

# Conservation of the prolapsed uterus is a valid option: medium term results of a prospective comparative study with the posterior intravaginal slingoplasty operation

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**Abstract** It has been reported that, by the age of 80, the risk of women to undergo surgery for the treatment of pelvic organ prolapse (POP) exceeds 10%, a percentage expected to increase with the rise in life expectancy. The vaginal approach for POP reconstructive operations is associated with fewer complications and results in a shorter rehabilitation period than the abdominal route, whereas hysterectomy is widely performed concomitantly whenever the uterus is significantly prolapsed. However, there is no clear evidence supporting the role of hysterectomy in improving surgery outcome. We present our experience with a new minimally invasive procedure—the posterior intravaginal slingoplasty (PIVS) for correction of advanced uterine prolapse—at the same time, comparing additive vaginal hysterectomy to uterine preservation, to evaluate the therapeutic significance of hysterectomy when vaginal apical prolapse is reconstructed with PIVS. Seventy-nine women presenting with moderate to severe uterine prolapse were enrolled into the current PIVS study. Vaginal hysterectomy was concomitantly performed upon patient's request (44 patients), whereas those wishing to preserve their uterus underwent reconstructive surgery only (35 patients). No intraoperative or postoperative major complications were recorded during an average follow-up of 29.8 months: One patient (1.3%) presented with surgical

failure, whereas 71 (89.9%) of the operated patients reported satisfaction with the therapeutic results. Bladder overactivity symptoms declined from three thirds of the patients preoperatively to below 10% postoperatively. Ten (12.7%) patients had vaginal tape protrusion; all underwent segmental tape resection at the out-patient clinic. Because the PIVS procedure does not require either laparotomy or deep transvaginal dissection, as previously required for operative intervention, the hospitalization period was relatively short: 4.2 days for the hysterectomy group and 1.5 for the non-hysterectomy group. Other statistically significant differences between the hysterectomy and non-hysterectomy groups were the average ages (63.5 vs 51.0 years, respectively) and concomitant surgery (87% vs 69%, respectively, the higher percentage due to additive amputation of elongated uterine cervixes). No other significant differences were recorded. The current results support the previously reported efficacy, safety, and simplicity of the PIVS procedure as well as the legitimacy of uterine preservation. Moreover, unstable bladder symptoms were found to be improved after this operation. However, long-term data are required to be able to draw solid conclusions concerning the superiority of the discussed operation.

**Keywords** Vaginal apical prolapse · Posterior intravaginal sling · Hysterectomy

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## Introduction

Up to 30% of all women suffer from pelvic floor relaxation progressed to a level which has a negative impact upon their quality of life [1]. The affected women frequently require manual assistance to urinate and report frequency, urgency, and urge incontinence as well as sex and bowel

function-related symptoms [2–4]. The lifetime risk of undergoing prolapse surgery is 1 in 11, whereas up to 30% of those who underwent surgery eventually will have repeat prolapse surgery [5, 6]. Being age-related, it is assumed that the prevalence of pelvic organ prolapse (POP) will further increase with the aging of the population [8]. There are two primary surgical access routes for reconstructive pelvic surgery to correct POP: the abdominal approach (either by laparotomy or via laparoscopy) [9, 10] and the vaginal approach [11, 12]. Although the best approach for restoration of vaginal apical support among the commonly utilized abdominal and vaginal routes remains controversial, the uterosacral ligament vault suspension is the most anatomical among the repairs. Hence, it is most unlikely that the uterosacral ligament support for the vaginal apical prolapse will create a predisposition to future anterior or posterior vaginal vault defects or compromise vaginal function [12, 13]. Given that the vaginal vault herniation is the result of separation of the pubocervical fascia from the rectovaginal and paracolpion fascia, resulting in an apical enterocele, it should be corrected by meticulous herniorrhaphy with reattachment of the vaginal vault to the uterosacral ligaments [14]. These considerations encouraged Petros to design an innovative procedure for the correction of the apical vaginal support defect, by replacing the uterovaginal ligament encoding with a synthetic sling positioned at the levator plate level space via vaginal approach to the pararectal area, performed in a daycare setting [15–18]. The issue of vaginal hysterectomy within the context of POP was addressed earlier with regard to the potential additive curative effect in terms of reduction in the POP postoperative recurrence rate and the influence of future quality of life. No advantage was attached to hysterectomy in the surgical cure of POP [19–27]. In this patient's series was hysterectomy compared to uterine preservation, to evaluate the therapeutic significance of removing the prolapsed uterus when performing posterior intravaginal slingplasty (PIVS).

## Materials and methods

Patients suffering from advanced uterine prolapse resulting from a vaginal apical support defect, diagnosed clinically according to the International Continence Society (ICS) pelvic organ prolapse quantification (POPQ) standard scoring system, were referred for PIVS. The patients were encouraged to opt for either concomitant vaginal hysterectomy (44 patients) or uterine preservation (35 patients) after receiving profound consultation and explanation of the informed consent. Between 1/2003 and 6/2005, 79 PIVS procedures were carried out on non-hysterectomized patients according to Petros in daycare settings. The

procedures were performed by two surgeons after an informed consent form had been signed [15–17]. The patients were followed up for an average period of 29.8 months (12 to 44 months). The PIVS is inserted via a lateral and posterior to the anus skin incision, transgluteally. Thereupon, the tunneler is advanced through the pararectal space up to the levator plate level, after which it is retrieved contralaterally and symmetrically. The sacro-uterine ligaments are sutured to the midline of the tape at their insertion into the uterine cervix and elevated to their correct original location within the pelvis. All patients were given 1-g Monocef (Cefonicid, Beecham Healthcare) intravenously, 1 h before surgery, and were subjected to iodine antiseptic prophylactic vaginal wash before the commencement of surgery. The mode of anesthesia depended upon the patient's request. Sixty-six patients, presenting with additional significant features of pelvic floor relaxation, had colporrhaphy (anterior and/or posterior) and tension-free vaginal tape as anti-incontinence surgery concomitant with the apical support surgery. Operative failure was stated whenever the Aa, Ba, C, Ap, Bp, or D points were found to be more than 1 cm beyond the hymeneal ring. The uterine cervix was amputated if it was elongated to more than half the vaginal length. Intraoperative and postoperative complications of all patients were prospectively recorded. The patients were interviewed in the first and sixth postoperative month and yearly thereafter, with 12- to 42-month follow-up. Subjective data regarding urgency, frequency, stress, and urge incontinence of urine and feces, sexual function impairments, voiding habits, and pelvic pain and bulging was prospectively recorded. The objective findings from physical pelvic examination, including verification of urine and feces leakage, relaxation, and prolapse of pelvic floor and organs, were also prospectively collected according to the ICS standards terminology. All statistical analyses were performed with SPSS 10.1.4 (SPSS, Chicago, IL). Student's *t* test was used for the quantitative variants analysis, whereas the Fisher's exact test and the chi-square test were applied for the categorical variants. All statistical tests were evaluated at the 0.05 significance level.

## Results

Seventy-nine patients diagnosed with uterine prolapse stage 3 or 4 according to the POPQ standard scoring system (D point, 1 cm or more below the hymeneal ring) were enrolled into this study. All demographic and personal details are tabulated in Table 1. Parity, menopause, preoperative bladder overactivity, previous pelvic reconstructive and anti-incontinence surgery, hormonal replacement therapy, background chronic illness as diabetes

mellitus, hypertension, and bronchial asthma, and cystocele and rectocele rates were all similar between the two study groups. The average patient's age, 63.5 years for the hysterectomy group and 51.0 years for the non-hysterectomy group, was the only statistically significantly different demographic parameter within the two groups. Fifteen patients, nine of the hysterectomy group and six of the non-hysterectomy group, had urodynamically proven urinary stress incontinence and therefore had additive anti-incontinence surgery. Thirty-three patients of the hysterectomy group and 24 patients of the non-hysterectomy group had additive colporrhaphy due to vaginal wall relaxation. Six patients of the non-hysterectomy group, with uterine cervixes elongated to more than half the total vaginal length, underwent cervical amputation concomitantly with PIVS to prevent future inconvenience due to cervical bulging out of the introitus. There was no significant difference between the two patient groups regarding the incidence of other additive surgery or the mode of anesthesia (Table 2). The average hospital-stay periods, 4.2 days for the hysterectomy group and 1.5 days for the non-hysterectomy group, were statistically significantly different. No significant differences were recorded regarding tape protrusion, recurrent cystocele and rectocele, therapeutic failure, postoperative bladder overactivity, and overall patient's satisfaction rates. The objective anatomical status results, which were prospectively collected at the postoperative follow-up meetings, are summarized and tabulated in Table 3. One patient with recurrent cystocele and one with recurrent rectocele were diagnosed within each group according to the POPQ measurements at the follow-up physical pelvic examinations as well as—in the non-hysterectomy group only—one patient with recurrent uterine prolapse corrections. All patients desiring sexual intercourse were able to do so; dyspareunia was not reported, and no de novo postoperative urinary incontinence

was recorded. At the postoperative follow-up appointments, the study patients were asked to define their subjective overall satisfaction with the operative therapeutic results as good or not good. The patient's overall satisfaction rate was similar between the two groups: 88.6% for the hysterectomy group and 91.4% for the non-hysterectomy group.

## Discussion

POP may occur in up to 50% of parous women. It may cause a variety of urinary, bowel, and sexual symptoms [1–4] and, as reported, necessitates surgical correction in 11% of the female population [5]. Previously reported surgical modalities, such as colporrhaphy, plication of the uterosacral ligaments, sacrospinous and sacral colpopexies, are associated with up to 58% recurrence rate in terms of objective POPQ scoring and prolapse-related subjective symptoms [6]. For the last decade, various surgical modalities for curing POP through reconstruction of the pelvic floor have been advocated, mainly modification of the colposacral and colpo-sacro-spinal fixations, using vaginal or abdominal approaches, via laparotomy or laparoscopy [7–14]. These operations were associated with well-documented complications, such as mesh erosion, dyspareunia, buttock pain, urinary and fecal incontinence, altered defecation and constipation, bladder injuries, urinary retention and infections, and cystocele and rectocele formation and protrusion, and other disadvantages, such as long operative time, slow return to normal living activities and great costs. Against this background, Petros was encouraged to develop the novel PIVS, entailing minimal invasiveness via a vaginal approach together with anatomical restoration of the uterosacral ligament suspension of the vaginal apex, performed in a daycare setting [15–18]. This operation permits the restoration of the anatomical position of the

**Table 1** Patients' demographics and personal details

|  | Hysterectomy <i>N</i> =44 | Non-hysterectomy <i>N</i> =35 | <i>P</i> value |
|--|---------------------------|-------------------------------|----------------|
| Age (years: av., std deviation)                  | 63.5(13.224)              | 51(10.001)                    | 0.002          |
| Parity (av., std deviation)                      | 3.95(2.327)               | 4.26(2.138)                   | 0.548          |
| Postmenopause (no., %)                           | 56(75%)                   | 40(53%)                       | 0.080          |
| Preoperative bladder overactivity (no., %)       | 34(77.3%)                 | 25(71.4%)                     | 0.200          |
| Previous pelvic reconstructive surgery (no., %)  | 5(11.4%)                  | 1(2.9%)                       | 0.152          |
| Anterior colporrhaphy                            | 1                         |                               |                |
| Posterior colporrhaphy                           | 2                         | 1                             |                |
| Antero-posterior colporrhaphy                    | 2                         |                               |                |
| Previous anti-incontinence surgery (no., %)      | 0(0.0%)                   | 1(2.9%)                       | 0.248          |
| Hormone replacement therapy (no., %)             | 9(20.5%)                  | 5(14.3%)                      | 0.607          |
| Background chronic illness <sup>a</sup> (no., %) | 14(31.8%)                 | 8(22.9%)                      | 0.810          |
| Gr. 2/3 cystocele (no., %)                       | 43(97.7%)                 | 32(91.4%)                     | 0.356          |
| Gr. 2/3 rectocele (no., %)                       | 42(95.4%)                 | 34(97.2%)                     | 0.768          |

<sup>a</sup> Diabetes mellitus, bronchial asthma, hypertension, and hypothyroidism.

**Table 2** Patients' operative details

|                                     | Hysterectomy <i>N</i> =44 | Non-hysterectomy <i>N</i> =35 | <i>P</i> value |
|-------------------------------------|---------------------------|-------------------------------|----------------|
| Anesthesia                          |                           |                               |                |
| General (no., %)                    | 11(25.0%)                 | 18(51.4%)                     | 0.990          |
| Regional (no., %)                   | 31(70.4%)                 | 16(45.7%)                     | 0.590          |
| Additive surgery (no., %)           | 39(87%)                   | 27(69%)                       | 0.030          |
| Colporrhaphy (no.)                  | 33                        | 24                            |                |
| Anti-incontinence surgery (no.)     | 9                         | 6                             |                |
| Cervical amputation (no.)           | 0                         | 6                             |                |
| Hospital stay (days, std deviation) | 4.2(1.4)                  | 1.5(0.7)                      | 0.015          |

vaginal apex, hence the conservation of the prolapsed uterus [21]. Preservation of the uterus was lately shown to contribute positively to the patient's self-esteem, body image, confidence, and sexuality [28–34].

The overall operative results in the current two series of patients are in agreement with previously reported data regarding the safety and efficacy of the PIVS method for vaginal apex support [15–18, 21]. Replacement of the broken uterosacral ligaments applying PIVS provides adequate uterine re-suspension, hereby permitting uterine preservation while treating advanced uterine prolapse [21]. In the current series of patients, in 35 of the women, a prolapsed uterus was conserved during PIVS in accordance with their personal preferences. Six (17.1%) among the latter, whose uterine cervix was longer than half of the total vaginal length, underwent amputation of an elongated uterine cervix to prevent later bulging out. Forty-four other patients elected vaginal hysterectomy to be performed concomitantly with the PIVS operation. The patients were followed up for an average period of 29.8 months. The differences between the hysterectomy and non-hysterectomy groups were insignificant except for the average age, length of hospitalization, and additive surgery: The hysterectomy group was older, had longer hospitalization periods, and had been subjected to numerous concomitant operations for pelvic floor reconstruction. Patients were assessed according to the POPQ measurements along the postoperative course: Cystocele, rectocele, and vaginal vault prolapse corrections were satisfactory in all but five patients, two in the hysterectomy group and three in the non-hysterectomy group. Bladder overactivity symptoms such as urgency, frequency, urge incontinence, and noctu-

ria, which had been troublesome for about three thirds of the patients preoperatively, were postoperatively reduced to about 10% of the patients in each group. The explanation for this major finding, the improvement of unstable bladder symptoms, is unclear, as such symptoms are generally deemed to be incurable. It has been previously explained with reference to the integral theory, using the trampoline analogy, whereby lax ligaments cannot support the bladder base stretch receptors, as a result of which these fire off prematurely. The PIVS restores the posterior ligamentous supports, hence contributing to the neural stability of the bladder and avoiding bladder overactivity symptoms [15, 16]. The PIVS therapeutic effectiveness does not appear to be inferior to previously reported operative techniques, and uterine conservation does affect neither the cure nor the complication rates. This procedure seems easier and faster to perform and might be less associated with intra- and postoperative procedure-related morbidity than the above-reported operations. Previously reported tape exposure rate of 10%, related to the mesh nature, was successfully reduced, as the tape is lately consisted with macro-porous monofilament material [18, 21]. The long-term effectiveness of this type of uterine suspension as yet has to be demonstrated.

## Conclusions

Posterior intravaginal slingplasty, designed by Petros to treat vaginal apical support defects, provides a safe, effective, and easy-to-perform surgical technique. This novel procedure facilitates preservation of a prolapsed uterus, resulting in a shorter hospitalization period and potentially minimizing the

**Table 3** Patients' postoperative details

|  | Hysterectomy<br><i>N</i> =44 | Non-hysterectomy<br><i>N</i> =35 | <i>P</i> value |
|--|------------------------------|----------------------------------|----------------|
| Tape protrusion (no., %)                                       | 6(13.6)                      | 4(11.4)                          | 0.771          |
| Recurrent cystocele (no., %)                                   | 1(2.3)                       | 1(2.9)                           | 0.870          |
| Recurrent rectocele (no., %)                                   | 1(2.3)                       | 1(2.9)                           | 0.870          |
| Operative failure (no., %)                                     | 0(0.0)                       | 1(2.9)                           | 0.200          |
| Postoperative bladder overactivity symptoms (no., %)           | 1(2.3)                       | 2(5.7)                           | 0.427          |
| Patients unsatisfied with overall therapeutic results (no., %) | 5(11.4)                      | 3(8.6)                           | 0.681          |

relatively high operative complication rate associated with hysterectomy. However, the latter amelioration as yet has to be confirmed in the long run.

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