Six minute walking test

Description

The six-minute walking test (6MWT) is a commonly used objective measure of functional exercise capacity in individuals with moderately severe impairment (ATS 2002). The distance an individual is able to walk along a flat 30 m walkway over a 6 minute period (6MWD), with breaks as required, is recorded. The test is a self paced, submaximal test of exercise capacity, which may better reflect the exercise level needed for daily tasks (ATS 2002).

Requirements for testing, instructions to client and monitoring

An indoor, flat, straight walkway, marked at regular intervals, at least 30 m long and free of obstacles is required. Shorter tracks are believed to reduce 6MWD due to greater number of turns (ATS 2002) and continuous tracks have been shown to increase 6MWD (Sciurba et al 2003). As there is a learning effect with an average increase in 6MWD of 15.2% on the second test (Sciurba et al 2003), at least one practice test is required with a minimum of 30 minutes rest between tests (ATS 2002). The longest 6MWD should be recorded. Prior to testing, measures of breathlessness and rate of perceived exertion using a modified Borg scale (Borg 1982), heart rate and pulse oximetry are recorded. If pulse oximetry is < 88%, supplemental oxygen should be used (Pulmonary Rehabilitation Toolkit 2006). Standardised instructions are given to the patient at the start of the test and standardised encouragement provided each minute during the test (see ATS 2002). Patients are able to stop and rest during the test, with the timer still running. On completion of the 6 minutes, the above measures are repeated, the patient’s limiting factor during the test, and total distance are recorded. Safety issues that should also be considered (see ATS 2002).

Reliability, validity and responsiveness to change

The 6MWT is reliable with ICCs ranging from 0.91 to 0.92 following practice tests (Guyatt et al 1985). It has shown good correlation with peak oxygen uptake in individuals with end stage lung disease (Cahalin et al 1995) and chronic heart disease (Guyatt et al 1985). Finally, the 6MWD appears to be responsive to change following rehabilitation programs (Bernstein et al 1994) with the minimum clinically significant difference estimated to be 54 m (Redelmeier et al 1997).

Commentary

The 6MWT is a frequently used outcome tool in the cardiorespiratory domain for different interventions including pharmacological, oxygen prescription, surgical assessment and rehabilitation as it was a simple, well tolerated test which can be performed without high tech equipment with minimal training. As it is self-paced and an activity familiar to all subjects it may better reflect activities of daily living which are performed at submaximal levels of exertion (Solway et al 2001).

The test must be undertaken using a standard protocol to minimise the potential risk of variability. Normally the tester does not walk with the patient to avoid influencing the pace of the subject. For some patient groups where continuous monitoring is required, the tester walks slightly behind the subject. It is recommended to terminate the test if the oxygen levels fall below 85% (Pulmonary Rehabilitation Toolkit 2006), however depending on the experience of the clinician and on the patient’s presentation the test may be continued even if SpO₂ < 85%. If the test is stopped, testing is recommenced when the oxygen levels approach resting values or when the patient feels able.

Improvement in the performance of the test has been shown with training effect, oxygen supplementation (Leach et al 1992), standardised encouragement, medications, and use of a wheeled walking frame (Probst et al 2004). These factors need to be recorded to ensure repeatability of the test. Use of a treadmill to undertake a 6MWT is not recommended as it externally paced. In one study the patients with severe lung disease demonstrated a mean 14% lower distance on a treadmill test when compared with a standard hallway test (Barthelemy et al 1990).

From a clinical perspective the test results can be used for exercise prescription. (Alison and Anderson 1981). The results can also be compared to predicted normal values that incorporate gender, height, and weight that have been shown to influence 6MWT results (Enright and Sherrill 1998, Troosters et al 1999). Although 54 m (95% CI 37 to 71) has been reported as the minimum significant change, for individuals with limited 6MWD it may be more reasonable to evaluate improvement based on percentage change from baseline. Currently the actual percent change to achieve clinical improvement has not been determined.

References

Pain provocation tests for diagnosis of sacroiliac joint pain

Description

There are many tests devised to provide information about sacroiliac joint (SIJ) pain and function. Only pain provocation SIJ tests have been shown to have satisfactory inter-examiner reliability and validity with respect to a meaningful reference standard. These tests apply stress to the SIJ to determine if the usual pain is produced or aggravated and have been described in the orthopaedic medicine literature over many decades. Cyriax (1975) was probably the first author to include some in a comprehensive examination schema. Although not all provocation SIJ tests have been subjected to good quality reliability and validity research, the distraction, thigh thrust, Gaenslen’s, compression, sacral thrust, and Patrick’s tests are fully described (Kokmeyer et al 2002, Laslett et al 2003) and good clinimetric data are available.

The tests take less than five minutes to carry out. Some training is needed to ensure correct application of sufficient force to adequately stress the SIJs. By definition these tests cannot provoke usual pain in asymptomatic patients.

Inter-examiner reliability ranges from kappa = 0.26 to 0.82 for each individual test (Laslett & Williams 1994, van der Wurff et al 2000a). A multitest regimen of three or more positive tests is more reliable than individual tests with kappa = 0.70 (95% CI 0.45 to 0.95) (Kokmeyer et al 2002).

Commentary

There is some confusion in the literature regarding naming of the tests. Distraction and compression are sometimes reversed with regard to the tests they describe (Albert et al 2000) – erroneously, I believe. The compression test may be called the separation test (Albert et al 2000) and a modified thigh thrust test may be called the posterior pelvic pain provocation (or 4P) test (Ostgaard et al 1994).

The composite of three or more positive SIJ tests has positive and negative likelihood ratios of 4.02 (95% CI 2.0 to 7.8) and 0.19 (95% CI 0.07 to 0.47) respectively (van der Wurff et al 2006). This is almost exactly the same as the values achieved in an earlier study (Laslett et al 2003). While this clinical prediction rule is useful the false positive rate is significant. SIJ pain is rarely co-existent with other sources of low back pain (Schwarzer et al 1994, 1995) except in pregnancy (Gutke et al 2006). When the source of pain is known to be from a structure other than the SIJ, the results of the SIJ provocation tests should be considered false positive.

SIJ pain is quite a different concept from SIJ dysfunction. The latter concept is hypothetical at best. Tests used to identify SIJ dysfunction are unreliable (van der Wurff et al 2000a) and invalid against diagnostic injection as a reference standard (van der Wurff et al 2000b). However, the reference standard of diagnostic injection has limitations. Since only the internal structures of the SIJ are anaesthetised by the procedure, extra-articular SIJ ligamentous pain is not identified. Consequently, the false positive rates of pain provocation and SIJ dysfunction tests may be over-estimated in studies using diagnostic injection as a reference standard (van der Wurff et al 2006).

Future research can now be constructed where patients most likely to have SIJ pain can be identified as a subgroup. The most powerful clinical method of identifying SIJ pain patients is the rule whereby these patients’ pain does not centralise with repeated movement testing and there are at least three positive SIJ provocation tests.

In summary, the clinical prediction rule of three or more provocations tests that provoke familiar back pain and non-centralisation of pain is a useful tool to identify patients more likely to have SIJ pain than some other painful condition.

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References


