

# Long term results of modified posterior intravaginal slingplasty (P-IVS) in patients with pelvic organ prolapse

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**Background:** Existing POP surgery methods repair vagina and ignore ligaments. The 1993 Integral Theory created a new strategy for pelvic floor surgery, site specific ligament repair. **Aim:** The objective of this study was to evaluate the anatomical and symptomatic success rates of a modified infracoccygeal sling procedure (P-IVS) for apical prolapse. **Methods:** 267 patients with symptomatic POP in various grades, underwent P-IVS operation between October 2009 and January 2014 modified by suturing each side of the tape to the sacrospinous ligament. Where required a modified anterior transobturator mesh (ATOM) procedure was performed for cystocele. All had follow-up for at least 1 year. **Results:** Mean age was 54.9 (28-88) years, mean operation time 149.8 (95-225) minutes, mean hospital stay 2.9 (1-10) days and mean follow up time 28.7 (12-63) months. Preoperatively 86.5% of the patients had anterior, 99% had posterior and 100% had apical prolapse. When surgical success was defined as grade 0 or grade 1 according to Baden-Walker, success rates for anterior, posterior and apical compartments at 3rd month were 92.1%, 98.1% and 97.3%; and 82.4%, 96.2% and 95.4% after  $\geq 1$  year, respectively. There was a statistically high improvement ( $p < 0.001$ ) in all symptoms, such as urinary stress and urge incontinence, nocturia, urgency, pad use, fecal incontinence, difficulty in defecation, pelvic pain and quality of life. **Conclusions:** Total pelvic reconstruction with bilateral SSLF of P-IVS tape in combination with ATOM and TOT, if necessary, has a high success and low complication rate. Experience and strict attention to surgical principles are important for good symptomatic and anatomical results.

**Keywords:** Integral theory; Pelvic organ prolapse (POP); Posterior intravaginal slingplasty (P-IVS); Rectocele; Sacrospinous ligament fixation (SSLF); Cystocele.

## INTRODUCTION

Pelvic Organ Prolapse (POP) is characterized by a descent of the pelvic organs: uterus, vagina, bladder, rectum and small bowel. In most cases concomitant urinary, defecation, sexual problems or pelvic pain are present. POP increases with age and causes great impact on quality of life.

In the past many different techniques have been described about POP surgery, but the search for the ideal technique still is going on. Due to the fact that deficient connective tissue is mainly responsible for prolapse and pelvic floor dysfunction,<sup>1</sup> an isolated damage of ligaments represents an exception.<sup>2</sup> In the majority of cases, a descent of pelvic organs is the consequence of both, insufficient support and suspension.<sup>2</sup> Traditional methods are still being used for surgical treatment of POP and stress urinary incontinence,<sup>3</sup> which are unphysiological in most cases and thus not able to cure symptoms or the exact anatomy in a proper way. A new dimension of understanding POP formation arose in 1992, when De Lancey<sup>4</sup> demonstrated the significance of connective tissue structures for organ suspension by specifying three levels of vaginal support; Level I, or the upper vagina, is supported by the cardinal-uterosacral ligament complex, Level II, or the mid-vagina, is supported by its attachments of the vaginal muscularis laterally to the fascia of the levator ani muscles, Level III support, being the most distal portion of the vagina, is provided by the perineal membrane and the rectovaginal septum.

Furthermore, conflicting data still exist regarding; the best approach (abdominally or vaginally) the effectiveness of POP surgery with and without hysterectomy, the use of artificial or autologous material to reinforce lax tissue, the best place to fix the apex/uterus (promontorium or sacrospinous ligaments) and the most effective combination of reconstruction.

In order to find an answer to these important questions in 1993 Petros et al. created a new vaginal strategy of pelvic floor surgery based on the Integral Theory,<sup>5,6</sup> which regards symptoms and organ prolapse as being both caused by lax suspensory ligaments. As, in our experience, this procedure

was not sufficient enough to bring the apex far back, resulting in a normal vaginal length, we modified the PIVS by suturing the polypropylene tapes to the sacrospinous ligaments with a special instrument. Furthermore, in case of concomitant anterior wall prolapse we combined the posterior IVS with insertion of an anterior transobturator 4-arm mesh (ATOM4), whereas the posterior ATOM arms were sutured to the sacrospinous ligaments on both sides as well. After establishing our new surgical strategy by combining two procedures we performed a prospective observational study.

The objective of this study was to find an answer to the above mentioned important questions and to evaluate the anatomical and symptomatic success rates obtained by our procedure in comparison to the data from the literature.

The study was approved by the local ethics committee. Informed patient consent was obtained. There was no conflict of interest.

## PATIENTS AND METHODS

This study is based on 267 patients, who had symptomatic POP of any degree and underwent P-IVS in combination with SSLF between October 2009 and January 2014 in Denizli State Hospital. Patients who were not admitted with POP, but with urinary and defecation problems resistant to conservative and medical treatment, were also included, if POP was detected whilst preoperative vaginal examination.

At the first consultation, all patients completed a questionnaire indicating age, body mass index (BMI), menopause status, parity, systemic diseases, medications, past gynecologic and urogynecologic history, previous operations, urinary symptoms, defecation symptoms, pelvic symptoms and sexual problems (Table 1). Preoperative and postoperative data were recruited retrospectively from the patient files, which had been prospectively recorded for each patient. Included were only patients with long term follow-up for at least one year and with at least two or more posterior fornix syndrome symptoms according to Petros and Ulmsten<sup>7</sup> such as abnormal emptying of the bladder,

TABLE 1. – Patient demographics (n = 267).

	Mean ± SD / n (%)	Range
Age	54.9 ± 11.4	28 - 88
Body Mass Index	28.1 ± 4.2	21 - 49
Parity	3.7 ± 1.7	1 - 10
Patients with menopause	169 (63.3%)	
Years in menopause	8.3 ± 9.1	0 - 40
Ongoing sexual activity	106 (39.7%)	
Previous surgery		
Hysterectomy	25 (9.4%)	
POP surgery	17 (6.4%)	
Incontinence surgery	6 (2.2%)	
Abdominal surgery	24 (9.0%)	
Operation time (minutes)	149.8 ± 26.3	95 - 225
Hospitalization (days)	2.9 ± 1.3	1 - 10
Follow-up (months)	28.7 ± 14.9	12 - 63

frequency, urgency, nocturia, fecal incontinence, obstructed defecation or pelvic pain.

Pelvic Organ Prolapse Distress Inventory 6 (POPDI-6) form and International Urogynecological Association (IUGA) and International Continence Society (ICS) definitions were also included in the questionnaire.<sup>8</sup> For the evaluation of stress urinary incontinence a stress test was performed. Fecal incontinence was defined as involuntary loss of solid or liquid feces. Defecation problems were also recorded.

Physical examination was always performed by the first author with a full bladder and POP grade was evaluated and graded according to Baden Walker half way system between grade I and IV. Valsalva maneuver was used to evaluate the extent of POP. Specific anatomical defects were also recorded according to integral theory diagnostic algorithm and diagnosis was supported by simulated operation when needed. Stress test was performed after replacement of prolapse with a speculum in patients with grade III-IV POP. The patients were classified into 3 groups for vaginal compartments, 86.5% of the patients had anterior prolapse (Baden-Walker Stages; 1:20.3%, 2:17.7%, 3:38.5% and 4:23.4%), 99% had posterior prolapse (Baden-Walker Stages; 1:12.8%, 2:38.5%, 3:26.7% and 4:20.9%) and 100% had apical prolapse (Baden-Walker Stages; 1:25.8%, 2:25.1%, 3:28.5% and 4:20.6%).

Only 2 (0.7%) patients underwent PIVS + SSLF without further surgery. In 265 (99.3%) patients at least one of the following concomitant surgical procedures was performed: ATOM in 163 (61%), posterior bridge repair in 226 (84.6%) and TOT in 199 (74.5%) patients (Figure 1). None

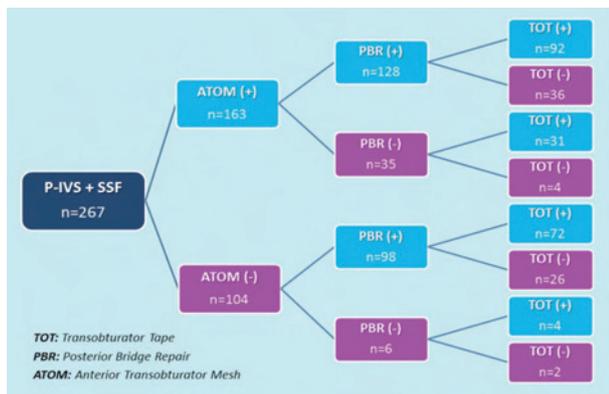


Figure 1. – Surgical algorithm.

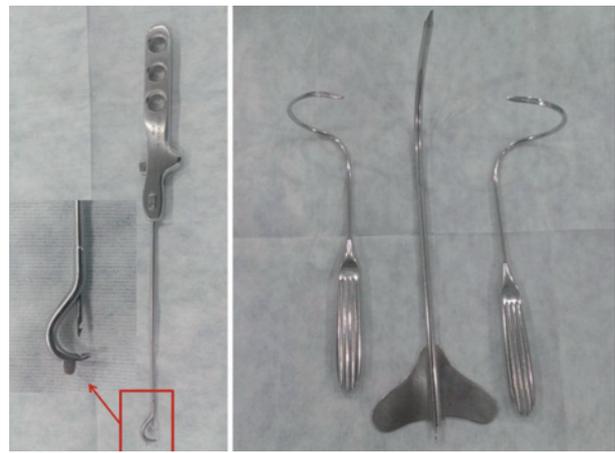


Figure 2. – Surgical instruments.

of the patients had concomitant hysterectomy. 237 cases were operated by the first and 30 by the second author.

### Postoperative Follow-up

Postoperative follow-up visits were performed after 3 months, 1 year and yearly thereafter. All 267 patients had a 3 months control. 128 patients came for next check-up after one year, 54 after 13 to 24 months, 47 after 25 to 36 months and 38 after 37 to 48 months. These 267 patients with a long term follow-up for at least 1 year represent our pre- and postoperatively evaluated study group.

For the symptomatic relief of prolapse, the responses to the 2nd and 3rd questions of the POPDI-6 form and the results of a visual analogue scale were recorded. All patients were asked about the changes in life quality, satisfaction and if they would recommend this operation to others.

Postoperatively, patients were examined during Valsalva maneuver and anatomical success was defined as “no prolapse” (Baden-Walker grade 0) or “minimal prolapse” (Baden-Walker grade I).

### Preoperative evaluation and surgical technique in details

All menopause patients were treated with local estrogen, single dose Ceftriaxone (2 gr) and thrombosis prophylaxis.

#### Level I repair:

After aquadissection a transverse incision was made in the posterior vaginal wall 1,5 cm below the cervix or cuff line and opened out antero-posteriorly. With a digital blunt preparation the sacrospinous ligament was freed from adherent tissue and two 2-0 prolene sutures were inserted into the ligament on both sides with a sacrofix device according to Goeschen (HandkeMedizintechnikGmbH Germany) (Figure 2). Bilateral 0.5 cm long incisions were made in the perianal skin at 4 and 8 o'clock, halfway between the coccyx and the external anal sphincter (EAS) in a line 2 cm lateral to the EAS. The tip of the IVS tunneller was gently pushed through the levator plate and placed into the ischio-rectal fossa (Figure 3a). Then it was brought approximately 2 cm medially from the ischial spine, the tape was turned around the rectum and reached the transverse incision. One prolene suture from each side was stitched through the middle of the tape leaving a distance of 4 cm between each other (Figures 3b and 3c).

The procedure was repeated on the contralateral side and the tape was secured to the vaginal vault and also to the remnants of the uterosacral ligaments and the cervix with interrupted No.1 Vicryl (Figure 3d). In all procedures, self-tailored 1 cm wide polypropylene monofilament meshes (Atrium®) were used.

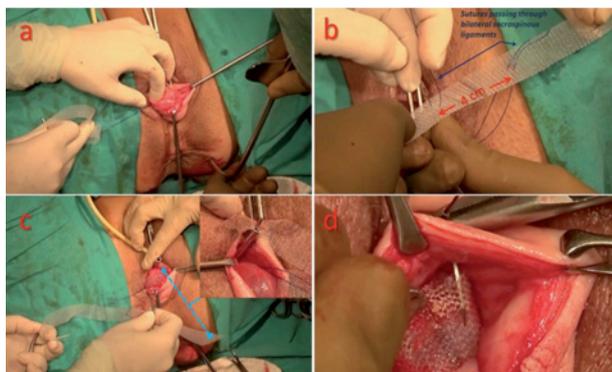


Figure 3. – IVS Tunneler was placed into the ischioanal fossa (a); one prolene suture from each side was stitched through the middle of the tape leaving a distance of 4 cm between each other (b); one end of the mesh is brought into the tip of the inner piece of tunneler (c) and, the tape was secured to the apex (d).

**Level II and III repairs:**

**Repair of the anterior vaginal wall:**

After aquadissection, a full thickness elliptical incision, 1-3 cm wide, over the herniation of the cystocele was made, extending from 2 cm distal of the bladder neck to the cervix or vaginal cuff. The space between bladder and vaginal wall was opened out with a scissors and blunt dissection up to the arcus tendineus fasciae pelvis (ATFP). Extensive diathermy was used to destroy the superficial vaginal epithelium overlying the bridge. The anterior part of the bridge was anchored by burrowing 0.5 cm below the anterior border of the incision, the posterior part into the cervix or vaginal cuff.

A polypropylene mesh (Atrium®) 4-5 cm wide, 30 cm long was cut in a figure with two arms on each side. The anterior two arms of both sides were pulled out transobturatorially (Figure 2). The posterior two arms were placed around the cervix subepithelially and then connected with the remaining sacrospinous sutures, one right and one left. The pubocervical fascia was narrowed with U-sutures to cover the mesh. The skin incision was closed. The remaining sacrospinal sutures on both sides were fixed to the free lower two ends of the meshes and tied at the end of the procedure.

TABLE 2. – Distribution of prolapse grades in patients with anterior, apical and posterior POP before, 3 months and at least 12 months postoperatively.

	Grade 1	Grade 2	Grade 3	Grade 4
Anterior POP Pre-op n= 231 (100%)	47 (20.3%)	41 (17.7%)	89 (38.5%)	54 (23.4%)
Anterior POP 3m Post-op n= 231 (100%)	22 (9.5%)	18 (7.8%)	3 (1.3%)	0 (0%)
Anterior POP ≥12m Post-op n= 231 (100%)	44 (19.0%)	36 (15.6%)	10 (4.3%)	0 (0%)
Apical POP Pre-op n= 267 (100%)	69 (25.8%)	67 (25.1%)	76 (28.5%)	55 (20.6%)
Apical POP 3m Post-op n= 267 (100%)	14 (5.2%)	6 (2.2%)	1 (0.4%)	0 (0%)
Apical POP ≥12m Post-op n= 267 (100%)	10 (3.7%)	9 (3.4%)	3 (1.1%)	0 (0%)
Posterior POP Pre-op n= 264 (100%)	37 (14.0%)	103 (39.0%)	69 (26.1%)	55 (20.8%)
Posterior POP 3m Post-op n= 264 (100%)	16 (6.1%)	5 (1.9%)	0 (0%)	0 (0%)
Posterior POP ≥12m Post-op n= 264 (100%)	23 (8.7%)	9 (3.4%)	1 (0.4%)	0 (0%)

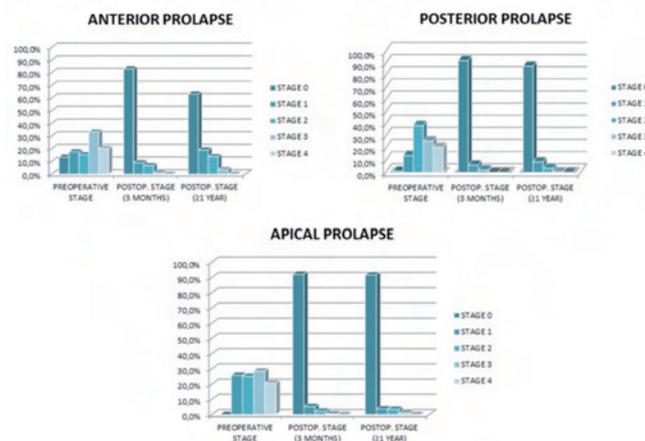


Figure 4. – Preoperative and postoperative prolapse grades.

**Repair of the posterior vaginal wall:**

After aquadissection, two full-thickness parallel longitudinal incisions were made along the posterior vaginal wall, extending from the transverse incision to 1 cm distal to the introitus. Extensive diathermy was used to destroy the superficial vaginal epithelium overlying the bridge. Adherent rectum was freed from the vaginal wall and perineal body (PB) over the distal 3-4 cm of vagina. The rectocele was reduced by using laterally placed horizontal mattress sutures which run subepithelially as a horizontal mattress suture through the bridge. The bridge was anchored separately to the tape above and the perineal body below. The sacrospinous and the PDS sutures were tied only with smooth tension to bring all pelvic organs in normal position. Finally 1 Vicryl unlocked running suture was placed which approximated the lateral cut edges.

**Statistical analysis**

Descriptive statistics were used to analyze the data of the patients. Pearson chi-square test, Fisher’s exact test and Wilcoxon signed rank tests were used to analyze categorical variables and functional results. All analyses were performed using SPSS 17.0 software (SPSS; Chicago, IL, USA). A p-value less than 0.05 was considered to be statistically significant.

**RESULTS**

Preoperative and postoperative prolapse grades are given in Table 2 and Figure 4. Anatomical success rates for apical, anterior and posterior compartments were 95.5%, 82.7% and 96.3% in a mean follow-up of 29 months. In contrast to the first 2 years success rates for anterior and posterior prolapse were significantly better in the last two years. Regarding apical prolapse the difference did not reach statistical significance, although we observed a 4.6% points improvement.

Postoperative changes in symptoms after 3 and ≥12 months are listed in Table 3. Surgery caused a significant improvement of the symptoms: urine incontinence, nocturia, urgency, pad use, defecation problems, pelvic pain and quality of life.

Intraoperative, early and late postoperative complications are summarized in Table 4. Only one patient needed postoperative blood transfusion, another one, admitted with vaginal bleeding after 10 days, was cured by some stitches under general anesthesia. Two patients had mesh erosion in 3 months follow-up and 5 later on. In these patients only the protruded mesh was removed and covered by vaginal

TABLE 3. – Symptoms before and after the surgery.

Preoperative n. (% of total)	Cured after 3 months	P Value*	Cured after ≥12 months	P Value*
Urinary incontinence n=195 (73)				
Stress UI n=125 (46.8)	121 (96.8%)	0.0001	113 (90.4%)	0.0001
Urge UI n=70 (26.2)	1 (87.1%)	0.0001	49 (70%)	0.0001
Stress test negative n=130 (48.7)	126 (96.9%)	0.0001	122 (93.8%)	0.0001
Nocturia n=65 (24.3)	61 (93.8%)	0.0001	27 (41.5%)	0.001
Urgency n=95 (35.7)	79 (83.1%)	0.0001	70 (73.7%)	0.0001
Pad Use (Daily)				
1-2 n=44 (16.6)	34 (77.3%)	0.0001	N/A	N/Ap
3-4 n=65 (24.5)	65 (100%)		N/A	
≥5 n=47 (17.7)	47 (100%)		N/A	
Fecal incontinence n=3 (1.1)	3 (100%)	0.083	3 (100%)	0.083
Difficulty in defecation n=59 (22.1)	55 (93.2%)	0.0001	50 (84.7%)	0.0001
Pelvic pain n=70 (26.2)	44 (62.9%)	0.0001	58 (82.9%)	0.0001
Quality of life				
Severely affected n=211 (79.0)	2 (0.7%)	0.0001	12 (4.5%)	0.0001
Moderately affected n=56 (21.0)	14 (5.2%)		26 (9.7%)	
Minimally affected n=0	13 (4.9%)		20 (7.5%)	
Not affected n=0	238 (89.1%)		209 (78.3%)	
Visual analogue scale**				
8-10	250 (93.6%)	N/Ap	233 (87.3%)	N/Ap
4-7	15 (5.6%)		21 (7.8%)	
1-3	2 (0.8%)		13 (4.8%)	

N/A: Not available, N/Ap: Not applicable

\*Data were compared to the preoperative status.

\*\*Patient's satisfaction from the surgical treatment (1 to 10)

skin followed by local estrogen application. In the long term follow up the most frequent complication was dyspareunia. However, this symptom was reduced from 33,8% before to 10,1% after the operation.

In the long term follow-up (≥1 year) 93.6% of the patients responded “No” to POPDI-6 2<sup>nd</sup> and 3<sup>rd</sup> questions. 78.2% of the patients pointed out, that POP symptoms did not affect their quality of life any longer after ≥1 year. 7.5% were affected minimally, 9.8% moderately and 4.5% severely. In the postoperative satisfaction visual analogue scale (from 1 to 10) mean score was 9.1 ± 2.1. 92.5% of the patients would recommend this surgery to others with similar symptoms. Even 82.6% patients with anterior wall recurrence (n=46), responded “No” to POPDI-6 2<sup>nd</sup> and 3<sup>rd</sup> questions and 85% recommended this surgery to others.

Twenty-five patients (9.4%) without any anatomical or functional problem after 3 months rejected further follow-up visits. These patients were contacted by telephone yearly. All remained happy with their situation.

## DISCUSSION

In 1990 Petros et al.<sup>9</sup> created a new vaginal procedure for pelvic floor surgery based on the Integral Theory and DeLancey's 3-level-classification.<sup>4</sup> Using Petros new treatment high cure rates for widely varied symptoms such as USI, urgency, nocturia, chronic pelvic pain were reported by Farnsworth<sup>10</sup> in 2002 and confirmed by Goeschen<sup>11</sup> 2004. In more recent publications anatomical success rates ranged from 37% to 100%.<sup>12-18</sup>

Our vaginal procedure combines the principles of Integral Theory based on DeLancey's suggestions and traditional proven surgery. The key pillar performed in all patients was bilateral fixation of the P-IVS tape to the sacrospinous ligament, a surgical evaluated for the first time. As in our series only 2 out of 267 patients presented an isolated apical pro-

lapse, exclusively these patients got P-IVS+SSLF without any concomitant surgery. All other cases obtained a simultaneous reconstruction of all damaged compartments. The rationale behind our strategy was to benefit the advantages of proven procedures by reinforcing deficient ligaments and supporting structures at the same time.

Recent data from the United States also demonstrate, that in approximately 225,000 POP operations performed every year, in 40 to 85% a combination was necessary.<sup>19-21</sup> This shows, that a defect in only one compartment is an exception, as POP is a multifactorial condition, mainly caused by lax connective tissue, requiring a complex repair in most cases.

In order to compare our postoperative anatomical results with the literature, anatomical success rates have been evaluated separately for each compartment using the Baden-Walker classification system.<sup>22</sup> This system has proven his worth for a long time.<sup>23</sup> Anatomic cure is defined as POP stage 0 or 1.<sup>24</sup> In 1996 another score, the POP-Q system was created as a scientific method for determining anatomic success before and after prolapse surgery.<sup>25</sup> As this classification has not been successful in daily routine, in our study we used the Baden-Walker system and defined success as POP grade 0 and 1. In case of converting our results in the POP-Q system, half of the patients with postoperative grade 2 prolapse would be Stage 1 and considered as successful. Nevertheless, our anatomical success rates range amongst the highest reported in the literature. The best success rate was obtained in the posterior (96,2%) and apical compartment (95,4%), whereas anteriorly only 82,4% had good anatomical results. Is there an explanation for these differences?

In order to replace the everted uterus or vaginal vault and reconstruct the posterior vaginal wall as physiological as possible we combined traditional surgery with Petros strategy based on DeLancey's recommendations. Meanwhile this idea got support by Karram and Maher.<sup>42</sup> In 2012 they

pointed out, that especially in cases of advanced posterior vaginal wall prolapse a combination of techniques is commonly required.

For Level I, the upper vagina repair, we inserted a tape along the uterosacral ligaments, connecting uterus or vault with the levator plate. The cardinal ligament complex was renewed by the posterior two arms of a mesh or a tape around the cervix. Both tapes and mesh arms were bilaterally sutured to the sacrospinous ligaments. SSLF was first described by Amreich in 1951 for cases with vaginal vault prolapse fixation<sup>26</sup> and later on for replacement of the uterus and the fornix. The success rates of SSLF range between 64% and 97%.<sup>17,27-30</sup> In contrast to the classical SSLF we used a minimal invasive instrument, which allows a digital blunt preparation to pass sutures through the ligament in a few minutes. We fixed the P-IVS tape with 2 sutures and, if necessary, two more for the posterior arms of the mesh or cervical tape. This combination provides an excellent apical support and still connects the levator plate with uterus and vagina.<sup>1</sup>

Posterior Level II or mid-vagina repair was performed with homologous tissue instead of mesh and with transvaginal holding sutures in order to reinforce the rectovaginal fascia. The aim of this procedure was to preserve the rectovaginal space and to prevent adhesions or mesh erosions.

Anteriorly the pubocervical fascia was renewed with mesh and two transobturator and two sacrospinous arms around the cervix or vaginal vault. The perineal body in Level III was reconstructed by horizontal mattress sutures.

Karram and Maher reported 2012 success rates for posterior wall repair between 76-96% with a mean of 83%, Barber et al 2013 92,8% for SSLF.<sup>31</sup> Our complex vaginal reconstruction resulted in an anatomical success rate of 96,2% for the posterior and 95,4% for the apical compartment, compared with the literature one of the highest.

It is well known since decades, that the anterior vaginal compartment is mainly exposed to the abdominal pressure and gravity. Therefore, according to the recent literature, the recurrence rate in this area is the highest among all compartments<sup>17</sup> and still at least two times higher than posteriorly.<sup>31</sup> Weber et al.<sup>32</sup> and Sand et al.<sup>33</sup> reported anterior colporrhaphy to be successful in the management of cystocele in only 30% and 57%, respectively. Thus, an isolated anterior colporrhaphy can not be recommended any longer.<sup>34</sup>

The 2012 Cochrane meta-analysis indicates that the use of transobturator mesh had a significant lower recurrence rate compared with anterior colporrhaphy alone, however is still 14% vs. 49%.<sup>35</sup> Already in 2001 Weber et al.<sup>32</sup> and Sand et al.<sup>33</sup> pointed out, that use of mesh improves the results. In randomized controlled trials comparing anterior colporrhaphy without and with mesh the success rates were better in the mesh groups, 57% vs. 75% and 37% vs. 42% respectively, but still unacceptably high. Barber et al. found an anterior recurrence rate of 13,7% after SSLF without mesh reinforcement in contrast to 7,2% posteriorly. That means; mesh support without SSLF and SSLF without mesh lead to better results in the anterior compartment than traditional colporrhaphy. Mesh insertion gives a good support to bladder base, however this method is not able to connect the anterior wall with the posterior muscles, a junction needed for backward force to open and close bladder and rectum.

Therefore our idea was to combine both strategies for further improvement. We inserted a transobturator 4-arm-mesh, girdled the posterior arms around the cervix or vault and sutured the arms bilaterally to the sacrospinous ligaments in order to fix the uterus and/or vaginal vault to the ligaments and to renew the cardinal ligaments. Compared

to the recent literature our anatomical results remained at the same level regarding the complete study period, but showed a significant improvement during the last 2 years due to enhanced exercise. Much more important is, that the majority of patients with anterior wall recurrence were asymptomatic (>82%) after  $\geq 1$  year and still satisfied with the surgery.

A prolapsed uterus or vaginal cuff can be repaired either abdominally or vaginally.<sup>36</sup> Up to now numerous surgeons still favor the abdominal way to restore the anatomy or to cure symptoms either by laparoscopy<sup>37-42</sup> or by laparotomy.<sup>35,43-45</sup> The success rate, when defined as lack of apical prolapse postoperatively, ranged from 78-100% and when defined as no postoperative prolapse, from 58-100%.<sup>45</sup> Consequently recent Cochrane analyses<sup>35</sup> and review articles<sup>46</sup> come to the conclusion, that "abdominal sacrocolpopexy is the gold standard for vaginal vault prolapse and is superior to vaginal sacrocolpopexy, with fewer recurrent prolapses and less dyspareunia". However, abdominal procedures provide only a small gate for POP reconstruction and a stable and narrow hiatus genitalis is necessary to prevent a recurrence POP after surgery.<sup>2</sup> Laparotomy or laparoscopy as it exists today, enables only the elevation of the descended level 1 structures such as vaginal apex or uterus and can suture a displaced anterior vaginal wall to the arcus tendineus fascia pelvis (ATFP). Furthermore, abdominal sacrocolpopexy does not mimic normal anatomy. Promontorial fixation creates an unphysiological vertical vaginal axis, which may result in high recurrence of prolapse and increased risk of enterocele and pain.<sup>2</sup> Our combination allows a physiological reconstruction of all damaged structures including a normal vaginal axis.<sup>2</sup>

In literature conflicting data still exist regarding the effectiveness of POP surgery with and without uterine preservation.<sup>47-52</sup> Dietz et al. report that uterine preservation is associated with more apical prolapse recurrences than vaginal hysterectomy at the time of POP-repair.<sup>48</sup> These results conflict with data by Maher et al., who found vaginal sacrospinous hysteropexy to be equally effective to vaginal hysterectomy combined with sacrospinous fixation.<sup>51</sup>

In our study no patient underwent concomitant hysterectomy. However, if the hypothesis is valid that uterus preservation deteriorate the outcome, we would expect worse anatomical results in our study group in comparison to the literature. However, this was not the fact. The opposite was true. Therefore, we are convinced that the cervix is the central attachment point and the strongest structure for fixation of artificial ligaments. Hysterectomy weakens the pelvic floor and can generate a significant increase in functional and anatomical recurrences. Furthermore, we do not excise vaginal excessive skin, a routine method in traditional POP surgery, because vaginal mucosa cannot regenerate and excision will only narrow and shorten the vagina.

Our next, up to now not answered question, was whether a combination of P-IVS, SSLF, ATOM and suburethral sling add up the complication rate for every procedure? Complications associated with P-IVS and SSLF are mainly hemorrhage, hematoma, bladder and rectal injuries, mesh exposure or erosions, dyspareunia and pelvic pain. In a recent review article, published by Cosma et al., the overall mean rate for hematoma was 2.6%, 0.8% for rectal injury, 3.3% for pain, 8.5% for mesh erosion, 1.4% for abscess and fistula, and 5.2% for dyspareunia.<sup>14</sup> Complications of SSLF are extensively reviewed by Tseng et al.<sup>53</sup> After SSLF the frequency of bladder and rectal injury was 0-2%, 0.5-8% for bleeding requiring transfusion, 0.3-18% for infection. Postoperative dyspareunia after SSLF occurred in 3% up to 61.1% with a mean of 15.7%.<sup>35</sup>

TABLE 4. – Intraoperative, early postoperative and postoperative complications.

	Intraoperative & Early postoperative n (%)	Postoperative 3 <sup>rd</sup> month n (%)	Postoperative 1 <sup>st</sup> year n (%)
Bladder injury	8 (3.0%)		
Rectal injury	3 (1.1%)		
Bleeding requiring transfusion	1 (0.4%)		
Hematoma	0 (0.0%)		
Wound infection	1 (0.4%)		
Mesh erosion		2 (0.7%)	5 (1.9%)
Pelvic pain		26 (9.7%)	12 (4.5%)
Urination problems		11 (3.7%)	4 (1.5%)
Defecation problems		4 (1.3%)	9 (3.4%)
Dyspareunia		5 (1.9%)	27 (10.1%)
Re-operation (POP Surgery)			7 (2.6%)
Re-operation (TOT)			6 (2.2%)

Our data show no increase of complications after complex surgery (Table 4). Mesh erosion is a major concern regarding POP surgery. We had only an erosion rate of 2.6%, which is one of the lowest in the literature. We believe, that this is the result of precise dissection, autologous tissue interposition between mucosa and mesh, estrogen use and above all experience. The most frequent complication was dyspareunia with a rate of 10.1% after ≥12 months. However, compared with the preoperative situation the incidence was reduced by two third.

CONCLUSIONS

Complete vaginal pelvic reconstruction of all damaged compartments with bilateral SSLF and PIVS, anterior transobturator mesh and suburethral sling, if necessary, has, compared with traditional surgery, an extremely high success and low complication rate. Concomitant procedures like ATOM, posterior bridge repair and TOT, performed at the same time when needed, do not increase complications, if the surgeon is experienced and follows the principles of vaginal reconstructive surgery.

CONFLICTS

None.

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### Multidisciplinary UroGyneProcto Editorial Comment

To improve the integration among the three segments of the pelvic floor, some of the articles published in *Pelvip erineology* are commented on by **Urologists, Gynecologists, Proctologists/Colo Rectal Surgeons or other Specialists**, with their critical opinion and a teaching purpose. Differences, similarities and possible relationships between the data presented and what is known in the three fields of competence are stressed, or the absence of any analogy is indicated. The discussion is not a peer review, it concerns concepts, ideas, theories, not the methodology of the presentation.

#### THE COLORECTAL SURGEON'S OPINION

In the series of patients considered in this work, the percentage of proctological symptoms seems to be low: 1.1% fecal incontinence; 22.1% obstructed defecation. This may depend on the small number of hysterectomized patients (25 of 267; 9.4%), and on a methodological limit in the search of symptoms and of anatomical/functional defects as well. When analyzing the efficiency of the mechanisms of continence and defecation, studies on the posterior compartment use scores that allow the quantification of the type of leakage and of the difficulty on expelling stools (Wexner, CCS, Agachan, Rome criteria, AMS, etc). Not using these items makes it more difficult to identify which patients require further diagnostic workup. The morphological and functional evaluation provides a series of diagnostic tests: proctoscopy and colonoscopy to rule out organic diseases including occult prolapses or stenoses, anorectal manometry/solid sphere test to measure tone, contrac-

tion/relaxation of the sphincters and rectal sensitivity, defecography/RMI to assess the extent of any prolapse and intussusception, ultrasound to check the integrity of the sphincters, anorectal EMG, transit time study. These investigations rule out colorectal diseases that, if proven, may require a specific specialist proctologic approach. In the interests of scientific validation, the good anatomical and functional results and symptoms reported by Caliskan after total pelvic reconstruction need to be verified in the long term with some of the above described methods, preferably with the participation of an interested colorectal reconstructive surgeon. For now, functional surgery in the posterior compartment at present seems to need a very careful and cautious approach with limited indications.

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