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What activities do patients with patellar instability perceive makes their patella unstable?

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ABSTRACT

Patellar instability is a disabling musculoskeletal condition. Whilst previous texts have suggested that twisting activities may cause patients to experience instability symptoms, no studies have assessed which activities are related to the patient's perceived instability. The purpose of this study was to determine which activities and with what frequency patients with patellar instability symptoms, perceive their patella to be unstable. Ninety patients referred because of recurrent patellar instability were asked to assess the frequency with which they perceived patellar instability for 19 everyday and sporting activities. The results indicated that sporting and multi-directional twisting activities were more frequently related to patellar instability symptoms, compared to lower energy, uni-planar activities. Females and those without a family history of patellar instability reported more frequent patellar instability symptoms, compared to males, or those with a family history of this disorder. Further study is now recommended to determine whether these results reflect that of patients with milder subluxation disorders, and whether factors such as hypermobility have an impact on perceived patellar instability for this patient group.

1. Introduction

Patellar instability is a painful and disabling musculoskeletal condition. The term patellar instability encompasses those patients who have experienced patellar dislocation, subluxation or general instability symptoms [1,2]. Patellar instability most commonly presents in young and physically active people [3,4] with an estimated incidence of 43 per 100,000 [5]. It can be a longer-term condition. Recurrent patellar dislocation events, where the patella fully disengages from the trochlear groove, with a total loss of joint contact between the patella and the femoral articular surface [6] occurs in 15% to 45% of patients following the conservative management of a first time patellar dislocation [7–9]. Furthermore, 20 to 40% of patients following a first time patellar dislocation may suffer the milder complaint of recurrent subluxation where only part of the patella is displaced within the femoral sulcus, ensuring that not all of the articular surface disengages from the trochlear groove [7–11].

Previous authors have suggested that a lateral patellar dislocation commonly occurs when the knee is partially flexed with the quadriceps contracting, such as during turning and twisting motions whilst trying to run [1,12]. The literature has previously suggested that activities such as twisting, stairs descent, and walking on uneven surfaces, may cause these patients to experience instability symptoms [13–15]. However, no studies have been undertaken to validate these hypotheses. The objective of this epidemiological study was therefore to address this limitation in our understanding of the pathophysiology and to determine with which activities patients with patellar instability perceive their patella to be unstable.

2. Materials and methods

2.1. Design

A survey study design was adopted in order to determine which activities cause patellar instability symptoms for a sufficiently large and representational sample of patients who experience patellar instability symptoms.

The study consisted of three parts. First, a pilot study was undertaken to assess the questionnaire used to survey this cohort. Secondly, an assessment of the intra-subject reliability of the post-pilot questionnaire was conducted. Finally, an assessment of the activities and frequency to which activities are perceived as causing patellar instability using this examined questionnaire.

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2.2. Patients

A total of ninety patients were recruited from 10th November 2008 to 11th November 2009 from the Orthopaedic and Physiotherapy departments at the author's institution. Patients were eligible if they were aged 11 years and over with no upper age limit, and had been diagnosed by a musculoskeletal physiotherapist or orthopaedic surgeon with patellar instability. For the purposes of this study, patients were diagnosed as having patellar instability if they reported two or more episodes where their patella either dislocated, or that they could recount multiple episodes of subluxation-symptoms where they felt that their patella was going to dislocate laterally; and that they presented with at least one of the following signs and symptoms of patellar instability:

(1) a positive patella apprehension test
(2) tenderness along the medial retinaculum
(3) abnormal patellar tracking or position e.g. lateralised, tilted, excursion such as a positive J-sign.

The justification of not requiring patients to exhibit all three criteria was based on the fact that there remains a dearth of evidence assessing the sensitivity and specificity of the physical examination tests for patients with patellar instability, reducing the confidence to which such tests should be used to identify the target sample [16]. Similarly, tests such as medial retinaculum tenderness and positive apprehension may also vary according to the time since the most recent episode of a frank patellar dislocation or subluxation event. However, these criteria are widely used in clinical trials assessing this population [17–20], and therefore appear to be the most appropriate means to identify this population. Patients who did not satisfy these eligibility criteria were not included in the survey.

All patients were required to be able to read and write English, and provide informed written consent.

The estimation of 90 participants was made to ensure that a satisfactory level of responses would be obtained to answer the research questions. We were unable to base the sample size of this study on a power calculation since this was the first time that the constructed questionnaire had been employed, and therefore we do not have prior standard deviation or standard error data required to conduct such a calculation [21,22].

The sampling strategy was stratified by age, where 30 subjects aged 11 to 15 years, 30 subjects ages 16 to 24 years, and 30 subjects aged 25 years and older were recruited. To ensure a representation of males and females reflecting the greater prevalence of patellar instability in female populations [14,23,24], we stratified each group by gender, recruiting 9 females, and 6 males for the pilot and reliability parts of this study, and 36 females and 24 males for the principle part of this survey. The study pathway is presented in Fig. 1.

2.3. Questionnaire

Each recruited patient completed a formal self-administered questionnaire which consisted of a list of 19 activities. These activities were identified through two methods. First, a systematic review was undertaken to assess what activities have been previously attributed to causing patellar instability symptoms. This was conducted through a search of the databases AMED, CINHAL, EMBASE, MEDLINE via Ovid, as well as a search of the Cochrane Library, Physiotherapy Evidence Database (PEDro) and Scopus databases using the terms "patella$" AND "disloc$" or "sublux$" or "instab$" AND "symptom$" or "patient reported" or "activit$" or "limit$". Secondly, anecdotal evidence from the researchers gained from previous patient's reports of symptomatic activities were also used to construct the list of potentially relevant activities.

To grade the activities, a Likert scale was adopted to allow patients to respond with either 'always', 'often', 'sometimes', 'rarely' and 'never'. Each patient was asked for each activity, to indicate how frequently they felt that their knee cap felt unstable and likely to "pop out" when participating in each described activity. Space was provided to allow patients to identify any additional activities previously omitted. Two versions of the questionnaire were constructed: one for patients over and one for patients under 16 years of age. The adult version included one question assessing whether turning a shopping trolley around a supermarket aisle caused patellar instability, which we considered may be less applicable to younger patients. Earlier activities were more sedate activities of daily living, whereas the latter activities were more physically demanding, sporting tasks. Each questionnaire took approximately 2 min to complete, and was completed either in the clinic, or at home as determined by the patient.

Data was also collected on patient family history of patellar instability, and their Contompasis hypermobility score was measured by the principal researcher before the questionnaire was completed [4,25]. These two factors have been suggested as potentially important prognostic indicators in previous cohorts evaluating patellar instability [13,14,26–29]. For the purposes of this study, family history was defined as a history of patellar dislocation or multiple subluxation events recalled by the patient, including both immediate and distant family members.

A pilot study consisting of the first 15 consecutive patients enrolled was conducted. Following this, the intra-subject reliability of the questionnaire was assessed with the next consecutive group of 15 patients. Each patient was provided with two copies of the questionnaire and asked to complete and return these with a one week interval between each. This allowed an assessment of the intra-subject reliability for 20% of the sample.

Ethical approval was granted from the institution's ethical review board.

2.4. Plan of analysis

The primary analysis assessed which activities caused patients with patellar instability to perceive instability symptoms. The secondary analysis determined the relative frequency these activities caused the symptoms. This was performed by converting the Likert scale results into numerical scores of always (4), often (3), some of the time (2), rarely (1), never (0). Mean, standard deviation and frequencies of each response of the converted Likert scale scores was made. Using the mean scores, we were able to rank the questions to determine which activities were the most, and the least aggravating in causing patellar instability in this cohort. Through these descriptive statistics, sub-group analysis of the differences in responses between males and females, those with a family history of patellar instability, to those without, and those who were hypermobile (Contompasis score $\geq$ 59) in comparison to those who were not (Contompasis score of 22) was conducted.

To assess intra-subject reliability, first and second questionnaire results were compared using weighted kappa statistics for this discrete data [30].

All analyses were performed on Statistical Package for the Social Sciences (SPSS) 16.0 (SPSS Inc, Chicago, Illinois).

3. Results

3.1. Cohort

All 90 patients who were approached to participate in the survey completed and returned the questionnaire. The demographics of these participants is summarised in Table 1. This indicated that the majority of those surveyed had no family history of patellar instability. Mean Contompasis hypermobility score was low, indicating that the cohort was largely not hypermobile. Only 16 patients presented with a Contompasis