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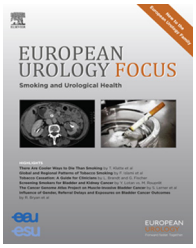

Review – Female Urology – Incontinence

Evaluation and Classification of Stress Urinary Incontinence: Current Concepts and Future Directions

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Abstract

Context: Stress urinary incontinence (SUI) is a common and bothersome problem that frequently requires operative management. Over the past two decades, novel techniques have been introduced into clinical practice. With the greater variety of surgical options now available, there is an increasing focus on selecting the appropriate procedure for the individual patient based on the likely underlying pathophysiologic mechanism.

Objective: To review the methods used in the evaluation of SUI and the proposed classification systems.

Evidence acquisition: A search of the PubMed database for the relevant search terms was conducted, and selected articles were retrieved and reviewed.

Evidence synthesis: Standardised terminology for the description of SUI has been produced by the International Continence Society describing the problem in terms of symptoms, clinical signs, and urodynamic observations. The two major pathophysiologic theories that have emerged over the past 50 yr, urethral hypermobility and intrinsic sphincteric deficiency, have influenced the development and adoption of surgical techniques. It is now recognised that these two entities are not dichotomous but often coexist. The primary aim of the evaluation of the patient presenting with SUI is to confirm the diagnosis and assess symptom severity before instituting conservative treatments. Secondary evaluation consists of more sophisticated techniques that assess anatomy of the bladder neck and urethra under rest and stress (eg, videourodynamics, ultrasound) or direct or indirect physiologic measures of the integrity of the sphincter mechanism.

Conclusions: Classification of patients with SUI into distinct groups based on probable pathophysiologic mechanism could help guide the choice of surgical procedure, but current systems are likely too simplistic, and methods of assessment lack standardisation in techniques and sensitivity.

Patient summary: Urinary leakage on exertion, termed *stress incontinence*, is a common problem that affects many women. There is a need to develop better ways of categorising the underlying causes of leakage to ensure that patients receive the optimal treatments.

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1. Introduction

Stress urinary incontinence (SUI) is an age-old problem that continues to generate great interest due to its considerable public health burden and the controversies that surround its management. It has been defined by the International Continence Society (ICS) as "the involuntary leakage of urine on exertion, or sneezing or coughing" [1]. The reported prevalence varies considerably due to inconsistencies in definitions and survey methods. One of the most thorough reviews (5th International Consultation on Incontinence) summarised that 10% of all women experience urine leakage at least weekly, whereas 25–45% have occasional leakage with SUI accounting for 50% of all incontinence [2]. A recent study utilising different survey methods confirmed this high prevalence [3]. In economic terms this translates to significant costs with an estimated annual direct cost of $13.12 billion in the United States [4], mostly due to the purchase of containment products and primary care visits. Given the trends in population growth and changing age demographics, costs are forecast to increase substantially over the next 20 yr [5]. Although generally perceived not to be as bothersome as urgency urinary incontinence [6,7], SUI exerts a significant personal burden on patients and is an important predictor of anxiety and depression [8].

In the past two decades, new techniques have been added to the SUI surgical armamentarium, in particular the less invasive midurethral tape procedures. The rate of SUI surgery has thus increased by as much as 27% [9]. Surgical management is associated with an incidence of treatment failure as well as a risk of potentially serious complications as has been well publicised. Consequently there is an increasing focus on identifying the right technique for the individual patient [10]. The diagnostic evaluation and classification of SUI is key to this process as well as the interpretation and comparison of data concerning the efficacy of different surgical approaches. This article reviews the contemporary basis for the evaluation of SUI and current classification systems with reference to relevant pathophysiologic concepts.

2. Evidence acquisition

A search of the PubMed database was conducted for full-text manuscripts in the English language using these search terms: stress urinary incontinence, evaluation, diagnosis, classification, urodynamics, videourodynamics, pressure-flow studies, cystometry, intrinsic sphincter deficiency, and urethral hypermobility. Abstracts were assessed for relevance and selected articles were reviewed. At least two authors checked the references used.

3. Evidence synthesis

3.1. Terminology

The importance of using appropriate terminology in the field of continence is widely recognised. In 2002, the ICS standardisation of terminology document described a rational approach to lower urinary tract dysfunction that categorises problems on the basis of symptoms as described by the patient, clinical signs as elicited by the clinician, and urodynamic observations [11]. The symptom of SUI is defined as the involuntary leakage of urine on exertion, sneezing, or coughing [11]. The sign of SUI is the observation of involuntary leakage from the urethra, synchronous with exertion/effort or sneezing or coughing [11]. Leakage must be observed immediately after the cough because cough-induced detrusor overactivity leakage may also occur following a short delay. SUI on prolapse reduction refers to the sign of stress incontinence only observed after the reduction of a coexistent pelvic organ prolapse. The urodynamic observation of SUI is termed *urodynamic stress incontinence* and characterised by the involuntary leakage of urine, associated with increased intra-abdominal pressure, in the absence of a detrusor contraction [11].

3.2. Pathophysiologic basis of stress urinary incontinence

An understanding of the pathophysiologic mechanisms that are postulated to cause SUI is essential to accurate classification. To date, these mechanisms are incompletely elucidated. Broadly two mechanisms are proposed: weakness in the supporting tissues of the urethra resulting in "urethral hypermobility" or a defective urethral sphincter mechanism termed *intrinsic sphincter deficiency* (ISD). These mechanisms are not dichotomous but rather represent a continuum, with many patients having features of both [12].

In 1923, Victor Bonney introduced the concept that SUI results as a consequence of loss in urethral support based on his observation of abnormal downward displacement of the anterior vaginal wall in women with SUI [13]. Following the work of others, Enhörning in 1961 introduced the pressure transmission theory, postulating that stress causes descent of the urethra out of the pelvis due inadequate proximal urethral support leading to a lack of transmission of intra-abdominal pressure to the urethra and thus causing urine leakage [14]. On this basis, retropubic suspension procedures to elevate the bladder neck and proximal urethra were popularised.

In the early 1990s, Delancey proposed the hammock theory based on studies on cadavers that demonstrated the urethra rests on the fused layers of endopelvic and pubocervical fascia attached to the arcus tendineus fascia pelvis and levator ani [15]. These fused layers are said to provide a hammock of support, a stable backstop against which the urethra is compressed during increases in intra-abdominal pressure. Around the same time, Petros and Ulmsten put forward a more complex mechanism focussed on laxity in the vaginal wall and pubourethral ligaments that they termed the integral theory [16]. The vagina is considered as suspended between the pubourethral ligaments anteriorly and the uterosacral ligaments posteriorly. During rest, the opposing forces of the pubococcygeus (anteriorly), levator plate (posteriorly), and longitudinal