Original Article

Suburethral Duplication of the Vaginal Wall – An Original Operation for Urinary Stress Incontinence in Women

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Abstract: The ideal surgery for urinary stress incontinence should be represented by operations producing increases in urethral closure pressure only when the intra-abdominal pressure is elevated. Guided by this principle the author proposes an original vaginal operation creating a suburethral duplication of the anterior vaginal wall, together with Halban's fascia, located under the proximal urethra just below the bladder neck. Over this supportive duplication the urethra is compressed during its dorsocaudal physiologic displacements. The technical details and indications of the procedure are fully described. In the period from 1974 to 1991, at the Department of Obstetrics and Gynecology, Medical Faculty, Skopje, 481 operations were performed. In this series, 74 patients had pre- and postoperative urodynamic evaluations. At 2 years 93.3% were continent without demonstrable obstruction. The simple technique and the use of autologous tissue, together with the lack of major complications and low recurrence rate, are the best advocates for the surgical procedure.

Keywords: Stress incontinence; Gynecological surgery; Vaginal operations; Stress incontinence surgery

Introduction

The physiology of urinary continence during straining is unclear and numerous hypotheses explaining the mechanism of stress incontinence and the principles of its surgical treatment have been proposed. Nevertheless, from the hydromechanical point of view it is evident that urinary leakage appears because of a lowering of urethral closure pressure. Consequently, each surgical treatment should aim to produce an increase in closure pressure. From the technical point of view, the operation should increase the resting urethral closure pressure, which is an antiphysiologic condition producing micturitional obstructive changes, or, without changing the urethral closure pressure at rest, the procedure should be able to increase the stress urethral closure pressure during increases in intra-abdominal pressure, with resultant urinary continence during straining.

Our extensive experience since 1968 in evaluating stress incontinent patients pre- and postoperatively using a standard protocol enabled us to demonstrate that stenosis, compression and lengthening of the urethra or elevation of the bladder neck into the intra-abdominal pressure zone are not valid principles for the successful surgical treatment of stress incontinence, because they produce increased resting urethral closure pressure. Following the results of a hydromechanical analysis of the lower urinary tract carried out in our service in 1974 [1], which produced an essential principle governing stress incontinence surgery, we formulated a hypothesis of a non-permanently acting suburethral support which produced compression of the urethra only during increases in intra-abdominal pressure. Technically, this is achieved by building a suburethral resistant structure - a 'bar' no wider than 1 cm - over which the proximal urethra will be compressed during its dorsocaudal physiologic displacements, which accompany the proximal urethra will be compressed during its dorsocaudal physiologic displacements, which accompany intra-abdominal high-pressure conditions. Ideally, the increases in urethral closure pressure should appear only with straining, and disappear with normalization of intra-abdominal pressure.

The intention of this paper is to present our experi-
ence with an original vaginal procedure [2] fulfilling the requirements of the formulated hypothesis for a non-permanently acting suburethral support. Essentially, our procedure creates a suburethral duplication of the vaginal wall, over which the proximal urethra is compressed during its physiologic dorsocaudal displacements.

Materials and Methods

The series comprised 481 stress incontinence cases operated on at the Department of Gynecology and Obstetrics of Medical Faculty, Skopje, in the period from 1974 to 1991. Preoperatively, all the cases submitted to a standard protocol encompassing a detailed history of incontinence, tests for evident or masked stress incontinence, cystourethroscopy, colpocystography or ultrasonography to document urethral hypermobility, and, since 1990 complete urodynamic investigation has been added (Urodyn 2100, Dantec, Skoulund, Denmark).

Using Millar microtransducers and electronic uroflowmetry, the urodynamic examinations consisted of static and dynamic urethral closure pressure profiles, functional urethral length, pressure–transmission ratios, uroflowmetry and residual urine measurements, all performed according to the International Continence Society [3] recommendations.

Seventy-four patients of the original group of 481 had both pre- and postoperative urodynamics and form the basis of this report. Postoperative studies were performed at least 12 months after the surgical procedure.

The term 'cured' refers to patients without any urinary leakage with a full bladder during postoperative urodynamic studies, along with increased stress urethral closure pressure in the absence of obstructive changes in urinary flow. These patients had the procedure done in association with a vaginal hysterectomy.

Statistical analysis utilized the following formula:

\[ Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{G_1}{n_1} + \frac{G_2}{n_2}}} \]

Technical Procedure

The principle of the operation is the creation of a trapezoidal duplication of the anterior vaginal wall, together with Halban's fascia, located under the proximal urethra just below the bladder neck.

The patient is placed in the lithotomy position and the uterine cervix is exposed and grasped with Pozzi's clamps. The anterior vaginal wall is exteriorized and a holding suture placed 1 cm below the external urethral meatus. Through a transverse anterior vaginal wall incision, a dissection of the anterior vaginal wall, together with Halban's fascia away from the bladder, is carried out using small curved scissors. The bladder pillars are not usually cut. Vaginal hysterectomy is carried out at this stage of the procedure, followed by the anterior vaginal repair.

The suburethral duplication of the vaginal wall [2] begins by placing a Foley catheter, the balloon of which is filled with 10–25 ml of liquid, depending on the extent of urethral funneling. Pulling on the catheter applies the balloon to the bladder-neck region and permits its easy localization. Just below the balloon base, three U-shaped sutures of '0' chromic catgut are placed. The first suture starts from the left side of the patient, goes parallel to the urethra and continues on the right side of the patient. On both sides this suture grasps about 10 mm of vaginal wall tissue, together with Halban's fascia (Fig. 1). Urethral or vesical tissue is not used as in Kelly's procedure [4], or paraurethral and paravesical tissues as in Bonney's [5], Kennedy's [6] Barnett's [7] or similar operations. The location of this suture on the lateral extent of the vaginal wall is a crucial part of the procedure, and after tying the suture, both flaps of the vaginal wall should be approximated with light tension in the midline. This creates a simple 'bar' under the proximal urethra without compressing or angulating the urethra.

After the first suture is tied a second one is placed (Fig. 2). It includes a little more tissue on both sides than the first suture (about 12–13 mm) and, after tying, the duplication of the vaginal wall becomes larger in the craniocaudal direction. The third suture takes in more

Fig. 1. The first suture in the shape of a U grasps about 10 mm of vaginal wall and Halban's fascia, starting on the left side of the patient.