Test-retest reliability of cuff pressure pain algometry in patients with knee osteoarthritis

Sirs,

Knee osteoarthritis (OA) is characterised by pain, yet the underlying mechanisms of OA pain are unclear. Knee OA patients may have a sensitised nociceptive system (1, 2), which may contribute to chronification of pain and encumbering treatment.

In order to explore these aspects of knee OA pain, reliable and feasible tools to assess pain sensitivity are important. Pressure pain algometry can be used for this purpose and reflects deep tissue nociception (3). People with knee OA have lower pressure pain thresholds (PPTs) compared to healthy controls at both affected and unaffected sites (1), suggesting central sensitisation of knee OA pain.

To assess pain sensitivity computerised cuff pressure algometry (CPA; Fig. 1) has been developed (4, 5). A double chamber tourniquet cuff is wrapped around the calf at the bulky part of the gastrocnemius muscle of the lower leg of the most symptomatic knee. A computer controlled compressor inflates the cuff with air at 1 kPa/s until the patient reports the first sensation of pain by pressing a push-button (4). The recorded pressure defines the PPT measured in kPa. The operator dependency of CPA is minimal, as only the cuff mounting and instructions are operator dependent. However, the reliability of the CPA has not been established in patients with knee OA. The purpose of this study was to assess the reliability of the CPA in patients with knee OA. A test-retest design was chosen to evaluate the stability of two CPA measurements separated by one week. At each visit the PPT was recorded 3 times, separated by at least 60 seconds, and averaged.

Reliability was assessed by intra-class correlation coefficients (ICCs) (6). The ICC can range from -1 to 1 with criteria for clinical acceptability suggested as: ICC<0.40 'poor reliability'; 0.40>ICC<0.75 'fair to good' reliability; and ICC>0.75 'excellent' reliability (7). Further, we calculated the measurement error (ME) from the square root of the mean square error term obtained from the two-way random effects ANOVA used to calculate ICC.

Twenty-five patients with knee OA met the eligibility criteria and had a mean (SD) age of 63.4 (8.3) years and BMI of 28.7 (4.3) kg/m^2. The mean (SD) disease duration was 11.4 (8.0) years and the median radiographic disease severity (Kellgren-Lawrence grade) was 3 (range: 1–4). The mean PPT was 15.6 kPa (SD 4.7) and 15.3 kPa (SD 3.7) at test and retest, respectively (no systematic difference; p=0.71). The ICC was 0.72 (95% CI 0.64–0.87) and the ME was 2.2 kPa.

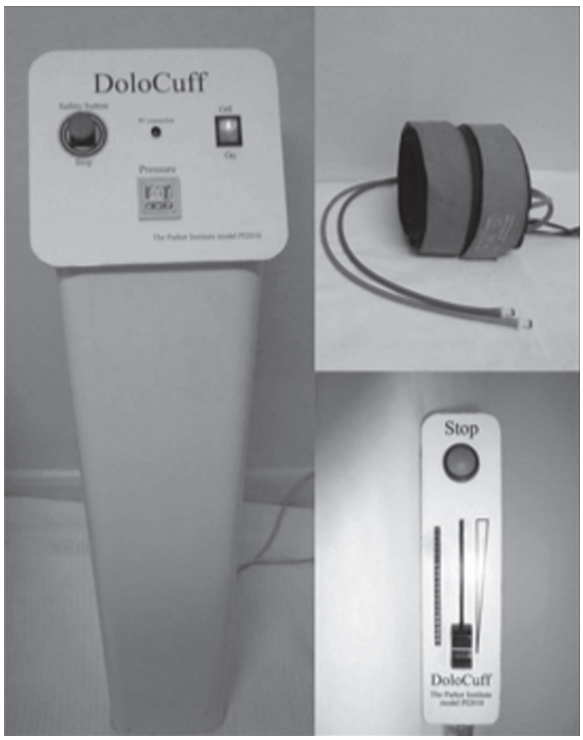

Fig. 1. The computerised cuff pressure algometer (CPA), including compressor and control panel, inflatable cuff, and a stop-button with integrated visual analogue scale.

The results show that there were no systematic difference between test and retest. The ICC of the CPA was 0.72 approaching the suggested threshold of 0.75 to obtain a label of "excellent reliability" (7). Further, the lower 95% CI of the ICC was 0.64, which does not fall below the suggested threshold for "poor reliability" (ICC<0.40). Therefore the reliability of PPTs obtained with the CPA on the calf in patients with knee OA can be considered as being "fair to good" (7). The ME of the CPA was 2.2 kPa. Whether this is a small or large ME is not clear as no knowledge about clinically relevant changes is available.

These results compare very well with a recent systematic review which indicates that PPT measurements are generally stable and reliable within a 7 day frame (1) and are useful for studies using pressure pain sensitivity assessed from CPA as an outcome.

In conclusion, CPA on the lower leg of the most symptomatic knee is a reliable tool to assess pressure pain sensitivity in patients with knee OA. However, there is a need for identifying clinically relevant thresholds for treatment response.

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