A Comparative Study of Colpocleisis vs. Vaginal Hysterectomy for the Treatment of Advanced Pelvic Organ Prolapse

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ABSTRACT **Background:** Vaginal hysterectomy (VH) and colpocleisis are both used for the treatment of advanced pelvic organ prolapse (POP).

Objectives: To compare short- and long-term outcomes of vaginal hysterectomy vs. colpocleisis for advanced POP.

Methods: Hospital and outpatient charts of patients who underwent VH or colpocleisis at our institution between January 2006 and December 2015 were reviewed. Clinical data were obtained and analyzed.

Results: In this study, 188 patients underwent VH and 32 patients underwent colpocleisis. The colpocleisis group was significantly older than the VH group (79.5 ± 4.5 vs. 69 ± 6.1 years respectively, $P < 0.0001$) and presented with significantly higher co-morbidity rates and a higher degree of POP. Perioperative blood loss was significantly lower (250 ± 7.6 ml vs. 300 ± 115 ml, $P < 0.0001$) and postoperative hospitalization was significantly shorter (2 ± 2.7 vs. 3 ± 2.2 days, $P = 0.015$) among the colpocleisis group. None of the patients from the colpocleisis group required an indwelling urethral catheter after discharge, compared to 27.5% of the patients from the VH group ($P = 0.001$). Total postoperative complication rate was significantly lower among the colpocleisis group (25% vs. 31% $P < 0.0001$). Objective recurrence of POP was significantly more common among the VH group (7% vs. 0% and 21% vs. 0% for the anterior and posterior compartments, respectively, $P = 0.04$).

Conclusions: Colpocleisis is associated with faster recovery, lower perioperative morbidity, and higher success rates than VH and should be considered for frail and elderly patients.

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KEY WORDS: anatomic success, colpocleisis, pelvic organ prolapse (POP), vaginal hysterectomy (VH)

Pelvic organ prolapse (POP) is a common gynecologic disorder, the prevalence of which is likely to increase as the population in western countries also ages [1]. Patients with POP may present with symptoms related specifically to the prolapsed organs or with associated symptoms including urinary and defecatory symptoms or sexual dysfunction [2]. A variety of surgical approaches are available to correct POP [3] and there are several factors that influence surgeons and patients when addressing the operative choice, including the desire to maintain future sexual activity and the patient's medical condition. Total pelvic reconstruction in patients with advanced POP may involve several procedures and might be associated with relatively high blood loss and morbidity [4]. Vaginal hysterectomy (VH) is one of the most frequently performed surgical procedures to treat advanced POP. Primary intraoperative complications of this procedure include visceral injury, infection, and hemorrhage. Reported rates of hemorrhage range from 1.4% to 2.6%, while those of ureteral and bladder injury range between 0.88% and 1.76%, respectively [5]. Infections occur in approximately 4–6% of all women [6,7] and may be related to the surgical technique used [8].

Some physicians advocate for an obliterative surgical operation, like colpocleisis, as a good therapeutic option for frail and elderly women with advanced POP and significant medical co-morbidities who are not sexually active [1,9]. This technique is based on the premise that apposition of the vaginal walls can prevent uterine prolapse and that a widened genital hiatus may lead to unsuccessful outcome [10]. It includes dissection of the vaginal mucosa away from both the anterior and posterior vaginal walls followed by approximation of these surfaces to one another while pushing the pelvic viscera back into the pelvis. Colpocleisis can be performed with or without concom-

itant hysterectomy; however, the addition of hysterectomy has been associated with a significant increase in operative time and transfusion rates compared to no hysterectomy [1].

It has been estimated that obliterative vaginal procedures represent only 0.5–5% of all pelvic reconstructive procedures performed today [11]. However, as the population ages, this surgical technique, which is well suited for patients with multiple medical co-morbidities and with no desire for further penetrative vaginal function, may be increasingly utilized. Notably, while not commonly performed, colpocleisis has been associated with excellent and durable anatomic outcomes, improved body image scores, and high patient satisfaction [12]. Likewise, in well-selected patients, low rates of regret over the loss of penetrative vaginal function have been reported. In addition, colpocleisis is associated with low perioperative morbidity [13]. In a recent comprehensive review of the colpocleisis literature, FitzGerald and colleagues [14] reported success rates of 91–100%, variable rates of major and/or minor postoperative complications, and regret rates of 3–9% [14]. Similar findings were noted by Wheeler and co-authors in their retrospective series [15]. To the best of our knowledge, and after Medline search of the English literature starting from 1966, only one comparative study has been published regarding the outcome of colpocleisis vs. VH for the treatment of advanced POP [16]. The aim of the current study was therefore to compare these outcomes in the setup of a university-affiliated tertiary medical center.

PATIENTS AND METHODS

In this retrospective study, charts of all patients who underwent VH or colpocleisis at our institution between January 2006 and December 2015 for advanced POP were reviewed. Both inpatient and outpatient charts, as well as demographic and clinical data were recorded. Colpocleisis is an obliterative procedure which involves attachment of the anterior and posterior vaginal walls to one another thereby blocking the vaginal outlet and preventing POP. Our research goal was to compare short- and long-term outcome of VH vs. colpocleisis for the treatment of advanced (stage III or IV) POP. Women aged 60–90 years were included in the study while those who underwent concomitant VH and colpocleisis, or those in whom surgery was performed for other indications apart from POP were excluded from the study. Colpocleisis and VH were compared with regards to patient's medical history as well as peri- and postoperative data. Long term surgical success rates were compared including prolapse recurrence as well as urinary and gastrointestinal symptoms. The degree of POP was determined according to the Baden & Walker and the Pelvic Organ Prolapse Quantification (POPQ) systems [17,18]. During the study period all women visiting our urogynecology clinic were requested to fill the Pelvic Floor Distress Inventory (PFDI-20) questionnaire pre- and postoperatively. Comparisons between groups were performed using Student's *t*-test for continuous variables, and Fisher exact or Chi square tests for categorical variables. A P value < 0.05 was considered statistically significant for all comparisons. Quantitative data are presented as mean ± standard deviation, median (range) or number (percent). The study was approved by the Carmel Medical Center Institutional Review Board Committee for Human Subjects (0187-15-CMC).

RESULTS

A total of 188 patients who had undergone VH and 32 patients who had undergone colpocleisis were identified. Thirteen patients from the VH group were excluded for not meeting inclusion criteria. The mean age was 70.6 ± 6.7 years. The colpocleisis group was significantly older than the VH group (79.5 ± 4.5 vs. 69 ± 6.1 years respectively, $P < 0.0001$) whereas parity was significantly higher in the VH group [3 (2–4) vs. 2 (1–3) respectively, $P < 0.022$ [Table 1]. Patients in the colpocleisis group presented with significantly higher co-morbidity rates including diabetes, hypertension, and ischemic heart disease [Table 1]. This group also had lower rates of overactive bladder syndrome (OAB) (12.5% vs. 45.5%, $P < 0.0001$) and a higher degree of uterine prolapse (4 [2–4] vs. 3 [1–4], $P < 0.0001$), cystocele (3 [1–4] vs. 2 [0–4], $P = 0.004$), and rectocele (3 [1–4] vs. 2 [0–4], $P < 0.0001$) [Table 2]. While only three patients (9%) from the colpocleisis group underwent additional procedures for POP repair, 94% of the patients from the VH group underwent concomitant anterior colporrhaphy and 61% underwent concomitant posterior colporrhaphy [Table 3]. All patients from the VH group but none from the colpocleisis group also underwent McCall culdoplasty. In contrast, concomitant transvaginal tape was performed more frequently among the colpocleisis as compared to the VH group (68% vs. 46% respectively, $P = 0.022$). Perioperative blood loss was significantly lower (250 ± 7.6 ml vs. 300 ± 115 ml, $P < 0.0001$) and postoperative hospital stay was significantly short-

Table 1. Demographic and clinical characteristics of the study population

	Vaginal hysterectomy (n=175)	Colpocleisis (n=32)	*P*-value
Age	69 ± 6.06	79.5 ± 4.5	**< 0.0001**
Parity	3 (0–12)	2 (1–11)	**< 0.022**
Diabetes	29 (17.4)	14 (43.8)	**0.001**
Hypertension	97 (58)	29 (90.6)	**< 0.0001**
Ischemic heart disease	30 (18)	16 (50)	**< 0.0001**

Values are presented as mean ± standard deviation, median (range) or number (%)

Bold signifies statistical significance

Table 2. Demographic and clinical characteristics of the study population

	Vaginal hysterectomy (n=175)	Colpocleisis (n=32)	*P*-value
Uterine prolapse (degree)	3 (1-4)	4 (2-4)	**< 0.0001**
Anterior wall prolapse (degree)	2 (0-4)	3 (1-4)	**< 0.0004**
Posterior wall prolapse (degree)	2 (0-4)	3 (1-4)	**< 0.0001**
POP-Q			
Ba (cm)	4 ± 1.9	6 ± 2.2	**0.001**
C (cm)	3 ± 3.5	4 ± 4.4	**0.009**
Bp (cm)	-0.4 ± 1.9	1.9 ± 3.7	**0.015**
SUI	85 (51)	20 (63)	0.22
OAB	76 (46)	4 (13)	**< 0.0001**

Values are presented as mean ± standard deviation, median (range) or number (%)

Bold signifies statistical significance

OAB = overactive bladder syndrome, POP-Q = Pelvic Organ Prolapse Quantification System, SUI = stress urinary incontinence

Table 3. Peri- and postoperative course

	Vaginal hysterectomy (n=175)	Colpocleisis (n=32)	*P*-value
Additional surgical procedures			
Anterior colporrhaphy	166 (94)	0 (0)	**0.0001**
Posterior colporrhaphy	103 (61)	3 (9)	**0.0001**
Transvaginal tape	78 (46)	22 (68)	**0.022**
McCall Culdoplasty	175 (100)	0 (0)	**0.0001**
Hospital stays (days)	3 ± 1.2	2 ± 0.3	**0.012**
Perioperative blood loss (ml)	300 ± 115	250 ± 7.6	**0.022**
Time with a catheter (days)	5 ± 4.5	2 ± 0.3	**0.001**
Fever (› 38°C)	19 (11.4)	2 (6.5)	0.539
Pelvic infection	4 (2.4)	1 (3.1)	0.589
Pelvic hematoma	9 (5.4)	2 (6.3)	0.692
Cardiac complications	4 (2.4)	0 (0)	> 0.99
Vascular complications	4 (2.4)	0	> 0.99
Readmission in one month	12 (7.3)	1 (3.1)	0.698
Total complication	54 (31)	8 (25)	**< 0.0001**

Values are presented as mean ± standard deviation, median (range) or number (%)

Bold signifies statistical significance

er (2 ± 2.7 vs. 3 ± 2.2 days, $P = 0.015$) among the colpocleisis group [Table 3]. While none of the patients from the colpocleisis group required an indwelling urethral catheter after their discharge from the hospital, 27.5% of the patients from the VH group were discharged with an indwelling catheter ($P = 0.001$). Last, total postoperative complication rates were significantly lower among the colpocleisis group compared to the VH group (25% vs. 31% $P < 0.0001$).

Long-term data were available for 144 patients from the VH group and 17 patients from the colpocleisis group, with a mean follow up time of 24 months (range 18–36 months). Objective recurrence of POP (≥ 2nd degree) was significantly more common among the VH group (7% vs. 0% and 21% vs. 0% for the anterior and posterior compartments, respectively, $P = 0.04$), whereas subjective recurrence rates (2.8% vs. 0% respectively, $P > 0.99$) were not significantly different between the two groups [Table 4].

Postoperative resolution of both OAB (70% vs. 52%, $P = 0.1$) and stress urinary incontinence (SUI) (95% vs. 94%, $P = 0.56$) were similarly common in both groups, while de novo occurrence of these disorders was similarly rare in both groups (0.2% vs. 0%, $P = 0.1$ and 0.7% vs. 0%, $P = 0.56$, respectively). Postoperative resolution of fecal incontinence (11% vs. 3%, respectively) was significantly more common and de novo occurrence of this problem (0% vs. 1.4%, respectively) was significantly less common among the colpocleisis group ($P = 0.015$). Resolution of constipation (32% vs. 29%) was more common and de novo occurrence of this problem (5% vs. 9%) was less common among the colpocleisis group; however, these differences were not statistically significant ($P = 0.2$) [Table 4].

DISCUSSION

Obliterative vaginal procedures offer high success rates and low surgical morbidity with the only contraindication being the desire to maintain vaginal patency and sexual intercourse. Our data clearly show that colpocleisis is associated with lower perioperative morbidity compared to VH with pelvic floor reconstruction. Moreover, objective recurrence of POP was less common, and resolution of fecal incontinence was more common among the colpocleisis group. Traditionally, colpocleisis has been reserved for elderly women with advanced POP who are not engaged in vaginal intercourse and for patients with multiple co-morbidities who are not candidates for long and extensive surgery [1]. Indications for obliterative prolapse repair are generally the same as for other POP repair procedures. However, obliterative procedures are less invasive and better tolerated by frail, elderly women than reconstructive procedures [19]. Petcharopas et al. [16] found colpocleisis to be associated with a significantly shorter hospital stay and reduced negative impact on patient's quality of life.

In our study we performed a retrospective analysis, which in-

Table 4. Peri- and postoperative course

	Vaginal hysterectomy (n=175)	Colpocleisis (n=32)	*P*-value
Subjective POP recurrence	4 (2.8)	0 (0)	> 0.99
Objective POP recurrence			
Anterior*	10 (7)	0 (0)	**0.04**
Posterior*	30 (21)	0 (0)	**0.04**
Apical*	8 (5.7)	0 (0)	0.6
SUI			
Resolved	132 (95)	16 (94)	0.56
Remained	6 (4.3)	1 (5.9)	
De-novo	2 (0.7)	0 (0)	
OAB			
Resolved	100 (70)	9 (52)	0.2
Remained	41 (29)	8 (47)	
De-novo	3 (0.2)	0 (0)	
Fecal incontinence			
Resolved	4 (3)	2 (11)	**0.015**
Remained	2 (1.4)	3 (17)	
De-novo	2 (1.4)	0 (0)	

Values are presented as mean ± standard deviation, median (range) or number (%)

Bold signifies statistical significance

* ≥ 2nd degree

OAB = overactive bladder syndrome, POP = pelvic organ prolapse, SUI = stress urinary incontinence

cluded a total of 207 patients, 175 of whom underwent VH and 32 who underwent colpocleisis for the treatment of advanced POP. Despite their inferior baseline characteristics including more advanced POP and higher co-morbidity rates, peri- and postoperative complication rates were significantly lower among the colpocleisis group. More specifically, perioperative blood loss, urinary retention and total complication rates were significantly lower and hospital stay was significantly shorter among this group of patients. Other complications such as postoperative fever, cardiac and vascular complications, as well as readmission rates were lower among the colpocleisis group; however, these differences did not reach statistical significance, presumably due to a relatively small sample size. These findings are in accordance with previously reported data showing that colpocleisis is associated with low perioperative complication rates [20]. Long-term outcome of the colpocleisis group showed several advantages over the VH group. While objective prolapse recurrence rates were low in both groups, they were significantly lower in the colpocleisis group. These findings are in accordance with previously published studies that reported anatomical success rates for colpocleisis of 91–100% [21,22], compared to the high (around 30%) anatomic recurrence rates reported for VH [23]. Previous studies have shown that colpocleisis improves voiding function by relieving functional obstruction from the prolapsed organs. Furthermore, irritative bladder symptoms such as urinary urgency and frequency were reduced as much as 50% for these patients [19]. With regard to the effect of VH on urinary symptoms, data seem to be more controversial [24]. A nationwide study by Altman and colleagues [25] found a doubled risk for de novo stress urinary incontinence after VH. The risk was highest in the first few years after hysterectomy but leveled by the 10-year follow-up. In our study resolution of OAB and SUI were similarly high and de novo occurrence rates were similarly low in both groups. With regard to bowel symptoms, previous studies have reported some improvement in bowel symptoms such as obstructed defecation after colpocleisis. Zebede and colleagues [13] reported improvement of constipation in 1 of 4 patients and of fecal incontinence in 1 of 3 patients. In contrast, VH was reported to be associated with more bothersome defecation symptoms compared to abdominal hysterectomy, including flatus and fecal incontinence. In our study, resolution rates of fecal incontinence were higher while de novo occurrence rates of this problem were lower among the colpocleisis group. Nonetheless, both resolution and de novo occurrence rates of constipation were not significantly different between the two groups.

STRENGTHS AND LIMITATIONS

One of the main strengths of the current study was the utilization of the validated PFDI-20 questionnaire to assess patient's urinary and defecatory symptoms. Its limitations include a relatively small sample size and a retrospective design. Baseline preoperative characteristics of the colpocleisis group (including older age, higher degree of prolapse, and higher co-morbidity rates) were substantially inferior to the VH group. Despite these differences, peri- and postoperative course was more favorable among the colpocleisis group, emphasizing the superiority of this procedure over VH for the treatment of POP in frail elderly patients. A national study [25] found that incorporating frailty into preoperative decision making is important for improving both subjective and objective outcomes among elderly women considering POP surgery. Our study results indicate that colpocleisis is a safe and effective procedure for older patients and for those with low performance status who are not interested in future vaginal patency or sexual intercourse. Furthermore, this procedure has a clear advantage over standard pelvic reconstructive procedures in terms of perioperative and long-term postoperative outcome. In view of the consistent increase in life expectancy and the growth of the geriatric population in modern countries, obliterative procedures are likely to become more prevalent. Further studies, preferably utilizing a prospec-

tive design are indicated to refine our understanding of the role of obliterative vs. non-obliterative vaginal procedures for the treatment of POP, including indications, perioperative course, and potential risks and benefits for various patient populations.

CONCLUSIONS

Colpocleisis is associated with lower perioperative morbidity, shorter hospital stays, higher anatomic success rates, and lower objective recurrence rates compared to VH. Furthermore, colpocleisis has several long-term advantages with regard to defecatory symptoms. Obliterative vaginal procedures are a good option for frail and elderly patients with multiple co-morbidities who are not candidates for extensive surgery and who are not interested in future vaginal patency or sexual intercourse.

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Capsule

Some viruses mix it up

Respiratory viruses such as influenza virus (IAV) and respiratory syncytial virus (RSV) are common among children and may cause co-infections, sometimes with exacerbated symptoms. Such infections are likely to have different dynamics from single infections. **Haney** and co-authors examined IAV and RSV coinfections in human lung cells in vitro and observed hybrid virus particles with surface glycoproteins and ribonucleoproteins from both viruses. Although RSV tends to be at a disadvantage in coinfections with IAV, the hybrids could apparently evade anti-influenza antibodies by using the RSV fusion glycoprotein to get into cells from which IAV receptors had been removed. Proteins from both viruses were found to colocalize on the apical side of bronchial epithelial cells. The authors did not test whether these hybrid viruses are transmissible between animals in vivo.

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