

# Obliterative LeFort Colpocleisis in a Large Group of Elderly Women

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**OBJECTIVE:** To report on anatomical and functional outcomes, patient satisfaction, and associated morbidity and mortality in patients undergoing LeFort colpocleisis.

**METHODS:** This was a retrospective case series of LeFort colpocleisis performed from January 2000 to October 2011. Data obtained from a urogynecologic database included demographics, comorbidities, medications, and urinary and bowel symptoms. Prolapse was quantified using the pelvic organ prolapse quantification (POP-Q) examination. Operative characteristics were recorded. All patients underwent pelvic examination and POP-Q assessment at follow-up visits. Patients also were asked about urinary and bowel symptoms as well as overall satisfaction. All intraoperative and postoperative surgical complications were recorded.

**RESULTS:** Three hundred twenty-five patients underwent LeFort colpocleisis. Fifteen patients were excluded from the analysis because of incomplete data. The mean age was  $81.3 \pm 5.3$  years. Comorbidities were common, with 74.1% of the patients having at least one concomitant medical condition. The procedure was performed under spinal anesthesia in 67%. Additional procedures at the time of colpocleisis included incontinence procedures (79%) and dilation and curettage (46%). Mean follow-up was 45 (range 2–392) weeks. Anatomical success rate was 98.1% and patients were highly satisfied, with 92.9% reported being “cured” or “greatly improved.” Complication and mortality rates were 15.2% and 1.3%, respectively.

**CONCLUSION:** Colpocleisis is an effective and low-risk procedure with high anatomical success rates and patient

satisfaction. Associated morbidity and mortality related to the procedure are low. Colpocleisis remains an excellent surgical option for the elderly patient with advanced pelvic organ prolapse.

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**LEVEL OF EVIDENCE: III**

By 2050, the elderly will represent the largest section of the population and pelvic floor dysfunction is projected to affect 58.2 million women in the United States. We thus can expect to see an increase in the demand for urogynecologic services in this population.<sup>1,2</sup> Most women older than age 65 years are afflicted with at least one chronic medical condition, and, with the rate of comorbid conditions increasing with age, surgery to treat pelvic floor dysfunction in the elderly can present a challenge for the pelvic reconstructive surgeon.<sup>3</sup> In fact, women older than age 80 years undergoing urogynecologic procedures have a 13.6 times increased risk of death after the procedure compared with their younger counterparts.<sup>4</sup> Factors increasing surgical morbidity include long operative time, significant blood loss, and anesthesia-related complications. Colpocleisis, a vaginal obliterative procedure, can be a viable option for elderly women with pelvic organ prolapse because of its simplicity, reported good anatomical outcomes, minimal anesthesia requirements, short operative times, and less blood loss compared with reconstructive procedures.<sup>5</sup>

Previous published studies include several descriptive case series reviewing anatomical outcomes as their primary focus. However, many of these series are small and lack a comprehensive characterization of preoperative symptomatology, patient comorbidities, and comprehensive postoperative outcomes, including anatomical and functional aspects. In addition, most published reports have only historical value, being at least 30 years old, and likely do not

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apply to the current elderly population and current practice of medicine.<sup>6</sup>

The objective of this descriptive retrospective review was to report on the LeFort colpocleisis procedure not only as it relates to anatomical outcomes but also as it relates to resolution of patient symptoms, surgical satisfaction, and associated morbidity and mortality.

## MATERIALS AND METHODS

This single-center chart review was approved by the Cleveland Clinic Florida Institutional Review Board. All patients who underwent a LeFort colpocleisis between January 2000 and October 2011 were included in the review. Patient information was obtained from the institution's urogynecologic database and patients with incomplete data were excluded. The LeFort colpocleisis is our preferred obliterative technique regardless of the presence of a uterus, and thus no colpectomies were performed. The procedure is offered to elderly women older than 65 years with advanced vaginal prolapse who do not have and do not express a desire for future sexual intercourse. During the study period, all procedures were performed by two fellowship-trained female pelvic reconstructive surgeons with the assistance of fellows in training. Our standard protocol includes preoperative medical clearance, one dose of preoperative intravenous antibiotic, prophylaxis for deep vein thrombosis, and recommendation for regional anesthesia.<sup>7</sup> The LeFort procedure was performed using a standard technique previously described in detail (Video 1, available online at <http://links.lww.com/AOG/A343>).<sup>8</sup> Essentially, rectangular portions of the anterior and posterior vaginal walls are demarcated with a sterile marker and the epithelium is removed with sharp dissection. The denuded areas are then sewn together front-to-back in progressive rows of 2-0 vicryl interrupted suture. A high perineor-

raphy was performed in all cases and concomitant incontinence procedures were performed as indicated.

Demographic information collected included age, body mass index (calculated as weight (kg)/[height (m)]<sup>2</sup>), parity, smoking status, history of prolapse surgery or hysterectomy, and degree of prolapse on examination. Comorbid conditions of interest included hypertension, heart disease, diabetes, depression, pulmonary disease, neurologic disease, history of cerebrovascular disease accident, and thyroid disease. The age-adjusted Charlson comorbidity index was calculated for all individuals. Patients with a Charlson comorbidity index of 0–2 points were considered to be at low risk, 3–5 points indicated moderate risk, and 6 or more points indicated high risk.<sup>9,10</sup> Patient symptomatology also was recorded, including the presence of pelvic pain, any urinary and bowel symptoms, or both. Urinary symptoms included stress and urge incontinence, voiding dysfunction, and urinary retention. Bowel symptoms were categorized as constipation, obstructive defecation, and fecal incontinence.

Urodynamic testing was performed for all patients to assess any bladder symptoms and to identify "occult" stress incontinence. All urodynamic tests performed at our institution include multichannel cystometry, pressure uroflowmetry, and urethral pressure profilometry. Concomitant sling placement when indicated and choice of sling were based on urodynamic parameters previously published at our institution.<sup>11</sup> Additionally, when performing an obliterative procedure, it is our standard of practice to evaluate the endometrium and uterus before surgery by recommending pelvic ultrasonography. Concomitant dilatation and curettage is then performed in those patients with abnormal or inconclusive ultrasound results.

The operative report was reviewed to confirm type of anesthesia, estimated blood loss, and any operative complications. Complications were categorized as intraoperative or postoperative, with postoperative complications further divided into early or late complications. Early complications were defined as those occurring within the first postoperative week, whereas late complications were defined as those occurring after the first postoperative week until 3 months after the surgery. To ensure that we obtained complete information on any and all complications, all operative reports, discharge summaries, outpatient notes, any emergency room visits, and all documented telephone calls were reviewed. Perioperative complications were separated into systems that included urogenital, pulmonary, gastrointestinal, skin, cardiovascular, neurologic, and renal and death. These included urinary tract infections, pulmonary embolism, bowel perforations,



**Video 1.** LeFort colpocleisis for advanced vaginal prolapse.

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hematomas, abscess, congestive heart failure, arrhythmia, and deep vein thrombosis.

Patients returned to our clinic for postoperative visits typically at 2 weeks, 6 weeks, 6 months, and then yearly. At every postoperative visit, all patients were questioned regarding any medical problems, pelvic floor symptoms, and overall patient satisfaction. In our practice, patients are questioned at each postoperative follow-up visit about whether they feel “cured,” “greatly improved,” “somewhat improved,” “not improved,” or “worsened” regarding their surgical procedure. This is a “global” scale of postoperative patient satisfaction that is used consistently at our institution. Any anatomical symptoms or prolapse recurrence also was recorded after pelvic examination. Pelvic organ prolapse quantification scoring was used to report prolapse type and stage. We defined overall success based on anatomical criteria as prolapse stage 1 or less documented at any postoperative follow-up visit.

Statistical analysis was performed using JMP 9 software. Data were analyzed with use of Wilcoxon rank-sum test for continuous variables and McNemar  $\chi^2$  test for categorical data. Kaplan-Meier analysis was performed to account for variable weeks of follow-up.

## RESULTS

A total of 325 patients underwent LeFort colpocleisis during the study period. Fifteen patients were excluded because of incomplete data, leaving a cohort of 310 patients for analysis. The mean age was  $81.3 \pm 5.3$  years and the mean body mass index was  $26.4 \pm 4.8$ . Two hundred eighteen (70%) patients presented with stage 4 vaginal prolapse and an additional 82 (26%) presented with stage 3 prolapse. Sixty-one (20%) patients had a history of prolapse surgery. All other demographic information is presented in Table 1.

Medical comorbidities of the cohort are listed in Table 2. Two hundred thirty (74.1%) patients had at

**Table 1. Demographic Information (N=310)**

Age (y)	81.3±5.3
Body mass index (kg/m <sup>2</sup> )	26.4±4.8
Parity	2 (0–13)
Current smoker	3 (0.01)
Previous hysterectomy	137 (44)
Previous prolapse surgery	61 (19.6)
Previous incontinence surgery	35 (11.2)
Pessary use	164 (52.9)
Prolapse stage	
II	10 (3.2)
III	82 (26.4)
IV	218 (70)

Data are mean±standard deviation, median (range), or n (%).

**Table 2. Comorbid Conditions (N=310)**

	n (%)	95% CI for Proportion
Hypertension	180 (58)	0.525–0.634
Heart disease	97 (31.3)	0.263–0.367
Diabetes	47 (15.1)	0.116–0.196
Depression	37 (11.9)	0.088–0.160
Pulmonary disease	33 (10.6)	0.077–0.146
Neurologic disease	28 (9)	0.063–0.127
History of cerebrovascular accident	23 (7.4)	0.05–0.109

CI, confidence interval.

least one comorbid condition and 164 (53%) had two or more comorbidities. The most common comorbid condition was hypertension, followed by cardiac disease. According to the age-adjusted Charlson comorbidity index scores, two (1%) patients were considered as being at low risk, 227 (73%) were at moderate risk, and 81 (26%) were at high risk.

Two hundred eight (67%) procedures were performed under spinal anesthesia, local anesthesia with intravenous sedation was used for three patients, and the remaining procedures were performed with general endotracheal anesthesia. Concomitant procedures included two (less than 1%) transvaginal hysterectomies, one (less than 1%) hysteroscopic resection of an intrauterine mass, 143 (46%) dilation with curettage procedures, and 244 (79%) incontinence procedures. Of these, 134 (55%) had retropubic slings and 96 (39%) had transobturator slings. In addition, eight underwent a suburethral Kelly-type plication and six had bulking agent injections at the time of surgery. In our cohort, 217 (70%) of the patients had placement of a Bonnano suprapubic catheter, and all patients discharged with a catheter were administered prophylactic antibiotics. Median blood loss was 100 (range 50–300) mL. Atypical or precancerous pathology was found on endometrial tissue samples of three patients. None chose any further evaluation or intervention.

Intraoperative complications occurred in five (1.6%) patients and included two small bladder perforations secondary to placement of needles for sling procedures<sup>1</sup> and iatrogenic uterine and bowel perforation during concomitant hysteroscopic resection of a uterine mass. Additionally, two complications occurred because of suprapubic catheter placement, with one resulting in a space of Retzius hematoma that was self-limited and one large bowel injury.

Postoperative complications occurred in 47 (15.16%, 95% confidence interval [CI] for proportion 0.116–0.196) patients. Complications were categorized according to whether they occurred early (within 1 week after surgery) or late (1 week to 3 months after



**Table 3. Postoperative Adverse Events Classified by Organ System (n=46)**

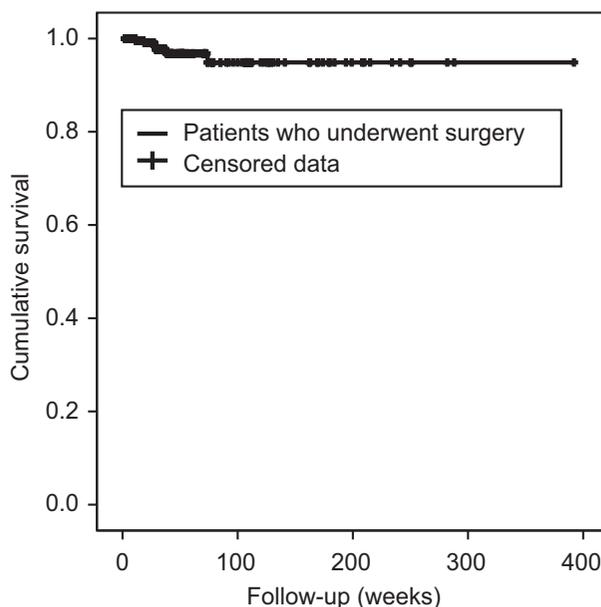
	Early (n=310)	Late (n=258)
Urogenital		
UTI	4	20
Urinary retention	0	1
Pulmonary		
Embolism	1	1
Gastrointestinal		
Severe diarrhea	1	0
Electrolyte imbalance	1	0
Perforated duodenal ulcer	0	1
Hematologic		
Anemia or hematoma	1	0
Infectious		
Urosepsis	2	1
<i>Clostridium difficile</i> colitis	0	1
Groin abscess	0	1
Neurologic		
Delirium	2	0
Cardiovascular		
Heart failure	1	0
Atrial fibrillation	1	0
DVT	1	0
Mortality		
Pulmonary embolism	1	1
Myocardial infarction	0	1
Septic shock	0	1

UTI, urinary tract infection; DVT, deep vein thrombosis. Data are n.

surgery) during the postoperative course and are listed in Table 3. Of the 310 patients, 258 (83%) had follow-up at 3 months or later. However, those without 3-month follow-up visits in our urogynecology clinic had visited other providers within our health system and review of all office notes did not reveal any other complications. Urinary tract infection was the most common complication encountered, affecting 25 (9%) patients. All cases of infection were confirmed with a positive urine culture. Common pathogens included *Klebsiella pneumoniae* (in eight), *Escherichia coli* (in seven), *Escherichia faecalis* (in six), *Staphylococcus aureus*, and multiple organisms (in four). During the postoperative course, four deaths occurred, resulting in a 1.3% mortality rate (95% CI for proportion 0.005–0.033). These included two pulmonary emboli, one myocardial infarction occurring 42 days after surgery, and one patient with development of sepsis and multiorgan failure after bowel injury occurring intraoperatively during concomitant hysteroscopic leiomyoma resection. This patient was readmitted on postoperative day 4 and exploratory laparotomy revealed a 1-cm defect in the anterior uterine fundus and thermal injury to the small bowel. This was

repaired; however, the patient experienced multiorgan failure and died. Median postoperative follow-up was 25 weeks (range 2–392). Because of variable weeks of follow-up, Kaplan-Meier analysis was performed to determine cumulative success of the procedure (Fig. 1). The mean time from the procedure until failure according to Kaplan-Meier analysis was 374.20 weeks (95% CI 358.53–389.53). The surgery resulted in high patient satisfaction, with 288 (92.9%) reporting a self-assessment of being cured or greatly improved. Recurrent prolapse occurred in six (1.9%) patients, resulting in a 98% anatomical success rate. All the successfully treated patients had a genital hiatus of 0.5–1.0 cm and stage 0 prolapse. The six recurrences involved C +6.0 (in one patient), Aa or Ba 0 (in one patient), Ap or Bp 0 (in three patients), and unilateral right-side suture line breakdown with Ap or Bp +2 (in one patient). Four patients underwent reoperation with a repeat colpopelvis and two elected to use a pessary.

Functional outcomes including urinary and bowel symptoms before and after surgery are illustrated in Table 4. There were 244 (79%, 95% CI for proportion 0.738–0.829) patients with a preoperative diagnosis of stress urinary incontinence. Of these, 19 (6.1%) reported pure stress incontinence, 68 (21.9%) reported mixed incontinence, and 157 (51%) patients had occult stress incontinence diagnosed during examination with reduction of the prolapse. Overactive



**Fig. 1.** Time until failure of procedure. The mean time until failure (95% confidence interval [CI]) was 374.20 weeks (358.53–389.53).

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**Table 4. Functional Outcomes**

	Preoperative	Postoperative	P*
Bowel symptoms			
At least one symptom	160	112	.002
Constipation	112	85	.019
Obstructed defecation	55	29	.001
Fecal incontinence	44	29	.044
Urinary symptoms			
Stress incontinence	87	20	.001
Urge incontinence	168	81	<.001
Voiding dysfunction	111	73	<.001
Urinary retention	151	28	<.001

Data are n unless otherwise specified.

\* P calculated using McNemar  $\chi^2$  test.

bladder symptoms were present preoperatively in 168 patients (54.1%, 95% CI for proportion 0.486–0.597) and resolved in approximately half. After colpopcleisis, de novo incontinence occurred in 30 patients (9.7%, 95% CI 0.067–0.137), including de novo urge in 24 and de novo stress in 6. Also, as seen in Table 4, reported bowel symptoms significantly decreased after surgery.

## DISCUSSION

LeFort colpopcleisis consistently has proven to be an effective durable surgical therapy for elderly patients with pronounced vaginal prolapse.<sup>12–17</sup> However, previous studies lack a comprehensive characterization of preoperative symptoms and postoperative functional and anatomical outcomes. Our study is a retrospective analysis of LeFort colpopcleisis patients, complete with preoperative patient comorbidities and descriptive data. Our anatomical success rate was 98.1%, similar to that seen in previous studies.<sup>6</sup> In addition, patient satisfaction is high after colpopcleisis and 93% of our patients reported being cured or greatly improved on self-assessment. This number is again similar to that reported in other articles examining quality of life and surgical satisfaction after colpopcleisis.<sup>13,18–20</sup>

Because the incidence of comorbid medical conditions increases with age, surgical intervention for pelvic floor disorders in the elderly requires careful consideration. With a mean age of  $81.3 \pm 5.3$  years, it is not surprising that 74.1% of patients in our cohort presented with at least one medical comorbidity. According to stratification by the age-adjusted Charlson comorbidity index, 99% of the cohort were at least considered as being at moderate risk and 26%

were considered as being at high risk. Although a previous study performed by Stepp et al did not validate the use of the Charlson comorbidity index as a risk assessment tool to predict the perioperative complications in this population, we used this tool to demonstrate that patients thought to be at high risk can still undergo a LeFort colpopcleisis without unacceptable morbidity.<sup>21</sup>

We have shown that the LeFort procedure is a low-risk and well-tolerated procedure. In this large series of patients, intraoperative and perioperative complications were infrequent. Of the complications, the majority were minor and urinary tract infections were the most common. It is important to note that four patients had urosepsis diagnosed, illustrating the need for postoperative vigilance, because urosepsis has a high rate of morbidity in this elderly population. Other major complications were unrelated to the colpopcleisis procedure itself but were a consequence of concomitant procedures such as hysteroscopy, sling procedures, and placement of a suprapubic catheter.

Preoperative assessment of the study group showed that 52% reported at least one bowel symptom, 28% reported stress incontinence, and 54% reported symptoms of urge incontinence. Urodynamic assessment also diagnosed occult stress incontinence in 51%, thereby emphasizing the importance of preoperative evaluation for occult incontinence.<sup>22,23</sup> In our cohort, 79% underwent a sling placement at the time of surgery. As demonstrated in a previous study from our center, we found that the addition of a sling at the time of colpopcleisis resulted in high rates of continence with minimal risk of postoperative voiding dysfunction and urinary retention.<sup>24</sup> Additionally, symptoms of urinary urgency and frequency may improve with the placement of a sling or prolapse surgery.<sup>24–26</sup> In our study, 54% reported preoperative urgency symptoms that were reduced by 50% postoperatively. A significant resolution of bowel symptoms also occurred. This is consistent with a previously published study by Gutman et al.<sup>27</sup>

When compared with other retrospective studies evaluating the outcomes of LeFort colpopcleisis, our study has several strengths. First, our cohort is the largest patient series in the literature. Unlike other studies, the same surgical technique was used for all patients regardless of whether there was a uterus present. Other publications group all patients who underwent different obliterative techniques in the same cohort, resulting in an imprecise understanding of the success rate or complications. Second, whereas most studies reported immediate postoperative complications, our patients were followed-up for 3 months



at a minimum, thereby giving a more accurate reporting of complication rates associated with this procedure. The limitations of our study are attributable to the inherent weakness of a retrospective study. Although we used a global assessment scale to evaluate symptom improvement, patients did not complete validated questionnaires preoperatively or postoperatively. Another limitation is that because our institution is primarily a referral center, and because many patients do not call Florida their permanent residence, follow-up beyond 1 year was difficult to achieve. Additionally, long-term follow-up in the elderly population may be limited by mobility issues, transportation issues, and other medical concerns that preclude adherence to long-term surgical follow-up.

In conclusion, LeFort colpopcleisis is a valuable option for elderly women with advanced prolapse. Our review demonstrated that LeFort colpopcleisis resulted in high success rates and few associated complications. Patients reported a high satisfaction rate and significant reduction in urinary and bowel symptoms. Based on this report, what once was thought to be a procedure of last resort may be considered a first-line option for elderly woman with advanced pelvic organ prolapse.

## REFERENCES

- United Nations, Population Division, DESA. World population ageing 1950-2050. Available at: <http://www.un.org/esa/population/publications/worldageing19502050/index.htm>. Retrieved March 14, 2012.
- Wu JM, Hundley AF, Fulton RG, Myers ER. Forecasting the prevalence of pelvic floor disorders in US women: 2010 to 2050. *Obstet Gynecol* 2009;114:1278-83.
- Centers for Disease Control and Prevention. Healthy aging. Helping people to live long and productive lives and enjoy a good quality of life. At a glance. 2011; CDC. Available at: <http://www.cdc.gov/chronicdisease/resources/publications/AAG/aging.htm>. Retrieved March 14, 2012.
- Sung VW, Weitzen S, Sokol ER, Rardin CR, Myers DL. Effect of patient age on increasing morbidity and mortality following urogynecologic surgery. *Am J Obstet Gynecol* 2006;194:1411-7.
- Abbasy S, Kenton K. Obliterative procedures for pelvic organ prolapse. *Clin Obstet Gynecol* 2010;53:86-98.
- FitzGerald MP, Holly ER, Sohail S, Thompson P, Zyczni H, Weber A. Colpopcleisis: a review. *Int Urogynecol J* 2006;17:261-71.
- Pollak JT, Davila GW, Kopka SL, Ciocon J. Urogynecological and reconstructive pelvic surgery in women aged 80 and older. *J Am Geriatr Soc* 2004;52:851-2.
- Neimark M, Davila GW, Kopka SL. LeFort colpopcleisis: a feasible treatment option for pelvic organ prolapse in the elderly woman. *J Pelvic Med Surg* 2003;9:1-7.
- Charlson M, Szatrowski TP, Peterson J, Gold J. Validation of a combined comorbidity index. *J Clin Epidemiol* 1994;47:1245-51.
- Koepke N, Paludan M, Petersen J, Hansen AT, Grau C, Hoyer M. Comorbidity index predicts for mortality after stereotactic body radiotherapy for medically inoperable early-stage non-small cell lung cancer. *Radiother Oncol* 2009;93:402-7.
- Guerette NL, Bena JF, Davila GW. Transobturator slings for stress incontinence: using urodynamic parameters to predict outcomes. *Int Urogynecol J* 2008;19:97-102.
- Harmanli OH, Dandolu V, Chatwani AJ, Grody MT. Total colpopcleisis for severe pelvic organ prolapse. *J Reprod Med* 2003;48:703-6.
- Fitzgerald MP, Richter HE, Bradley CS, Ye W, Visco AC, Cundiff GW, et al. Pelvic support, pelvic symptoms, and patient satisfaction after colpopcleisis. *Int Urogynecol J Pelvic Floor Dysfunct* 2008;19:1603-9.
- DeLancey JO, Morley GW. Total colpopcleisis for vaginal eversion. *Am J Obstet Gynecol* 1997;176:1228-32.
- Glavind K, Kempf L. Colpectomy or LeFort colpopcleisis—a good option in selected elderly patients. *Int Urogynecol J* 2005;16:48-51.
- Hanson GE, Keettel CW. The Neugebauer-LeFort operation—a review of 288 colpopcleises. *Obstet Gynecol* 1969;34:352-7.
- Goldman J, Ovadia J, Feldberg D. The Neugebauer-LeFort operation: a review of 118 partial colpopcleisis. *Eur J Obstet Gynecol Reprod Biol* 1981;12:31-5.
- Barber MD, Amundsen CL, Paraiso MFR, Wedner AC, Romero A, Walter MD. Quality of life after surgery for genital prolapse in elderly women: obliterative and reconstructive surgery. *Int Urogynecol J* 2007;18:799-806.
- Murphy M, Sternschuss G, Haff R, van Raalte H, Saltz S, Lucente V. Quality of life and surgical satisfaction after vaginal reconstructive vs. obliterative surgery for the treatment of advanced pelvic prolapse. *Am J Obstet Gynecol* 2008;198:573.e1-7.
- Hullfish KL, Bovbjerg VE, Steers WD. Colpopcleisis for pelvic organ prolapse patients: goals, quality of life and satisfaction. *Obstet Gynecol* 2007;110(2 Pt 1):341-5.
- Stapp KJ, Barber MD, Yoo EH, Whiteside JL, Paraiso MFR, Walters MD. Incidence of perioperative complications of urogynecologic surgery in elderly women. *Am J Obstet Gynecol* 2005;192:1630-6.
- Chaikin DC, Groutz A, Blaivas JG. Predicting the need for anti incontinence surgery in continent women undergoing repair of severe urogenital prolapse. *J Urol* 2000;163:531-4.
- Groutz A, Gold R, Pauzner D, Lessing JB, Gordon D. Tension-free vaginal tape (TVT) for the treatment of occult stress urinary incontinence in women undergoing prolapse repair: a prospective study of 100 consecutive cases. *Neurourol Urodyn* 2004;23:632-5.
- Smith AL, Karp DR, Lefevre R, Aguilar VC, Davila GW. LeFort colpopcleisis and stress incontinence: weighing the risk of voiding dysfunction with sling placement. *Int Urogynecol J* 2011;22:1357-62.
- Tahseen S, Reid P. Effect of transobturator tape on overactive bladder symptoms and urge urinary incontinence in women with mixed urinary incontinence. *Obstet Gynecol* 2009;113:617-23.
- Foster RT Sr, Barber MD, Paraiso MF, Walters MD, Weidner AC, Amundsen CL. A prospective assessment of overactive bladder symptoms in a cohort of elderly women who underwent transvaginal surgery for advanced pelvic organ prolapse. *Am J Obstet Gynecol* 2007;197:82.e1-4.
- Gutman RE, Bradley CS, Ye W, Markland AD, Whitehead WE, Fitzgerald MP. Effects of colpopcleisis on bowel symptoms among women with severe pelvic organ prolapse. *Int Urogynecol J* 2010;21:461-6.

