Manual Therapy 17 (2012) 364–368

Contents lists available at SciVerse ScienceDirect

Manual Therapy

journal homepage: www.elsevier.com/math

Technical and measurement report

The Active Straight Leg Raise test in lumbopelvic pain during pregnancy

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ARTICLE INFO

Article history:
Received 1 July 2011
Received in revised form
11 January 2012
Accepted 18 January 2012

Keywords:
Low back pain
Pelvic girdle pain
Pregnancy
Diagnostics

ABSTRACT

Although many properties of the Active Straight Leg Raise (ASLR) test as a diagnostic test in lumbopelvic pain (LPP) are well documented, various elements are lacking. A cross-sectional study was performed to compute sensitivity and specificity, to assess the advantages and disadvantages of various cutoff points, to analyze the relation between the ASLR test and the Posterior Pelvic Pain Provocation (PPPP) test, and to investigate the relation with confounders.

Data of 110 women with LPP and 72 without LPP were available. The advantages and disadvantages of four cutoff points of ASLR, and combinations of the ASLR and PPPP, were investigated by comparing sensitivity, specificity and area under the curves (AUC) of receiver operating characteristic curves (ROC). The influence of the site of pain was analyzed by means of AUC. The relation with confounders was measured using Pearson correlation coefficients.

Results show that for diagnostic use the best cutoff for the ASLR test in pregnancy is between score 0 and 1. Specificity of the ASLR test is good (88%). Sensitivity for all types of LPP during pregnancy is moderate (54%), and is larger in case of more pain and disability. When combined with the PPPP test, sensitivity of the ASLR test is larger (68%). Isolated symphyseal pain, isolated low back pain and isolated coccyx pain are not diagnosed by these two tests. The ASLR test is not influenced by age, number of previous deliveries, BMI, cause of LPP (pregnancy-related or not), the existence of urinary incontinence and/or level of fatigue.

1. Introduction

A variety of tests are used to diagnose lumbopelvic pain (LPP) during pregnancy (Albert et al., 2000; Vleeming et al., 2008). In 1999 the Active Straight Leg Raise (ASLR) test was introduced and has shown to be a reliable instrument to measure disease severity in pregnancy-related LPP (Mens et al., 1999, 2001, 2002b). The test is recommended in the European guidelines for pelvic girdle pain. Mens et al. (1999) showed that the result of the ASLR test correlates with mobility of the pelvic joints. Various studies support their idea that difficulty to perform the ASLR test indicates a hampered load transfer function across the sacroiliac joints (O'Sullivan et al., 2002; de Groot et al., 2008). The ASLR test is mostly scored on a six-point scale ranging from 0 = not difficult at all to 5 = unable to do (Mens et al., 2002b). When the scale was used as disease severity parameter the scores of left and right side were added so that the scale ranged from 0 to 10. Because of its good responsiveness (Mens et al., 2002a) the score has been used as a parameter in a clinical trial for pelvic girdle pain (Stuge et al., 2004).

Besides its use as severity parameter, the test is also used in the diagnosis of pregnancy-related pelvic girdle pain (PGP) (Stuge et al., 2004). However, information about sensitivity and specificity, especially in a pregnant population is scarce (Mens et al., 2001; Robinson et al., 2010a). In the study by Mens et al. (2001), the data on sensitivity and specificity were computed from a rather 'artificial' database: in that study the patients and controls were recruited from two different populations. Controversy still exists regarding the most appropriate cutoff point. For the use of the ASLR test as diagnostic test the sum of the score of both legs is used with a cutoff to assume that the test is negative or positive at various levels. Sometimes the cutoff is chosen between scores 0 and 1: score 0 is negative and the scores 1–10 are positive (Mens et al., 2001; Robinson et al., 2010a); sometimes between 3 and 4: scores 0–3 are negative and scores 4–10 are positive (Vøllestad and Stuge, 2009; Robinson et al., 2010b). To our knowledge, the advantages and disadvantages of the different cutoff points are not yet established.

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1356-689X/$ – see front matter © 2012 Elsevier Ltd. All rights reserved.
doi:10.1016/j.math.2012.01.007

The present study evaluated the sensitivity and specificity of the ASLR test in LPP during pregnancy, and the advantages and disadvantages of various cutoff points. Also examined was the relation between the ASLR test and the Posterior Pelvic Pain Provocation (PPPP) test; a valid and reliable test to diagnose pregnancy-related PGP (Östgaard et al., 1994; Vleeming et al., 2008). Finally, the existence of possible confounders was investigated.

2. Materials and methods

2.1. Study participants

A total of 182 women in the third quartile of their pregnancy were selected; 110 with LPP and 72 without LPP. The procedure has been extensively described elsewhere (Mens et al., 2012).

A woman was considered to have LPP if

1) she gave a positive answer to the question: "Do you experience low back and/or pelvic pain at this moment or did you during the previous seven days?"
2) and the questionnaire and the physical examination yielded no indications for a specific disease that could cause pain in the lumbopelvic region.

If she gave a negative answer to the question and had no indications for a specific disease, the subject was classified as 'without LPP'.

The Medical Ethics Committee of the Erasmus Medical Centre Rotterdam approved the study (Register number NL32486.078.11).

2.2. Measurements

2.2.1. Questionnaires

With several questionnaires, information was collected about current pain in the lower back or pelvic area, obstetric history and general health. In case of current pain in the low back or pelvic area, additional information was collected about the severity and location of the pain, and pain-related symptoms. When pain started during a pregnancy (previously or currently) or within 3 weeks after a previous delivery, the current pain was labelled as 'pregnancy-related'.

Severity of pain and fatigue were scored on a numeric rating scale (NRS) by asking the subject for the average pain or fatigue experienced during the previous week. The NRS ranges from 0 (no pain or fatigue) to 10 (most imaginable pain or fatigue).

Severity of pain-related disability was scored by means of the Quebec Back Pain Disability Scale (QBPDS).

Severity of urinary incontinence was scored on a Likert scale: 1) No incontinence, 2) Mild incontinence, 3) Moderate incontinence, and 4) Severe incontinence. The scale was dichotomized by pooling scores 2–4 as 'any incontinence'.

Localization of pain was pointed out by the subject on a drawing of the posterior and anterior part of the body from waist to upper legs. Pain syndromes based on previous studies (Albert et al., 2000; Robinson et al., 2010a) were defined based upon the site(s) of the pain. The following pain syndromes were distinguished: 'symphysis pain only', 'Posterior Pelvic Pain (PPP) unilateral', 'PPP bilateral', 'PPP unilateral with symphysis pain', 'PPP bilateral with symphysis pain', 'low back pain only' and 'coccyx pain only'. External validity of the pain drawing was not tested.

2.2.2. Clinical examination

The following tests were selected:

1) The ASLR test was scored by the subject on a six-point scale ranging from 0 = not difficult at all to 5 = unable to do (Mens et al., 2002b). ASLRsum and ASLRmax were computed. ASLRsum was defined as the sum score of left and right ASLR (so ranging from 0 to 10). ASLRmax was defined as the highest score of the left and right ASLR (so ranging from 0 to 5). To be able to use the ASLRsum and ASLRmax as a diagnostic tool, dichotomization was performed. Four cutoff levels were investigated for ASLRsum: between score 0 and 1; 1 and 2; 2 and 3; and 3 and 4. For ASLRsum only the first three levels were used. Because control subjects seldom have ASLRsum score 4 or more and ASLRmax score 3 or more disadvantages of higher cutoff levels were not analyzed (Mens et al., 2001; Robinson et al., 2010a,b).
2) The PPPP test was performed in supine position with 90° hip flexion and 90° knee flexion (Östgaard et al., 1994). In this position the investigator gave manual compression on the knee of the subject perpendicular to the examination couch. The test was scored positive if, at least at one side, pain was felt at the back of the pelvis at the tested side.

2.3. Statistical analysis

SPSS 15.0 was used for the analyses. Normally distributed continuous variables are presented as mean and standard deviation (SD). Ordinal data are reported as percentages per category. Differences between normally distributed variables were analyzed with the independent *t*-test. Differences between ordinal variables were analyzed with the Mann–Whitney *U*-test.

To compare the diagnostic properties of the defined cutoff levels of the ASLRsum and ASLRmax, sensitivity, specificity and area under the curves (AUC) of the receiver operating characteristic curves (ROC) were computed within the group of subjects with LPP. To analyze the additional value of the combination of the ASLR test and the PPPP test, AUCs were also computed for the situation in which at least one of the two tests is positive ('ASLR with the highest AUC or PPPP') and for the situation that both tests are positive ('ASLR with the highest AUC and PPPP').

The three tests or test combinations with the highest AUCs were also used to compute the AUCs for the defined pain syndromes.

The three tests or test combinations with the highest AUC were also checked for the existence of possible confounders by means of Pearson's correlation coefficients for continuous variables and with Spearman's Rho for ordinal variables and not-normally distributed continuous variables. A p-value <0.05 was considered significant.

3. Results

3.1. Characteristics of the sample (Table 1)

A total of 222 women were contacted; 36 refused to cooperate for various reasons, two were excluded because of insufficient knowledge of the Dutch language, one because of signs of radicular pain, and one because of a groin hernia. Thus, data of 182 participants were available for analysis.

The current pain started during a previous pregnancy or within 3 weeks after a previous delivery in 23.4%; during the current pregnancy in 42.1%; otherwise in 34.5%. Mean level of pain was 3.6 (SD 2.2), and mean score for pain-related disability measured on the QBPDS was 26.8 (SD 15.9).

3.2. Best levels of cutoff of diagnostic tests

The AUCs of the ASLRsum at four levels of cutoff ranged from 0.59 to 0.71 with the highest score for the cutoff between score 0 and 1 (Table 2). Specificity is highest for the ASLRsum with cutoff between 3 and 4. This high specificity comes at the expense of a low