0 (5.0–7.0)	8.0 (7.0–9.0)
Insertional Achilles tendinopathy (n = 36)	6.5 (5.0–7.6)	8.0 (7.0–9.0)
Plantar fasciitis (n = 126)	7.0 (5.5–8.0)	9.0 (7.5–10.0)
All patients (n = 282)	*7.0 (5.0–8.0)*	*8.0 (7.0–9.0)*

IQR: interquartile range.

Table 1 displays the demographic information for the patient cohort sub-divided by condition. Average figures where displayed are median and IQR, apart from the proportion of male/female respondents.

Subject numbers for patellar and quadriceps tendinopathies were very limited, making reliable analysis more difficult. There were significant differences between different conditions for the age of respondents ($p < 0.001$), the duration of symptoms ($p = 0.008$) and for the gender ($p = 0.035$). Even by excluding the figures for quadriceps and patellar tendinopathies, the significant differences between groups remained ($p < 0.05$).

Self-reported pain scores

Patients self-reported a 0–10 pain score (often called a visual analogue scale, but more accurately called a numerical rating scale) for their level of 'average pain'. In addition, using the same scale, patients self-reported their level of 'worst pain' that they had suffered from their condition recently, in order to cover the natural variability of their symptoms. Across the whole cohort, there was a median score of 7.0/10 (IQR: 5.0–8.0) for the patients 'average' or typical pain, and a 'worst pain' score of 8.0/10 (IQR: 7.0–9.0). Figures are given in Table 2 for both self-reported 'average pain' and 'worst pain' scores by condition, and as the data were not normally distributed, median figures and IQR are displayed.

There was no statistically significant difference found between the groups for the 'average pain' or the 'worst pain'.

Neuropathic pain

Patients were also asked to complete the painDETECT questionnaire at baseline to identify the presence of neuropathic pain. In total, 282 patients completed this questionnaire during the study period, with a median value 14.0 (from a maximum of 38) and an IQR of 8.0–19.0.

In total, 43% (n = 122/282) scored 12 or less on the painDETECT questionnaire indicating that a neuropathic component to their pain was unlikely. A further 29% (n = 82/282) scored between 13 and 18 giving an equivocal result about the presence of neuropathic pain and 28% (n = 78/282) of all respondents scored 19 or higher indicating a neuropathic component was very likely with their pain.

Table 3 gives a breakdown of the median scores and proportions in these lower limb tendinopathy conditions studied.

Overall, there were no statistically significant differences in painDETECT scores between the different

Table 3. PainDETECT scores for different conditions.

	painDETECT (PD) median score (IQR)	Neuropathic pain unlikely (PD = 0–12)	Equivocal (PD = 13–18)	Neuropathic pain likely (PD = 19–38)
Greater trochanteric pain syndrome (n = 75)	14.0 (7.0–20.0)	45%	24%	31%
Quadriceps tendinopathy (n = 4)	8.5 (6.0–12.0)	75%	25%	0%
Patellar tendinopathy (n = 10)	11.0 (9.3–14.0)	60%	30%	10%
Mid-substance Achilles tendinopathy (n = 31)	14.0 (9.5–18.5)	39%	35%	26%
Insertional Achilles tendinopathy (n = 36)	15.0 (12.0–19.0)	28%	44%	28%
Plantar fasciitis (n = 126)	13.5 (8.0–19.8)	45%	26%	29%
All patients (n = 282)	*14.0 (8.0–19.0)*	*43%*	*29%*	*28%*

IQR: interquartile range.

conditions from the data available, ($p = 0.104$). Although there appears to be a difference between patients with quadriceps or patellar tendinopathies and the remainder of the groups, this difference did not reach statistical significance but this may have been influenced by the small numbers for these two conditions.

There were statistically significant, although weak, correlations between the 'average pain' on a 0–10 pain scale and the score from the painDETECT questionnaire (correlation coefficient (r_s) = 0.357, $p < 0.01$) and between the 'worst pain' and the painDETECT score ($r_s = 0.374$, $p < 0.01$). There was no statistically significant correlation between the painDETECT score and duration of symptoms in this population.

There was no correlation between age of respondent and painDETECT score or 'average pain'; however, a very weak negative correlation was found between the age and the self-reported 'worst pain' ($r_s = -0.169$, $p = 0.005$).

There were no differences found between duration of symptoms, self-reported 'average' pain, self-reported 'worst' pain and painDETECT score between male and female respondents for patients with the same clinical condition.

Discussion

This work has used the painDETECT questionnaire to identify the presence of neuropathic pain and this questionnaire has been validated in patients with conditions such as low back pain and fibromyalgia.[46,49,50] This questionnaire has not previously been used in a population of patients with tendinopathies and has not been specifically validated in this clinical population. However, the questions in the painDETECT questionnaire are not site-specific, and it is thought that extrapolating this questionnaire to patients with tendinopathy conditions is a valid use of this questionnaire. While questionnaires such as painDETECT may not be able to 'diagnose' neuropathic pain, it is able to act as a screening tool for its presence with high-levels of specificity and sensitivity.[42,45] Its use in this manner can therefore alert the treating clinician to its possible presence.

This work has included patients with 'true' tendinopathy conditions (mid-substance Achilles and patellar tendinopathy), insertional tendinopathy conditions (insertion-AT), as well as conditions not traditionally thought to be true tendinopathies (GTPS and PF) and this is open to discussion. However, there are tendinopathy-like features of both GTPS and PF, including common proposed causalities, common features demographically and similar effective treatments and management strategies. Therefore, directly comparing the presence of neuropathic pain between these similar, if not the same, group of conditions was judged to be reasonable; however, figures are given for specific condition in this series for easy sub-group analysis.

This study is the first to be published using the painDETECT questionnaire to investigate the prevalence of neuropathic pain in patients with chronic lower limb tendinopathies. This study found that when using the painDETECT questionnaire as a tool, neuropathic pain was thought to be unlikely in just under half (43%) of patients, and in one-quarter (28%), neuropathic pain was thought to be likely. This compares to studies that show between one-third and one-half of patients with low back pain have a neuropathic component to their symptoms.[46,51] As could be expected, there was found to be a correlation between self-reported pain scores and painDETECT questionnaire score, with previous work demonstrating that patients with neuropathic pain have more intense pain than those without.[46] There was no correlation found between painDETECT questionnaire and duration of symptoms; however, as only chronic conditions were

included, this may have been influenced by selection bias. There was also a very weak negative correlation between age and 'worst pain' on a 0–10 scale and any clinical significance of this remains unclear.

These data are from a single NHS hospital Sports Medicine Department and further work is required to see whether these findings are replicated in other settings. Ideally, a cohort of patients presenting in primary care with symptoms to investigate painDETECT values at first presentation rather than more chronic cases and to see whether the score from this questionnaire could correlate to outcomes from initial treatments and natural history. Furthermore, the low numbers during the data collection period of patients with patellar and quadriceps tendinopathies inhibit firm conclusions; however from the data available, there appeared to be the possibility of differences between patellar and quadriceps tendinopathies (increased male patients, lower average painDETECT scores) compared to the other conditions studied, and a differing age/gender distribution for these conditions is in line with previous works. However, the low subject numbers for these conditions in this series prevented reliable comparisons, and this could be a focus of further work.

The high positive predictive value of the painDETECT found in other studies suggests that neuropathic pain components may be present in a proportion of patients with chronic lower limb tendinopathies in this series. Previous work has suggested that patients with neuropathic pain may receive less benefit from interventions, unless their neuropathic pain is considered within their management plan.[42] Further work therefore needs to be done to assess whether the same is true with patients with a neuropathic pain component to their chronic tendinopathy symptoms and whether this may be predictor of worse outcome following different tendinopathy interventions. If this is found to be true, then specific treatment algorithms will need to consider the presence of neuropathic pain and factor this into management pathways for optimal patient benefit.

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