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Platinum Priority – Guidelines

Editorial by XXX on pp. x–y of this issue

Systematic Review of the Performance of Noninvasive Tests in Diagnosing Bladder Outlet Obstruction in Men with Lower Urinary Tract Symptoms

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Abstract

Context: Several noninvasive tests have been developed for diagnosing bladder outlet obstruction (BOO) in men to avoid the burden and morbidity associated with invasive urodynamics. The diagnostic accuracy of these tests, however, remains uncertain.
Objective: To systematically review available evidence regarding the diagnostic accuracy of noninvasive tests in diagnosing BOO in men with lower urinary tract symptoms (LUTS) using a pressure-flow study as the reference standard.
Evidence acquisition: The EMBASE, MEDLINE, Cochrane Database of Systematic Reviews, Cochrane Central, Google Scholar, and WHO International Clinical Trials Registry Platform Search Portal databases were searched up to May 18, 2016. All studies reporting diagnostic accuracy for noninvasive tests for BOO or detrusor underactivity in men with LUTS compared to pressure-flow studies were included. Two reviewers independently screened all articles, searched the reference lists of retrieved articles, and performed the data extraction. The quality of evidence and risk of bias were assessed using the QUADAS-2 tool.
Evidence synthesis: The search yielded 2774 potentially relevant reports. After screening titles and abstracts, 53 reports were retrieved for full-text screening, of which 42 (recruiting a total of 4444 patients) were eligible. Overall, the results were predominantly based on findings from nonrandomised experimental studies and, within the limits of such study designs, the quality of evidence was typically moderate across the literature. Differences in noninvasive test threshold values and variations in the urodynamic definition of BOO between studies limited the comparability of the data.

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Detrusor wall thickness (median sensitivity 82%, specificity 92%), near-infrared spectroscopy (median sensitivity 85%, specificity 87%), and the penile cuff test (median sensitivity 88%, specificity 75%) were all found to have high sensitivity and specificity in diagnosing BOO. Uroflowmetry with a maximum flow rate of <10 ml/s was reported to have lower median sensitivity and specificity of 68% and 70%, respectively. Intravesical prostatic protrusion of >10 mm was reported to have similar diagnostic accuracy, with median sensitivity of 68% and specificity of 75%.

Conclusions: According to the literature, a number of noninvasive tests have high sensitivity and specificity in diagnosing BOO in men. However, although the majority of studies have a low overall risk of bias, the available evidence is limited by heterogeneity. While several tests have shown promising results regarding noninvasive assessment of BOO, invasive urodynamics remain the gold standard.

Patient summary: Urodynamics is an accurate but potentially uncomfortable test for patients in diagnosing bladder problems such as obstruction. We performed a thorough and comprehensive review of the literature to determine if there were less uncomfortable but equally effective alternatives to urodynamics for diagnosing bladder problems. We found that some simple tests appear to be promising, although they are not as accurate. Further research is needed before these tests are routinely used in place of urodynamics.

1. Introduction

Lower urinary tract symptoms (LUTS) are prevalent and bothersome in men and women of all ages. Determining whether these symptoms are due to bladder outflow obstruction (BOO) is important in determining the optimal management [1]. Indeed, the success rate for surgical procedures such as transurethral resection of the prostate is presumed to be superior in patients with urodynamically documented BOO. However, it is not possible to reliably diagnose BOO on the basis of clinical symptoms alone, and the gold standard for diagnosis is urodynamic assessment via a pressure-flow study. However, this is an invasive test with risks of bothersome urinary symptoms, haematuria, and urinary tract infection. Furthermore, it can be unpleasant, with considerable rates of anxiety and embarrassment [2]. It also requires dedicated equipment and specific expertise, and is expensive. Consequently, a number of noninvasive tests have been described to replace the pressure-flow study in diagnosing BOO in men with LUTS. The objective of this systematic review (SR) is to determine the diagnostic accuracy of noninvasive tests in diagnosing BOO in men with LUTS with reference to the gold standard of invasive urodynamics.

2. Evidence acquisition

We used standard methods recommended by the Cochrane Methods Group for the Systematic Review of Screening and Diagnostic Tests [3], Preferred Reporting Items for Systematic Reviews (PRISMA), and Standards for Reporting Diagnostic Accuracy Studies (STARD) [4]. The study protocol was published on PROSPERO (CRD42015019412).

2.1. Search strategy

An experienced research librarian collaborated in planning the search strategy. The EMBASE, MEDLINE, Cochrane Database of Systematic Reviews, Cochrane Central (Cochrane HTA, DARE, HEED), Google Scholar, and WHO international Clinical Trials Registry Platform Search Portal databases were searched up to May 18, 2016. Only English language articles were included. The detailed search strategy is described in the Supplementary material. Additional sources for articles included the reference lists of the studies included and clinical content experts (EAU Male LUTS Guideline Panel). Two reviewers (SM and RU) screened all abstracts and full-text articles independently. Disagreement was resolved by discussion; if no agreement was reached, a third independent party acted as an arbiter (AKN).

2.2. Types of study design included

All types of studies (including at least 10 participants) assessing the diagnostic accuracy of noninvasive tests using invasive urodynamics as a reference standard were eligible.

2.3. Types of participant included

Eligible study populations recruited adult men (≥18 yr) with LUTS (as defined by the study authors). Studies in which the proportion of men with either neurologic disease or urethral stricture was >10% were excluded.

2.4. Types of intervention included

The following noninvasive tests (ie, index tests) were eligible for inclusion. A detailed description of each index test is included in the Supplementary material.

(1) Prostate volume/height
(2) Intravesical prostate protrusion (IPP)
(3) Detrusor/bladder wall thickness measured on transabdominal ultrasound (DWT/BWT)
(4) Ultrasound-estimated bladder weight (UEBW)
(5) Doppler ultrasound
(6) Near-infrared spectroscopy (NIRS)
(7) Uroflowmetry

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