

OVERVIEW AND SYSTEMATIC REVIEW OF NON-INVASIVE URODYNAMIC TECHNIQUES

Hypothesis / aims of study

The gold-standard practice of pressure-flow (PFS) studies at present involves invasive catheterisation of the bladder and rectum or abdominal stoma to measure intravesical, intra-abdominal and by calculation, detrusor pressures. The most obvious disadvantage with this approach is that it is invasive, and although a study showed that invasive urodynamics is fairly well tolerated it can cause a significant amount of distress to patients, as well as physical discomfort¹. One study demonstrated that a younger age and apprehension level were the most significant factors associated with high levels of pain and embarrassment in certain patients.²

Nevertheless, various methods have been devised in recent years to eliminate the invasive nature of traditional pressure flow studies and cystometrograms, which involve the insertion of some forms of catheters in the lower urinary tract for pressure measurement. One of the problems that early workers faced with non-invasive urodynamics (NIUDN) was calibration and standardization of measurements and values. The review aims to study the various methods of non-invasive urodynamics, assess their efficacies, as well as detail advantages and disadvantages with each method.

Finally at the conclusion of the review, a novel method of measuring intravesical and detrusor pressure will be put forward and discussed with basic science evidence, for the feasibility of this new method, which awaits formal development and clinical testing.

Study design, materials and methods

A review of the literature was done using the Ovid and Science Direct databases, for most of the data acquisition, together with other relevant Medical databases to obtain as wide as possible a spectrum, of the data both past and present, on non-invasive urodynamic practices.

Results

Despite the problems associated with invasive urodynamics, from the literature searched, one finds that urologists have strived to continually innovate new methods and equipment, as well as define new concepts to replace conventional invasive urodynamics. However in a comprehensive systematic review of the subject looking at a number of current NIUDN methods or concepts, none could be found to replace conventional UDN with respect to invasive pressure-flow studies (PFS), to diagnose bladder outlet obstruction (BOO)³. It may be generally extrapolated, that the same conclusion would be reached, with respect to filling cystometry.

Interpretation of results

This and other evidence suggests that non-invasive urodynamic methods need further research and development if they are to replace conventional urodynamics.

Concluding message

Most NIUDN methods rely on an indirect assessment of pressure within the bladder. This is achieved through various means, for example via a penile cuff, ultrasound assessment of bladder, or detrusor thickness or by some other means. Indirect methods used for assessment of intravesical pressure, have inherent limitations, due to their reliance on surrogate markers for pressure. Because of this, when one examines the efficacy and accuracy of current NIUDN modalities, one finds them wanting.

References

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