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PICO Question: In individuals aged 20-55 diagnosed with non-radicular, low back pain, do SI motion palpation tests or pain provocation tests more accurately confirm the SIJ dysfunction diagnosis based on the intra-articular injection gold standard?

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| **Author, name of journal and year** | **Title of article** | **Purpose of the study/study type** | **Participants** | **Intervention** | **Outcome/Results** | **Conclusions** | **Comments/Notes** |
| Laslett et al. (2005); *Manual Therapy* | Diagnosis of Sacroiliac Joint Pain: validity of individual provocation tests and composites of tests | Look at the utility of SI provocation tests for diagnosing SIJ pain  Cohort | 48 subjects  -32 females, 16 males  -average age: 42.1  -average duration of symptoms: 31.8 months | -30 min clinical exam was completed; it include SIJ provocation tests: distraction, thigh thrust, Gaenslen’s test, compression, and sacral thrust  -Each subject then received a SIJ injection; 80% of pain reduction or greater were then scheduled for a confirmatory block to accurately diagnosis SIJ dysfunction | -Of the 48 subjects, 16 of them had positive SIJ injections  -Individual tests:  sensitivity (0.50-0.88)  Specificity (0.69-0.81)  -3 or most positive tests:  Sensitivity (0.94)  Specificity (0.78)  -Ultimate clinical rule: perform the distraction, thigh thrust, compression and sacral tests, but stop once two positive tests have been achieved; this resulted in sensitivity of 0.88 and specificity of 0.78 | -If a patient does not have any positive results, SIJ dysfunction can be ruled out  -Thigh thrust and distraction test had the highest values for sensitivity and specificity, so they should be completed first  -If a patient has pain with all of the tests, then this is not a reliable interpretation of SIJ pathology | -SIJ injection was used to diagnosis SIJ dysfunction  -Combination of tests has higher diagnostic utility than the individual tests  -The order of completing the tests is important |
| Broadhurst et al. (1998); *Journal of Spinal Disorders* | Pain Provocation Tests for the Assessment of Sacroiliac Joint Dysfunction | Determine if 3 pain provocation tests are reliable to establish a diagnosis of SIJ dysfunction  RCT | 40 subjects  -30 females, 10 males  - average age: 35  -control group: 20 subjects  -intervention group:20 subjects | -3 pain provocation tests were administered to both groups  -tests: FABER, POSH, and REAB  -control group: normal saline injection  -intervention group: injection of 1% Lignocaine  -3 pain provocation tests were administered to both groups again after the injection | FABER test: sensitivity (0.77); specificity (1.0)  POSH test: sensitivity (.80); specificity (1.0)  REAB test: sensitivity (0.87); specificity (1.0) | -intra-articular injections can significantly block the pain caused by SIJ dysfunction  -3 provocation tests used all had high levels of sensitivity and specificity; therefore, they can be used in the clinic to diagnose SIJ dysfunction | -this study used a lower percentage of pain relief from the SIJ injection (70%); therefore, they may have had more false positives than a study that used 80% or 90% as the cut off for pain relief |
| Stanford et al. (2010); *Pain Medicine* | Is it useful to repeat Sacroiliac Joint Provocative tests Post-Block? | Determine the usefulness of repeating SIJ provocation tests after a SIJ injection  Cohort | 34 subjects  -over the age of 18  -had pain for over 6 months  -pain was unilateral and below L5 | -6 pain provocation tests were administered to all subjects  -tests: Patrick’s, thigh thrust, Gaenslan’s (right and left), compression, and sacral thrust  -all subjects received a SIJ injection of Lidocaine  -30 mins after the injection, 6 provocation tests were repeated | ->79% pain relief, represented a positive response to the injection  -11 subjects had confirmed SIJ pain  - Pre-block 3 or more positive SIJ provocation tests  -sensitivity: 0.82  -specificity: 0.57  -PPV: 0.47; NPV: 0.87  -PLR: 1.9  -Normalization of >1/2 of the positive SIJ provocation tests  -sensitivity: 0.89  -specificity: 0.30  -PPV: 0.53; NPV: 0.75  -PLR: 1.3 | -Pre-block testing has the diagnostic utility for diagnosing SIJ pain  -The presence of 3 or more positive tests has good diagnostic utility for identifying SIJ pain  -SI injections eliminate intra-articular pain; however SI provocation tests stress extra-articular structures, which is the main reason why the tests did not normalize after the injection | -pre-block provocation tests were statistically significant (p=0.04)  -post-block normalization tests were not statistically significant (p=0.3)  -larger sample size is needed to asses post-block normalization  -the distraction test was not used in this study, which was interesting because it has been found to have high diagnostic utility in other studies |
| Robinson et al. (2007); *Manual Therapy* | The reliability of selected motion- and pain provocation tests for the sacroiliac joint | Assess the inter-rater reliability of 1 palpation and 6 provocation tests for SIJ pain  Cohort | 61 subjects  -56 females, 5 males  -average age: 31.6  -15: AS  -30: post partum pelvic girdle pain  -16: no low back or pelvic pain | -Each subject was examined by 2 physiotherapists with 11 hours between the two examinations  -Tests used: compression, distraction, posterior pelvic pain provocation, Patrick-Faber, bilateral internal rotation of the hip, tests of joint-play, and drop-test  -subject’s pain was analyzed as discordant or concordant, and movements were compared between the sides | -percentage agreement for the pain provocation tests ranged from 67%-97%  -merging no pain and discordant pain: percentage agreement increased to 74%-97%  -Cluster 1 (3-4 positives out of 5 tests): distraction, posterior pelvic pain test, Patrick-Faber, bilateral IR, 1-sided IR: 76%-90% agreement  -Cluster 2 (2 positives out of 3 tests): posterior pelvic pain test, Patrick-Faber, and IR: 89%-91% agreement | - Results showed moderate to good reliability for the pain provocation tests and poor reliability for the palpation test  -Clusters of 3 out of 5 pain provocation tests also showed good reliability | -SIJ injection was not used in this study to identify subjects with SIJ dysfunction  -This article also supports the use of clusters of provocation tests; reliability is not good for the palpation tests; therefore, it should not be used in the clinic  -Used subjects with several different diagnoses that have been found to cause SIJ pain |
| Laslett et al. (2003); *Australian Journal of Physiotherapy* | Diagnosing painful sacroiliac joints: a validity study of a McKenzie evaluation and sacroiliac provocation tests | Examine the use of SIJ tests when used in conjunction with a McKenzie evaluation  Cohort | 48 subjects  132 females, 16 males  -average age: 42.1  -average duration of symptoms: 31.8 months  -Roland-Morris score: 75.7% | -Each subjects received a clinical examination that consisted of a McKenzie assessment, SIJ provocation tests and a hip joint assessment  -McKenzie assessment: end range movements, flex/ext in standing, side gliding, flex/ext in lying  -SIJ tests: distraction, thigh thrust, Gaenslen’s test, compression and sacral thrust  -Then all of the subjects received a SIJ injection; subjects with >79% pain relief had a confirmatory injection | -16 subjects had positive SIJ injections  -3 or more positive SIJ tests: sensitivity (0.91); specificity (0.78); PLR (4.16); NLR (0.12)  -9 subjects had centralization or peripheralization of their symptoms, which was classified as discogenic pain  -3 or more positive SIJ tests (removing patients with discogenic source of pain): sensitivity(0.91); specificity (0.87); PLR (6.97); NLR (0.11) | -SIJ pain provocation tests can be used to diagnosis SIJ pain within a specific clinical reasoning process that includes a McKenzie assessment that will assist in excluding subjects who SIJ pain might be a referral from discogenic pain  -The use of the McKenzie assessment can reduce the number of false positives from the SIJ provocation tests | -Further testing should be completed on the reliability of the McKenzie assessment; further clinical training is needed to use this evaluation technique correctly  -This study also supports the use of 3 positive provocation tests to make a SIJ diagnosis |
| Van der Wurff et al. (2006); *Arch Phys Med Rehabil* | A multitest regimen of pain provocation tests as an aid to reduce unnecessary minimally invasive sacroiliac joint procedures | Examine the accuracy of a multitest regimen of 5 SIJ pain provocation tests to decrease the number of unnecessary SIJ procedures  Prospective study | 60 subjects  -47 females, 13 males  -average age: 51  -average duration of symptoms: 98 months  -ODI score: 48  -positive responders: 27  -negative responders: 33 | -Each subject received a examination that included pain provocation tests: distraction, compression, thigh thrust, Patrick sign and Gaenslen’s test  -Then each subject received two injections: short and long acting anesthetics; the sequence was randomized for each subject | -These researchers used a receiver operating characteristic (ROC) curve to analyze the tests. 0.7 is a fair value, and anything greater than 0.8 is good  -Of the subjects who had 3 or more positive tests (30 total), 29 of them had a positive response to the first injection, and 23 had a positive response to the second injection as well (true positive)  -The ROC for 3 out of 5 tests had the maximal area under the curve (.799), sensitivity (0.85), specificity (0.79), NPV (0.87), PLR (4.02) and PPV (0.77) | -They concluded that when 3 tests are positive out of 5, the probability is between 65%-93% that the pain is from the SIJ  -When fewer than 3 tests are positive, the probability of the SIJ not being the cause of their pain was between 72%-99%  -These results show clearly that a multitest regimen can be used to diagnose SIJ pain in the clinic | -These researchers provided statistics using 1, 2, 3, 4, and 5 positive tests  -It is clear from their results that 3 out of 5 positives has the highest diagnostic utility  -This study used a pain relief cut off of 50%, which is much lower than the other studies |
| Szadek et al. (2009); *Journal of Pain* | Diagnostic validity of criteria for sacroiliac joint pain: a systematic review | The purpose was to use the criteria for SIJ pain that was proposed by the IASP and complete a literature review of the research available.  Review article | No specific subject base  Articles were found from the databases: PubMed, EMBASE and CINAHL beginning in Sept 2007 | -2 separate reviewers looked at the eligibility of the articles and then performed data extraction on them with the QUADAS, a tool created for this study  -agreement between the reviewers was completed using the kappa coefficient | -616 articles were found, 587 of them were excluded, leaving 29 articles, 18 of these fulfilled all of the inclusion criteria  -agreement between the reviewers was high (95.7%)  -Patrick’s sign: sensitivity (1.0), specificity (0.87)  -thigh thrust test: sensitivity (1.0), specificity (.80)  -compression test: sensitivity (.63), specificity (.70)  -3 positive provocation tests: sensitivity (0.85), specificity (0.76) | -Pain mapping and pain referral patterns have the ability to correctly identify SIJ pain  -The compression and thigh thrust tests are useful in diagnosing SIJ pain  -3 positive tests shows good diagnostic utility for identifying SIJ pain | -This review of the literature shows that the individual compression and thigh thrust tests have good diagnostic utility; however, all of the other studies point to the use of multiple tests, which was also found to be true in this review of literature |
| Kokmeyer et al. (2002); *Journal of Manipulative and Physiological Therapeutics* | The reliability of multitest regimens with sacroiliac pain provocation tests | The purpose was to assess the inter-rater reliability of multitest scores from a regimen of 5 provocation SIJ tests.  Cross-sectional | 78 subjects  -17 females, 61 males  -average age of 38  -19 were asymptomatic | -The researchers chose their tests based on the tests with the highest reliability from previous studies  -Tests used: Gaenslen’s, Patrick’s sign, compression, distraction, and thigh thrust  -Each subject had 2 examiners apply all 5 tests for 5 seconds each | -Cohen’s kappa coefficient was used to measure the amount of agreement  -Table 1 and 2 provide reliability and validity data for the pain provocation tests  -The researchers found that the various test regimens of multiple tests had better statistical reliability than the individual tests  -Both reviewers were able to identify all of the asymptomatic individuals | -These researchers found that a multitest regimen of 3 out of 5 tests was found to have good reliability values; however, further research needs to be completed on the validity of the measure  -Also pain provocation tests have higher diagnostic utility than palpation tests | -These results compared individual and groups of tests, which clearly shows the better reliability values for the group of tests over the individual tests |

(FABER: flexion, abduction, external rotation; POSH: posterior shear; REAB: resisted abduction; PPV: positive predictive value; NPV: negative predictive value; PLR: positive likelihood ratio; AS: ankylosing spondylitis; IASP: International Association for the Study of Pain; QUADAS: Quality Assessment of Diagnostic Accuracy Studies)