Pressure algometry

Description

Pressure pain threshold (PPT) is defined as the minimal amount of pressure that produces pain. A simple hand-held pressure algometer (PA) with a spring is commonly used, although more sophisticated electrical devices with a strain or pneumatic pressure gauge have been developed. They hold the peak force or pressure (kp (kilopond) = 10 N, Newton = 100 kPa (kilopascal)) until tared, and some may also be connected to a computer and thus have continuous output. PPT measured with a probe 1.6 mm in diameter or larger reflects the tenderness of deep tissues as anesthesia of skin only affects the results of smaller probes (Takahashi et al 2005). The most commonly used surface area of probes is 0.5 or 1 cm^2. Rolke et al (2005) compared hand-held spring and electronic PAs and found no significant difference for clinical purposes. The PA is placed perpendicular to the tissue surface and pressure applied steadily at a constant rate. Reported pressure application rates have ranged from 0.05 to 20 N/s (Jensen et al 1986). Higher PPT scores were recorded at higher application rates. Ideally compression should be performed slowly enough to allow the subject time to react when pain is felt. When the subject reports feeling pain the action of pressure is stopped, or to avoid delay by the tester, by pressing a switch on an electronic PA.

Commentary

PAs have been marketed for diagnostic purposes in clinical practice since neuromuscular conditions are often associated with mechanical hyperalgesia. However, pressure algometry is not a diagnostic tool for differentiating soft tissue pathology from other conditions, as several factors, eg disc prolapse, joint luxation, and bone fracture, may increase the local tenderness of soft tissues. Tenderness may vary greatly in painful body parts and there are often several sensitive sites. Pain may be also referred. Taking numerous measurements over local and referred pain areas would be time consuming. Thus, the PA is not helpful in finding these points. Such points can be located in the clinic simply by manual palpation, as no tools for finding them exist even with recent advances in diagnostic imaging. However, manual palpation is not able to quantify the tenderness of these sites. Pressure algometry may be used to study the amount of tissue tenderness, once the right measurement site has been identified.

Pressure algometry has been recommended for clinical practice on the basis of good repeatability when expressed by intraclass correlation coefficients (ICC) results. However, the ICC lacks sensitivity to systematic changes, such as incremental improvements, or deterioration due to repeated testing. Moreover, ICCs have been shown to range from 0.43 to 0.94 for patient populations and only slightly better correlations have been obtained among healthy subjects (Ylinen et al 2007). The considerable variation in ICCs may depend on several factors such as different measurement sites, small study populations, and the experience of the tester. Fischer (1988) suggested that a compression force equivalent to more than 20 N between a painful site and a corresponding normal site is clinically significant and indicates the presence of hyperalgesia. Equivalent results have been obtained in other studies when analysing intratester measurement error, coefficient of repeatability, and variation (Nussbaum and Downes 1998, Smidt et al 2002, Ylinen et al 2007).

PPT show large inter-individual variability in healthy subjects (Fischer 1988, Rolke et al 2005). Therefore, no normative values have been established outside of which pathology could be identified reliably and case-control studies also have shown inconsistent results (Farasyn and Meeusen 2005, Schenk et al 2007). Pressure algometry has been shown to have good validity when assessed by pain and disability questionnaires (Goolkasian et al 2002, Wlodyka-Demaille et al 2002) and, since it assesses a different aspect of pain, may be warranted in addition to other measures. Tenderness varies greatly at different sites of the same body part also in healthy subjects, but studies have shown no difference in PPT between right and left sites in homologous body regions (Fischer 1987, Prushansky et al 2004). Thus, the healthy side may be used as a normal reference in unilateral painful conditions. Pressure algometry has been claimed to be an objective measure. However, although a quantitative measure, it is nevertheless a subjective measure, as it is based on patient report of pain. Moreover PPT may be influenced subconsciously by the tester while compressing the PA. Thus, blinding is recommended in studies. Caution is especially advised when interpreting the results in clinical practice.

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The Medical Outcomes Study 36-item short-form health survey (SF-36)

Description

The SF-36 is the most widely used generic health survey for the general population. Its use has been documented in over 1000 publications (Ware 2000). The SF-36 has been used to describe the health status of individuals suffering from a wide range of general health, post-surgical, and musculoskeletal complaints.

The questions in the SF-36 are simple to understand and relevant to most people's lives. The SF-36 measures the following specific dimensions of health:

- Physical Function
- Role Physical
- Bodily Pain
- General Health
- Vitality
- Social Functioning
- Role Emotional
- Mental Health

These eight dimensions are also commonly combined to produce two summary measures: a Physical Component Summary (PCS) and a Mental Component Summary (MCS).

Instructions to the client and scoring: The SF-36 is a self-administered questionnaire. Subjects complete one response from a range of options for each of the 36 questions. A combination of item response(s) is then aggregated to calculate a score for each of the eight dimensions listed. The scores for each dimension range from 0 to 100, with higher scores indicating better health status. Bodily Pain is also scored in this way, with higher scores indicating less pain.

The two summary scales (PCS and MCS) are scored differently from the eight dimension scores. These scales are scored using norm-based methods. A score of 50 reflects an average score with respect to these populations. Scores lower than 50 reflect less than average health and scores greater than 50 reflect better than average health.

Reliability and validity: The SF-36 has been shown to have high internal consistency, reliability, and validity across both general populations and specific patient groups such as those with low back and neck pain (Ware 2000, McHorney et al 1994, McCallum 1995). Of interest to physiotherapists, the SF-36 has been shown to have similar responsiveness to neck-specific questionnaires such as the NDI and FRI (Jette and Jette 1996, Riddle and Stratford 1998, Stewart et al 2007) and back-specific questionnaires such as the Oswestry Disability Index (Walsh et al 2003)

Commentary

The SF-36 takes 5 to 10 minutes to complete. It provides a comprehensive measure of clinical outcome and is one of the few tools that take into account both physical and psychological aspects of health.

Possibly the main advantage of the SF-36 is its ability to provide a comparison of health status data across different patient groups with direct reference to the general population. The SF-36 also enables clinicians to identify coexisting problems, such as psychological problems which may have gone unrecognised with other assessment methods.

Unfortunately the requirement to use normative data makes scoring of the questionnaire by hand tedious and prone to error. (Scoring algorithms may be found in Ware et al 1994.) A more reliable option is computerised or on-line scoring using customised software which has a cost per use. A downside of this on-line system is the comparison of patient data to US norms. A scoring program utilising Australian normative data, Clinical Outcome Evaluation System, is also available. This is a simple and efficient tool, however a licence must be purchased to make use of the software. Without customised software the SF-36 is unwieldy for clinicians to use with individual patients and hence has become primarily a tool for researchers.

The Physical Function scale, which may be important for musculoskeletal conditions, has been reported to be prone to 'floor and ceiling' effects, meaning that the scale is insensitive for those patients with very high or low levels of disability in performing physical activities (Davidson et al 2004).

Generally the questions are well understood. Australian populations may have difficulty with some of the terminology (eg, 'How much of the time during the past 4 weeks did you feel full of pep?') and references to distances in yards and miles. Some patients may also find some of the questions irrelevant to their particular situation.

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