

# Reattachment of the endopelvic fascia to the apex during anterior colporrhaphy: does the type of suture matter?

Salomon Zebede · Aimee L. Smith · Roger Lefevre ·  
Vivian C. Aguilar · G. Willy Davila

Received: 16 January 2012 / Accepted: 10 June 2012 / Published online: 10 July 2012  
© The International Urogynecological Association 2012

## Abstract

**Introduction and hypothesis** We aimed to determine if the use of permanent suture for the apical fixation during traditional anterior colporrhaphy results in improved outcomes compared to delayed absorbable suture.

**Methods** A retrospective case-control study was performed in patients who underwent traditional non-grafted anterior colporrhaphy with reattachment of the anterior endopelvic fascia to the apex/cervix comparing permanent (group 1) or absorbable suture (group 2). Patients were matched based on age, body mass index, and presenting stage of prolapse. The primary outcome assessed was anterior wall vaginal prolapse recurrence defined as Pelvic Organ Prolapse Quantification (POP-Q) points Aa or Ba  $\geq -1$  cm. Secondary outcome measures included overall prolapse stage, subjective reporting of satisfaction, and any healing abnormalities or complications resulting from suture type.

**Results** A total of 230 patients were reviewed (80 in group 1 and 150 in group 2) and median follow-up was 52 (24–174) weeks. A statistically significant improvement in anterior wall anatomy was seen in group 1 compared to group 2 [(Aa  $-2.70 \pm 0.6$  cm vs  $-2.5 \pm 0.75$  cm,  $p=0.02$ ) and Ba ( $-2.68 \pm 0.65$  cm vs  $-2.51 \pm 0.73$  cm,  $p=0.03$ ), respectively]. Comparing prolapse stage, there were no observed differences between the groups. Exposure of the permanent suture occurred in 12 patients (15 %) and 5 (6.5 %) required suture trimming to treat the exposure.

**Conclusions** Reattachment of endopelvic fascia to the apex at the time of anterior colporrhaphy results in low recurrence rates. Use of permanent suture for apical fixation is

associated with improved anatomic correction at the expense of increased suture exposures.

**Keywords** Genital prolapse · Anterior colporrhaphy · Suture materials

## Introduction

Pelvic organ prolapse affects millions of women and surgical correction of anterior vaginal wall prolapse is a common gynecological procedure [1–3]. Anterior colporrhaphy, in which native tissue is plicated in the midline, has been a standard technique used for anatomic restoration of the anterior vaginal wall since first described by Kelly in 1913 [4–6]. However, recurrence rates as high as 40 % have been reported with these repairs [7–9]. In an attempt to improve outcomes, many surgeons have turned to the use of synthetic meshes due to reported cure rates as high as 93–100 % [10, 11]. Due to concerns over the morbidity associated with mesh use, many surgeons have begun to reexamine techniques and reevaluate the value of traditional repairs [12, 13].

Previously, studies investigating surgical outcomes have focused on comparing differences between procedures, with little information assessing modifications and improvements in technique [14]. Since most cystoceles begin as superior transverse fascial tears from the cervix/apex, we as well as others advocate incorporation of the apical-most plication stitch of the anterior colporrhaphy to the supportive tissue at the apex [15]. Addressing this defect with reattachment of the torn fascia at the time of anterior colporrhaphy restores the continuity between the anterior vaginal wall and apex and may decrease recurrences.

As many surgeons believe this stitch to be important for decreasing failure rates of anterior repair, the choice of suture material may be critical and affect the overall success

S. Zebede · A. L. Smith · R. Lefevre · V. C. Aguilar ·  
G. W. Davila (✉)  
Department of Gynecology, Urogynecology & Reconstructive  
Pelvic Surgery, Cleveland Clinic Florida,  
2950 Cleveland Clinic Boulevard,  
Weston, FL 33331, USA  
e-mail: davilag@ccf.org

of the repair. Previously, the choice of suture type had been at the discretion of the surgeon with little scientific evidence to guide this selection. While there are few published studies, it appears that the use of permanent sutures in reconstructive pelvic surgery may offer advantages over absorbable sutures. Specifically, one published study reported a lower failure rate following uterosacral ligament suspension with permanent suture compared to a delayed absorbable suture [16].

It was the objective of our study to examine the use of permanent suture for the apical-most plication stitch during traditional anterior colporrhaphy and determine if it results in improved outcomes compared to delayed absorbable suture.

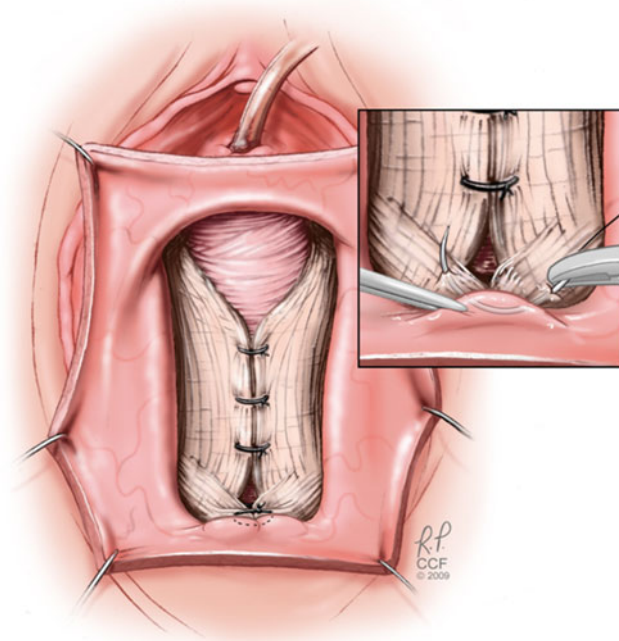
## Methods

This was an Institutional Review Board approved retrospective case-control study performed at a single institution comparing patients who underwent traditional non-grafted anterior colporrhaphy with reattachment of the anterior endopelvic fascia to the apex/cervix using a permanent 2-0 prolene suture (group 1) or an absorbable 2-0 vicryl suture (group 2).

Charts were obtained from a urogynecological database from January 2007 to December 2010. We excluded patients with less than 6 months follow-up, abdominal surgery, and repairs reinforced with synthetic meshes or biologic grafts. As of October 2008, surgeons at our institution switched to using a permanent suture for this apical fixation stitch. These patients were then matched in a 2:1 ratio based on age, body mass index (BMI), and presenting stage of prolapse to a control group of patients having undergone repair prior to October 2008 when absorbable suture was used. Patient demographics, preoperative Pelvic Organ Prolapse Quantification (POP-Q) examination, and operative characteristics were recorded. All operative reports were reviewed to confirm the type of suture used.

All procedures were performed by two fellowship-trained urogynecologists using the same technique for repair. All patients are given a standard dose of preoperative antibiotics and the procedure is started through vertical midline incision. The vaginal epithelium is then dissected off the underlying fibromuscular layer to the lateral vaginal sulci and up to the vaginal apex or cervix if present. This layer is then plicated in the midline using interrupted 2-0 polyglactin 910 suture (vicryl, Ethicon, Somerville, NJ, USA) from the level of the bladder neck to the vaginal apex. When placing the final most proximal suture we incorporate the endopelvic fascia with the cardinal ligaments, thus reattaching the anterior vaginal wall to the vaginal apex (either cervix or vaginal cuff). When the uterus is still present, the proximal suture is placed through the cervical stroma (Fig. 1).

In group 1, this stitch was permanent 2-0 prolene and in group 2 a 2-0 polyglactin 910 suture (vicryl, Ethicon,



**Fig. 1** Anterior vaginal fibromuscular layer plication highlighting incorporation of apical tissue into the most proximal plication suture

Somerville, NJ, USA) was used. Concomitant procedures including apical suspension and suburethral sling were performed as indicated.

At every follow-up visit overall patient satisfaction was assessed using a global scale and complete physical examination, including POP-Q assessment, was performed. The primary outcome assessed was prolapse recurrence of the anterior vaginal wall defined by POP-Q points Aa or Ba  $\geq$  -1. The final recorded follow-up visit was used to collect anatomic outcome data. Secondary outcomes included POP-Q points and any healing abnormalities or complications resulting from suture type including suture exposures occurring at any time during the follow-up period and presence of granulation tissue persistent after 12 weeks postoperatively. The treatment method for suture-related complications was also recorded. Data on vaginal estrogen use was not consistently present and therefore not assessed.

Statistical analysis was performed using JMP v9. Descriptive statistics were analyzed with use of Wilcoxon rank sums for continuous variables and Fisher's exact test for categorical data.

## Results

A total of 323 anterior colporrhaphies were performed at Cleveland Clinic Florida between January 2007 and December 2010. Of these patients 93 were excluded: 78 patients lacked sufficient follow-up, 4 patients had concomitant abdominal sacrocolpopexy, and in 11 patients the anterior

colporrhaphy was augmented with use of a biologic graft. The data from the remaining 230 patients were analyzed. Eighty patients underwent anterior colporrhaphy with the apical-most plication stitch incorporated into the apical support tissue with a permanent 2-0 prolene (group 1). In the remaining 150 patients the apical-most plication stitch was a 2-0 polyglactin 910 suture (group 2).

Baseline characteristics were similar in both groups and are presented in Table 1.

Patients presented with similar degrees of prolapse with most patients presenting with stage II-III anterior wall prolapse (Table 2). Concomitant procedures were similar between the groups and included vaginal hysterectomy with McCall culdoplasty (45 vs 52 %,  $p=0.3$ ), vaginal vault suspension (20 vs 24 %,  $p=0.5$ ), and suburethral slings (79 vs 75 %,  $p=0.6$ ). Median follow-up was 52 (24-174) weeks for group 1 and 52 (24-149) weeks for group 2 ( $p=0.13$ ).

Anterior wall POP-Q points significantly improved following surgery in both groups. However, patients in group 1 had better anatomic correction that was statistically significant for both POP-Q points Aa ( $-2.70\pm 0.6$  cm vs  $-2.5\pm 0.75$  cm, respectively,  $p=0.02$ ) and Ba ( $-2.68\pm 0.65$  cm vs  $-2.51\pm 0.73$  cm, respectively,  $p=0.03$ ). All other postoperative POP-Q points were similar between groups (Table 3).

Analysis of our primary outcome revealed no difference in anterior wall recurrence; 7 (8.8 %) patients in group 1 had failure with POP-Q point Ba  $\geq -1$  cm and 17 (11.3 %) patients in group 2 ( $p=0.5$ ). Two patients overall were symptomatic

**Table 1** Group characteristics

	Permanent (group 1), $n=80$	Absorbable (group 2), $n=150$	$p$ value
Age	62.8 $\pm$ 11.6	62.9 $\pm$ 10.6	0.9
BMI	26.5 $\pm$ 4.9	26.3 $\pm$ 5.2	0.7
Postmenopausal	69 (86)	123 (82)	0.9
Parity	2 (0–5)	2 (0–12)	0.8
Previous hysterectomy	23 (29)	41 (27)	0.9
Previous anterior repair	4 (5)	7 (5)	1.0
Concomitant surgery			
Hysterectomy + McCall culdoplasty	36 (45)	78 (52)	0.3
Apical suspension	16 (20)	36 (24)	0.5
Apogee vault suspension	16	35	
Sacrospinous hysteropexy	0	1	
Suburethral sling	63 (79)	112 (75)	0.6

Data are given as mean  $\pm$  standard deviation, median and range, or  $n$  (%) where appropriate

**Table 2** Mean preoperative POP-Q measurements

	Permanent (group 1), $n=80$	Absorbable (group 2), $n=150$	$p$ value
Aa	0.9 $\pm$ 1.6	0.8 $\pm$ 1.5	0.45
Ba	1.2 $\pm$ 1.9	1.3 $\pm$ 2.2	0.58
Ap	-0.3 $\pm$ 1.2	-0.8 $\pm$ 1.4	<0.01
Bp	-0.3 $\pm$ 1.4	-0.5 $\pm$ 1.7	0.27
C	-3.9 $\pm$ 4.3	-3.3 $\pm$ 4.2	0.28
TVL	9.2 $\pm$ 2.4	9.2 $\pm$ 2.5	0.97
gh	3.1 $\pm$ 1.0	3.0 $\pm$ 1.3	0.67
pb	3.4 $\pm$ 0.8	2.9 $\pm$ 0.8	<0.01

with their recurrence and desired reintervention. In group 1, one patient underwent repeat surgery utilizing a biologic graft and one patient in group 2 desired a pessary.

Overall, the majority of patients were satisfied following surgery. Sixty-eight (85 %) of the patients in group 1 reported being “cured” or “greatly improved” on self-assessment. In group 2, 108 (72 %) patients were “cured” or “greatly improved.” Additionally, there was no difference in the presence of granulation tissue at 12 weeks (14 vs 16 %, respectively,  $p=0.5$ ). There was a statistically significant increase in the number of patients in the permanent suture group that had visible suture present at their 6-week examination (15 vs 2.7 %,  $p<0.01$ ). Five (6.5 %) patients required intervention for the exposed suture by trimming in the office. Of note, this exposure did not only occur in the immediate postoperative period with our patients requiring intervention at a median of 51 weeks (12–55 weeks) after surgery. Operative intervention was not required in any case for treatment of suture exposures. There was no difference in the number of patients diagnosed with de novo dyspareunia due to the anterior stitch. One patient (1.3 %) in group 1 and three patients (2 %) in group 2 experienced de novo dyspareunia.

**Table 3** Mean postoperative POP-Q measurements

	Permanent (group 1), $n=80$	Absorbable (group 2), $n=150$	$p$ value
Aa	-2.7 $\pm$ 0.6	-2.5 $\pm$ 0.7	0.02
Ba	-2.6 $\pm$ 0.6	-2.5 $\pm$ 0.7	0.03
Ap	-2.6 $\pm$ 1.0	-2.8 $\pm$ 0.5	0.01
Bp	-2.6 $\pm$ 1.0	-2.7 $\pm$ 1.0	0.13
C	-8.1 $\pm$ 1.9	-7.9 $\pm$ 2.6	0.8
TVL	8.6 $\pm$ 2.3	8.8 $\pm$ 1.3	0.9
gh	2.1 $\pm$ 0.8	2.1 $\pm$ 0.8	0.9
pb	3.7 $\pm$ 0.7	3.7 $\pm$ 0.7	0.7

## Discussion

Surgical correction for anterior wall prolapse represents a frustrating challenge for the pelvic surgeon. Despite anterior colporrhaphy first being described over a century ago, there has been little modification in technique and few published reports of what the ideal surgical technique is. It is surprising that as one of the most frequently performed prolapse repairs, there is little evidence clearly supporting one technique over others.

Unlike previous reported failure rates for native tissue anterior wall prolapse repair ranging from 20 to 70 %, our review revealed that when the vaginal wall fibromuscular layer is carefully dissected and plicated and all anatomic fascial defects are adequately addressed failure occurs in only 10 %, with even fewer patients developing symptomatic prolapse recurrence. In our study, overall recurrence rates were low; however, there were no observed differences between the groups.

Our data support the concept that the reattachment of the anterior wall endopelvic fascia to the apical support tissue is of critical importance and may play a significant role in improving success rates. Additionally, our success may be explained by the high rate of concomitant procedures performed in our population, as concomitant sling and restoration of apical support has previously been shown to decrease cystocele recurrence [17, 18] specifically, suburethral slings were performed in approximately 75 % and level I apical support procedures in approximately 50 %, but were equally distributed in both groups.

When reviewing surgical outcomes, it is not only important to review modifications in technique but also the materials used in the repair. More recently, surgeons have turned to more permanent materials to augment their repairs. Most notably, polypropylene mesh has resulted in improved anatomic correction, but at a price of increased complications. Due to these concerns, surgeons have turned to reevaluating the use of non-mesh techniques. Chung et al. [16] recently reported on outcomes following uterosacral ligament suspension using permanent suture compared to absorbable suture and found a significantly higher failure rate in the absorbable suture group. Although our review did not find a statistically significant difference in recurrence between permanent and absorbable suture (8.75 vs 11.3 %,  $p=0.5$ ), there was improved anatomic correction as quantified by anterior wall POP-Q points in the permanent suture group. Although at 1 year it can be argued that the difference between a Ba of  $-2.7$  vs  $-2.5$  cm may not be clinically significant, it may be expected this difference will continue to progress and affect long-term success.

The use of permanent materials in vaginal surgery must be weighed carefully with potential complications. Specifically, exposure of permanent meshes has caused surgeons to reevaluate their utility, and this concern does exist with using permanent suture. Although we found no difference in rate of healing abnormalities as quantified by the presence

of granulation tissue at 12 weeks, there were significantly more patients that developed vaginal exposure of the permanent suture. Although none required operative reoperation, five (6.5 %) patients did have to undergo trimming of the suture exposure, which can sometimes be difficult and uncomfortable for the patient.

The retrospective nature of this study lends itself to certain limitations. We recognize that debate currently exists on what the best outcome measure is for surgical success. Due to standardization and ease of data collection, our study like many others used an objectively measured outcome of POP-Q failure greater or equal to stage II. This has been criticized by many due to the low impact of these stage II failures on patient satisfaction. Subjective outcome measures are necessary to determine the true success rates of surgical procedures, and this is supported by our low reoperation rate for symptomatic recurrence. Finally, all studies in which surgical outcomes are evaluated and measured by the performing surgeon lend themselves to significant bias. Although this could also be the case in our review, many of our postoperative visits are performed by clinical fellows who were not directly involved in the patients' surgery.

Our study's strengths include the fact that this is a large retrospective review of 230 patients that underwent native tissue anterior colporrhaphy with greater than 1-year follow-up data. We recognize that because our repairs were standardized and only performed by two surgeons, these results may not be reproducible in the hands of other pelvic surgeons.

A critical examination of current surgical techniques is necessary to achieve superior outcomes. We have shown that meticulous identification and repair of all fascial defects, specifically reattachment of endopelvic tissue to the cervix/apical tissue, may increase success rates of traditional anterior colporrhaphy. Additionally, the use of permanent suture material may improve anatomic success without an increase in significant complications. Future comparative trials are necessary to definitively identify the best surgical technique and materials that will result in optimal outcomes from anterior colporrhaphy.

**Conflicts of interest** GW Davila: consultant and honoraria: Astellas, Watson, American Medical Systems, Novasys Medical, CL Medical; research funding: American Medical Systems, Astellas. Other authors: none.

## References

1. Tegerstedt G, Maehle-Schmidt M, Nyren O, Hammarstrom M (2005) Prevalence of symptomatic pelvic organ prolapse in a Swedish population. *Int Urogynecol J Pelvic Floor Dysfunct* 16:497–503

2. Rortveit G, Brown JS, Thom DH, Van Den Eeden SK, Creasman JM, Subak LL (2007) Symptomatic pelvic organ prolapse: prevalence and risk factors in a population-based, racially diverse cohort. *Obstet Gynecol* 109:1396–1403
3. Shah AD, Kohli N, Rajan SS, Hoyte L (2008) The age distribution, rates, and types of surgery for pelvic organ prolapse in the USA. *Int Urogynecol J Pelvic Floor Dysfunct* 19:421–428
4. Nichols DH, Randall CH (1996) *Vaginal surgery*, 4th edn. Lippincott Williams & Wilkins, Philadelphia
5. Rock JA, Jones HW (2003) *Te Linde's operative gynecology*, 9th edn. Lippincott Williams & Wilkins, Philadelphia
6. Kelly HA (1913) Incontinence of urine in women. *Urol Cutan Rev* 17:291–293
7. Weber AM, Walters MD, Piedmonte MR, Ballard LA (2001) Anterior colporrhaphy: a randomized trial of three surgical techniques. *Am J Obstet Gynecol* 185:1299–1304
8. Sand PK, Koduri S, Lobel RW et al (2001) Prospective randomized trial of polyglactin 910 mesh to prevent recurrence of cystoceles and rectoceles. *Am J Obstet Gynecol* 184:1357–1362
9. Nguyen JN, Burchette RJ (2008) Outcome after anterior vaginal prolapse repair: a randomized controlled trial. *Obstet Gynecol* 111:891–898
10. Milani R, Salvatore S, Soligo M, Pifarotti P, Meschia BM, Cortese M (2005) Functional and anatomical outcome of anterior and posterior vaginal prolapse repair with prolene mesh. *BJOG* 112:107–111
11. de Tayrac R, Devoldere D, Renaudie J, Villard P, Guilbaud O, Eglin G, French Ugytex Study Group (2007) Prolapse repair by vaginal route using a new protected low-weight polypropylene mesh: 1-year functional and anatomical outcome in a prospective multicentre study. *Int Urogynecol J Pelvic Floor Dysfunct* 18:251–256
12. Rogers RG (2011) To mesh or not to mesh: current debates in prolapse repair fueled by the U.S. Food and Drug Administration Safety Notification. *Obstet Gynecol* 118(4):771–773
13. Iglesia CB, Sokol AI, Sokol ER, Kudish BI, Gutman RE, Peterson JL, Shott S (2010) Vaginal mesh for prolapse: a randomized controlled trial. *Obstet Gynecol* 116:293–303
14. Goldstein HB, Vakili B, Franco N, Echols KT, Chesson R (2007) The effect of suture material on outcomes of surgery for pelvic organ prolapse. *Pelvipерineology* 26:174–177
15. Peterson T, Karp DR, Aguilar V, Davila GW (2010) Primary versus recurrent prolapsed surgery: differences in outcomes. *Int Urogynecol J* 21:483–488
16. Chung CP, Miskimins R, Kuehl TJ, Yandell PM, Shull BL (2012) Permanent suture used in uterosacral ligament suspension offers better anatomical support than delayed absorbable suture. *Int Urogynecol J* 23:223–227
17. Goldberg RP, Koduri S, Lobel RW et al (2001) Protective effect of suburethral slings on postoperative cystocele recurrence after reconstructive pelvic operation. *Am J Obstet Gynecol* 185:1307–1312
18. Tantanasis T, Giannoulis C, Daniilidis A, Papathanasiou K, Loufopoulos A, Tzafettas J (2008) Tension free vaginal tape underneath bladder base: does it prevent cystocele recurrence? *Hippokratia* 12:108–112