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Research Paper Review

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Diagnostic Accuracy of Clinical Tests of the Hip: A systematic review with meta-analysis

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ABSTRACT

BACKGROUND

Hip Physical Examination (HPE) tests have long been used to diagnose a myriad of intra-and extra-articular pathologies of the hip joint. Useful clinical utility is necessary to support diagnostic imaging and subsequent surgical decision making.

OBJECTIVE

Summarise and evaluate the current research and utility on the diagnostic accuracy of HPE tests for the hip joint germane to sports related injuries and pathology.

METHODS

A computer-assisted literature search of MEDLINE, CINHAL and EMBASE databases (January 1966 to January 2012) using keywords related to diagnostic accuracy of the hip joint. This systematic review with meta-analysis utilised the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for the search and reporting phases of the study. Der-Simonian and Laird random effects models were used to summarise sensitivities (SN), specificities (SP), likelihood ratios and diagnostic OR.

RESULTS

The employed search strategy revealed 25 potential articles, with 10 demonstrating high quality. Fourteen articles qualified for meta-analysis. The meta-analysis demonstrated that most tests possess weak diagnostic properties with the exception of the patellar-pubic percussion test, which had excellent pooled SN 95 (95% CI 92 to 97%) and good specificity 86 (95% CI 78 to 92%).

CONCLUSION

Several studies have investigated pathology in the hip. Few of the current studies are of substantial quality to dictate clinical decision-making. Currently, only the patellar-pubic percussion test is supported by the data as a stand-alone HPE test. Further studies involving high quality designs are needed to fully assess the value of HPE tests for patients with intra- and extra-articular hip dysfunction.

ANALYSIS

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Background Information
Sport-related hip injuries are common among athletes, both elite and recreational, and are often associated with trauma or repetitive strain (1, 2). Despite an increase in the availability of diagnostic imaging techniques, differential diagnosis of hip pathologies continues to be difficult for clinicians in many cases. The complex regional anatomy and biomechanics of the hip joint, along with overlapping symptoms and referral patterns, serve to complicate the diagnostic process.

In an attempt to improve consensus among clinicians treating hip conditions, a common language and protocol for hip pathologies has been proposed (3). There remains, however, a lack of consensus regarding the diagnostic accuracy of the various hip physical examination (HPE) tests commonly used by clinicians. The objective of the current study was to perform a systematic review and meta-analysis of the diagnostic accuracy of HPE tests for both intra- and extra-articular pathologies.

PERTINENT RESULTS

Initial searches yielded 152 potentially eligible studies. One hundred twenty seven studies were excluded, leaving a total of 25 studies for inclusion in the review. The overall quality of studies was rated as "substantial", based on the QUADAS 1 evaluation criteria (kappa = 0.68).

Intra-articular pathology
Hip Osteoarthritis
Two studies (both high quality) evaluated Trendelenburg's test, resisted hip abduction and FABER's test. Only resisted abduction demonstrated a small post-test probability influence (positive likelihood ratio [LR+]: 3.5). *(EDITOR'S NOTE: hip OA is most often diagnosed based on history, ROM limitation patterns and confirmation [if necessary] via imaging findings – this remains the most logical approach and the standard of practice.)*

Impingement/Labral/Intra-Articular Pathology
Twelve studies (all low quality) evaluated several tests, including FABER, internal rotation, resisted straight leg raise, FADDIR, flexion/internal rotation and Thomas tests. Of these tests, only the Thomas test demonstrated value as a potential screening test for intra-articular pathologies (LR+: 11.1).

Hip or Femur Fracture
Five studies (one high quality) evaluated tests for hip or femoral fracture. The patellar-pubic percussion test (PPPT) showed moderate influence as a stand-alone test (LR+: 5.1 to 20.4). The stress fracture fulcrum test was also evaluated but was found to be relatively inferior.

Avascular Necrosis
One study (high quality) investigated a number of HPE tests for avascular necrosis on a group of 176 HIV patients. However, the overall results of this study indicated a relatively minor ability to influence post-test probability for this condition.

Extra-Articular Pathology

Gluteal Tendinopathy:

Three studies (high quality) evaluated passive and active internal hip rotation and resisted external rotation for gluteal tendinopathies and showed that passive and active internal rotation were the most accurate tests available.

Sports-Related Chronic Groin Pain

One study investigated the single adductor test, squeeze test and bilateral adductor test and found that the bilateral adductor test was the most indicative of chronic groin pain (LR+: 7.7).

Leg complaints in endurance athletes due to vascular causes

One study (low quality) evaluated leg complaints in athletes due to vascular causes and found that a femoral bruit with hip extended was diagnostic of most leg complaints in this cohort, with a LR+ of 6.0.

CLINICAL APPLICATION & CONCLUSIONS

Similar to other research findings dealing with the spine (4), shoulder (5) and knee (6), the majority of HPE tests are deficient for contributing to post-test probability of a dedicated hip-specific diagnosis. The majority of the HPE tests evaluated do not show sufficiently sound levels of sensitivity and specificity to be considered valuable as stand-alone tests for hip pathologies.

Of the tests evaluated in this review, only the patellar-pubic percussion test (PPPT – for femoral fracture), resisted external rotation (gluteal tendinopathy) and Thomas test (labral tear) showed strong relative diagnostic value as stand-alone tests. Hip pathologies will likely continue to require a multi-modal diagnostic approach to properly identify the underlying cause, until further development and evaluation of HPE tests occurs.

STUDY METHODS

Search Strategy

MEDLINE, EMBASE and CINAHL electronic databases were searched from inception to January 2012. Grey literature searches and hand searches of bibliographies were also included in the search.

Selection Criteria

Inclusion criteria:

- Subjects presented with hip or groin pain
- A cohort, case control, and/or cross sectional design was used
- At least one clinical examination test used to evaluate intra-or extra-articular pathology was evaluated
- The test in question was compared against an acceptable criterion reference
- Diagnostic accuracy (sensitivity [SN] and specificity [SP]) values were calculated/reported
- The article was in English

Exclusion criteria:

- The pathology was associated with a condition that was isolated elsewhere (ex. lumbar spine) but referred pain to the hip
- The studies omitted values of either SN or SP
- The clinical examination test was performed under any form of anaesthesia or in cadavers
- The study used instrumentation that was not readily available to all clinicians,
- Only individual physical clinical tests were included
- The study was performed on infants/toddlers.

Risk of Bias
Risk of bias was evaluated using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS 1) tool. A study was considered to have low risk of bias if it fulfilled at least 10 of the 14 criteria items established by the QUADAS scale.

STUDY STRENGTHS/WEAKNESSES

Limitations
- The QUADAS scale lacks item scores for sample size, case control designs and other areas that may affect the true quality of an individual study.
- The meta-analysis failed to show statistically significant findings for most evaluated tests, reflecting the low sample size in the majority of included studies.
- The heterogeneity among studies regarding inclusion/exclusion criteria limits the pooling of findings.

Strengths
- The search strategy was comprehensive.
- The use of meta-analysis of data (when applicable and possible) provided additional statistical support the authors' conclusions.
- Inclusion of a broad range of hip pathologies allowed for a more comprehensive analysis and provides findings relevant to the broad range of professionals treating hip pathologies.

Additional References:

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