

Overlapping Anal Sphincteroplasty

Impact of Suture Selection on Bowel Symptoms

Brent A. Parnell, M.D., William E. Whitehead, Ph.D., Elizabeth J. Geller, M.D., Mary L. Jannelli, M.D., and AnnaMarie Connolly, M.D.

OBJECTIVE: To look at women who underwent overlapping anal sphincteroplasty (OAS) with the use of either permanent or absorbable sutures and to describe patient-reported fecal continence and quality of life.

STUDY DESIGN: A case series of 40 women who underwent OAS completed the Modified Manchester Health Questionnaire a mean of 50 months after surgery. Descriptive statistics were used to describe those who had permanent sutures and those who had absorbable sutures.

RESULTS: The primary outcome, loss of solid stool, was similar at 50% for each group. Severity of incontinence symptoms, as measured by the Fecal Incontinence Severity Index, was lower in the permanent suture group (15.9 vs. 24.0). There was no difference in overall impact on quality of life.

CONCLUSION: While overall patient-reported fecal incontinence was similar, permanent suture use at time of OAS was associated with decreased fecal incontinence severity. (J Reprod Med 2011;56:187–191)

Keywords: anal sphincter, fecal incontinence, quality of life, sphincteroplasty, sutures.

Permanent sutures could provide an extra measure of strength to a muscular anastomosis that may need longer to heal due to the immediate demands postoperatively.

Fecal incontinence negatively impacts the lives of 1–17% of adults in population-based studies.^{1–4} Historically, management of this disorder has included

behavioral modification, dietary interventions, medical management and ultimately surgical treatment. A commonly performed surgical procedure is the overlapping anal sphincteroplasty (OAS), with long-term reported success rates of 26–62%.^{5–12} However, despite the common use of this procedure,

little work has been performed to identify variables that might produce a more durable outcome. This has been identified as a research priority.^{13,14}

Surgeons use a wide range of suture materials, including absorbable, delayed-absorbable and permanent sutures. No currently available studies evaluate the effect of suture selection on the outcomes of OAS. Due to the prevalence of fecal incontinence and the common use of this procedure, appropriate suture selection could have an impact on a patient's quality of life.

The primary aim of this study was to look at a series of women who underwent OAS with the use of

From the Division of Female Pelvic Medicine and Reconstructive Surgery, Department of Obstetrics and Gynecology, and the Department of Medicine, University of North Carolina at Chapel Hill.

Presented at the American Urogynecologic Society 30th Annual Scientific Meeting, Hollywood, Florida, September 24–26, 2009.

Address correspondence to: Brent A. Parnell, M.D., 3032 Old Clinic Building, Campus Box 7570, Chapel Hill, NC 27599-7570 (bparnell@med.unc.edu).

Financial Disclosure: The authors have no connection to any companies or products mentioned in this article.

either permanent or absorbable sutures and describe the patient continence rates as well as Modified Manchester Health Questionnaire (MMHQ)¹⁵ scores. The hypothesis was that the use of permanent sutures in an OAS would result in improved fecal continence and MMHQ scores.

Materials and Methods

This study was a case series of all English-speaking women >18 years of age who had undergone an OAS with the Division of Female Pelvic Medicine and Reconstructive Surgery at a university hospital from July 1997 to January 2008. Women were excluded if they had subsequent surgeries to treat fecal incontinence or were deceased. Institutional Review Board approval was obtained prior to initiation of the study.

Women who had undergone an OAS during the study period were identified using operating room and hospital electronic databases. They were notified by mail of the study and then contacted by telephone, at which time verbal consent was obtained from those patients interested in participation. No further contact was made with women who declined participation.

After obtaining verbal consent, the MMHQ was administered over the telephone. The MMHQ has been previously validated for telephone administration¹⁵ and has the Fecal Incontinence Severity Index (FISI) embedded within it. The MMHQ measures quality of life using eight subscales: incontinence impact, role limitations, physical limitations, social limitations, personal relationships, emotions, sleep/energy and severity measures. It is scored on a 0–100 scale with higher numbers representing greater impact on quality of life. The FISI provides a weighted index of the frequency of incontinence of solid stool, liquid stool, mucous and gas on a scale of 0–61 with higher scores indicating greater fecal incontinence severity. The weight assigned to each type and frequency of fecal incontinence is based on the previously established consensus of patients with fecal incontinence (FISI patient score) and the previously established consensus of colorectal surgeons (FISI surgeon score).¹⁶

The MMHQ was administered by the study principal investigator and took approximately 15 minutes to complete by telephone. The investigators were blinded to suture type until after administration of the questionnaire, after which time chart reviews were performed. Patient demographics and preoperative, operative and immediate postopera-

tive variables were abstracted from the electronic operating room database and the electronic medical records and then entered into a database for analysis. MMHQ scores were similarly entered into the database.

Patients were then divided into two categories based on the use of permanent suture or absorbable suture in the anal sphincter complex at the time of the OAS. The choice of suture was determined by the attending surgeon based on their standard surgical practice. One of the four attending surgeons used Gore-tex almost exclusively, and another surgeon used nylon for a period of time in sequential cases. All cases were performed applying the standard overlapping bulk technique to the anal sphincter complex, and this technique was stable, without change over the study period, other than choice of suture. No effort was made to separately isolate the internal anal sphincter.

The primary study outcome, patient-reported fecal incontinence of solid stool, was then described for each of the two patient categories. Patient-reported fecal incontinence of solid stool was defined as loss of solid stool ">1–3 times a month." Secondary outcomes included weighted summary scores from the FISI¹⁶ and the 8 quality of life subscales of the MMHQ. Descriptive statistics were used to describe the outcomes for each of the two groups. Statistical analysis was performed with SPSS 16.0 (SPSS Inc., Chicago, Illinois).

Results

A total of 76 women were eligible for the study, with updated contact information available for 56 women. Mailing addresses and phone numbers were not available or were invalid for the remaining 20 patients. Of these 56 women, 45 were successfully contacted and 40 agreed to participate (Figure 1). We were unable to reach the remaining 11 due to either subsequent death or lack of patient response after 5 or more attempts to contact.

Of the women enrolled in the study, 20 (50%) had surgery using permanent sutures, and the remaining 20 women had absorbable sutures used. Specific suture material used for sphincteroplasties is outlined in Table I. The demographics of the groups are described in Table II. The two patient categories were similar, with an overall mean age of 49.2 years. Ninety percent of the women were Caucasian, and 43% were postmenopausal. The median number of vaginal deliveries was 2, and mean BMI was 27.3. The mean time from surgery to the completion of

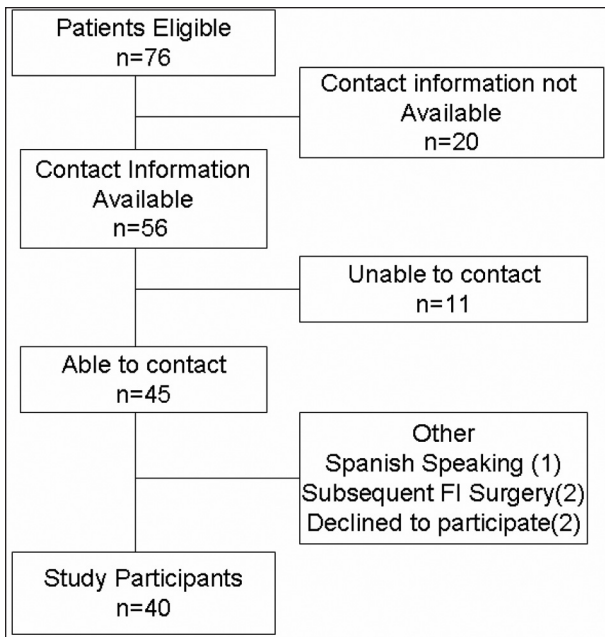


Figure 1 Enrollment algorithm for study subjects.

the questionnaire was 39.2 months in the permanent suture group and 59.7 months in the absorbable suture group. More women used tobacco (20% vs. 0%) at the time of their surgery in the absorbable suture category. Finally, the preoperative perineal body measurement on pelvic organ prolapse quantification (POP-Q) examination differed between groups and measured 1.2 cm greater in the permanent suture group.

The groups had similar patient-reported rates of irritable bowel syndrome (23.1%), diarrhea (20.5%) and constipation (25.6%) as well as other major medical comorbidities. On average 37.5% of patients used stool softeners, 37.5% used fiber supplementation, 15% used antidiarrheal agents and 7.5% used laxatives. Concomitant procedures were commonly performed and were similar as seen in Table III except for paravaginal repair, which was more frequent in the permanent suture group.

Postoperative wound complications were uncommon for both groups. Six women in the permanent suture group experienced a wound separation and 3 women had a wound infection, all treated conservatively. The permanent suture group had 3 suture erosions that were each managed in the clinic setting. In the absorbable suture group, 5 women had wound separations with 2 wound infections, once again managed conservatively. One patient,

who had her OAS done using PDS (Ethicon, Inc., Somerville, New Jersey), experienced suture erosion. This case was also managed in the clinic setting.

The primary outcome was incontinence of solid stool, and the secondary outcomes included weighted summary scores from the FISII and the 8 quality of life subscales of the MMHQ (Table IV). Patient-reported fecal incontinence rates for solid and liquid stool were similar between groups. Overall, the mean fecal incontinence rate for solid stool was 50% and for liquid stool was 57.5%. The FISII patient score was lower in the permanent suture group than in the absorbable suture group (15.9 vs. 24.0). The social limitations category was also lower in the permanent suture group (3.8 vs. 21.8), with no differences seen for the remaining subscales.

Discussion

This preliminary data presents one of the first reports on the effect of suture selection at time of OAS on fecal incontinence and quality of life. We report fecal incontinence rates and quality of life outcomes observed in 40 women who underwent OAS using either permanent or absorbable suture. The rate of incontinence of solid stool, the primary outcome of this study, was similar between the two groups and consistent with rates quoted in the current literature.⁵⁻¹² However, women in the permanent suture group had lower FISII patient scores, indicating less severe symptoms overall. Of note, there was a significantly shorter time period between surgery and questionnaire completion for the permanent suture group, which could have contributed to these results.

With no increase in surgical or postoperative morbidity (i.e., suture erosions or wound infections), the permanent group displayed less overall

Table I Suture Selection

Suture material	Permanent suture No. (%)	Absorbable suture No. (%)
Gore-Tex ^a	17 (85)	—
Nurulon ^b	2 (10)	—
Ethibond ^b	1 (5)	—
Vicryl ^b	—	14 (70)
PDS ^b	—	6 (30)
Total	20 (100)	20 (100)

^aW. L. Gore & Associates, Inc., Flagstaff, Arizona.

^bEthicon, Inc., Somerville, New Jersey.

Table II Demographic Characteristics of Study Groups

Variable	Permanent suture (n = 20)	Absorbable suture (n = 20)
Age (yr)	51.8 ± 15.9	46.6 ± 9.9
Race		
Caucasian	18 (90)	18 (90)
African American	1 (5)	1 (5)
Other	1 (5)	1 (5)
Time since sphincteroplasty (mo)	39.2 ± 14.7	59.7 ± 27.2
Tobacco use	0 (0)	4 (20)
Birth weight (g)	3,636 ± 401.5	3,813 ± 474.4
POP-Q perineal body (cm)	3.1 ± 0.8	1.9 ± 1.1
Postmenopausal	8 (40)	9 (45)
Vaginal deliveries	2 (2, 3)	2 (2, 3)
Lacerations	1 (0, 1)	1 (1, 1.75)
Body mass index (kg/m ²)	27.0 ± 6.0	27.6 ± 6.4
Episiotomies	0 (0, 1)	0 (0, 1)

Data presented as mean ± standard deviation, n (%), or median with interquartile range.

severity of their fecal incontinence symptoms and experienced fewer social limitations than the absorbable suture group. While prior studies utilizing braided permanent sutures at time of concurrent sphincteroplasty and posterior repair¹⁷ or at time of sacrospinous ligament suspension¹⁸ have demonstrated increased risk of suture erosion, monofilament permanent sutures appear less likely to cause infection, foreign body reaction and sinus formation and have fewer suture-related complications.^{19,20} Polytetrafluoroethylene or Gore-tex, a monofilament suture, was the permanent suture used most frequently in our study. The higher likelihood of infection associated with the braided sutures could explain the complication associated with the previously reported studies.

The current case series has weaknesses characteristic of such design. These weaknesses include selection bias, which could manifest as differences in patient characteristics that influenced the choice of suture, differences amongst surgeons who preferred one type of suture over another, and changes in practice that may have occurred over time independent of suture material. A randomized, controlled trial is needed to confirm these findings.

The strengths of this study include the use of a validated questionnaire, the MMHQ, to assess the outcomes of interest and the high participation rate of available subjects (80%). While the use of appropriate sutures in the repair of the sphincter muscle has been addressed in the recent past as a research priority,¹⁴ we found no published data looking at

Table III Concomitant Procedures by Group

Variable	Permanent suture (n = 20) (%)	Absorbable suture (n = 20) (%)
Hysterectomy	5 (25)	4 (20)
Anterior repair	3 (15)	3 (15)
Posterior repair	8 (40)	7 (35)
Midurethral mesh sling	5 (25)	1 (5)
Burch	6 (30)	2 (10)
Paravaginal repair	10 (50)	3 (15)

the role of suture selection in OAS. The present study addresses this important gap in the literature and suggests that permanent sutures may be a valid choice at the time of OAS.

Permanent suture is used in a variety of pelvic floor reconstructive procedures to augment long-term support after the healing process is complete. Procedural examples include the Burch retropubic urethropexy, the abdominal sacral colpopexy, the sacrospinous ligament fixation and suture rectopexies. The use of permanent sutures at the time of the anal sphincteroplasty follows this same line of clinical reasoning. Currently, no standard of care has been established as surgeons use a variety of suture types during repair of the anal sphincter complex. Orthopedic surgeons commonly use permanent sutures in muscle belly or tendon injuries such as in acute Achilles tendon ruptures, where they may choose an end-to-end repair technique and use a permanent suture²¹ as their standard of care. In

Table IV Modified Manchester Health Questionnaire by Group

Variable	Permanent suture (n = 20)	Absorbable suture (n = 20)
Fecal incontinence ^a		
Solid stool	9 (45)	11 (55)
Liquid stool	10 (50)	13 (65)
FISI-patient	15.9 ± 10.1	24.0 ± 12.7
FISI-surgeon	16.8 ± 11.7	24.3 ± 13.6
MMHQ subscales		
Incontinence impact	42.5 ± 28.2	46.3 ± 35.6
Role limitations	14.4 ± 21.2	20.6 ± 27.3
Physical limitations	16.3 ± 25.7	23.1 ± 27.6
Social limitations	3.8 ± 11.6	21.8 ± 34.3
Personal relationships	13.2 ± 25.5	31.6 ± 37.3
Emotions	17.9 ± 27.3	32.1 ± 36.6
Sleep/energy	7.5 ± 15.9	9.4 ± 23.3
Severity measures	35.3 ± 33.3	23.8 ± 27.2

Data presented as mean ± standard deviation or n (%).

^a"How often in the past month have you experienced any amount of accidental bowel leakage that consisted of solid/liquid stool?" Positive response: "> 1–3 times a month."

OAS, the repair is immediately subjected to traction as the striated sphincter muscle has resting tone and is under voluntary control that is utilized for continence. Permanent sutures could provide an extra measure of strength to a muscular anastomosis that may need longer to heal due to the immediate demands postoperatively. Our data suggest that the use of permanent sutures may be a viable option to improve patient-related outcomes without increasing morbidity.

While overall patient-reported fecal incontinence was similar for the two groups, permanent suture use at time of OAS was associated with decreased fecal incontinence severity and fewer social limitations. Future directions of this work could include a multicentered, randomized, controlled trial to further clarify the role for permanent suture at the time of OAS.

References

- Johanson JF, Lafferty J: Epidemiology of fecal incontinence: The silent affliction. *Am J Gastroenterol* 1996;91:33–36
- Bharucha AE, Zinsmeister AR, Locke GR, et al: Prevalence and burden of fecal incontinence: A population-based study in women. *Gastroenterology* 2005;129:42–49
- Nelson R, Norton N, Cautley E, et al: Community-based prevalence of anal incontinence. *JAMA* 1995;274:559–561
- Nygaard I, Barber MD, Burgio KL, et al: Prevalence of symptomatic pelvic floor disorders in US women. *JAMA* 2008;300:1311–1316
- Barisic GI, Krivokapic ZV, Markovic VA, et al: Outcome of overlapping anal sphincter repair after 3 months and after a mean of 80 months. *Int J Colorectal Dis* 2006;21:52–56
- Bravo Gutierrez A, Madoff RD, Lowry AC, et al: Long-term results of anterior sphincteroplasty. *Dis Colon Rectum* 2004;47:727–731
- Halverson AL, Hull TL: Long-term outcome of overlapping anal sphincter repair. *Dis Colon Rectum* 2002;45:345–348
- Karoui S, Leroi AM, Koning E, et al: Results of sphincteroplasty in 86 patients with anal incontinence. *Dis Colon Rectum* 2000;43:813–820
- Malouf AJ, Norton CS, Engel AF, et al: Long-term results of overlapping anterior anal-sphincter repair for obstetric trauma. *Lancet* 2000;355:260–265
- Trowbridge ER, Morgan D, Trowbridge MJ, et al: Sexual function, quality of life, and severity of anal incontinence after anal sphincteroplasty. *Am J Obstet Gynecol* 2006;195:1753–1757
- Maslekar S, Gardiner AB, Duthie GS: Anterior anal sphincter repair for fecal incontinence: Good long term results are possible. *J Am Coll Surg* 2007;204:40–46
- Madoff RD: Surgical treatment options for fecal incontinence. *Gastroenterology (Suppl)* 2004;126:S48–S54
- Whitehead WE, Wald A, Norton NJ: Priorities for treatment research from different professional perspectives. *Gastroenterology (Suppl)* 2004;126:S180–S185
- Weber AM: The perspective of a gynecologist on treatment-related research for fecal incontinence in women. *Gastroenterology (Suppl)* 2004;126:S169–S171
- Kwon S, Visco AG, Fitzgerald MP, et al: Validity and reliability of the Modified Manchester Health Questionnaire in assessing patients with fecal incontinence. *Dis Colon Rectum* 2005;48:323–331
- Rockwood TH, Church JM, Fleshman JW, et al: Patient and surgeon ranking of the severity of symptoms associated with fecal incontinence: The fecal incontinence severity index. *Dis Colon Rectum* 1999;42:1525–1532
- Luck AM, Galvin SL, Theofrastous JP: Suture erosion and wound dehiscence with permanent versus absorbable suture in reconstructive posterior vaginal surgery. *Am J Obstet Gynecol* 2005;192:1626–1629
- Toglia MR, Fagan MJ: Suture erosion rates and long-term surgical outcomes in patients undergoing sacrospinous ligament suspension with braided polyester suture. *Am J Obstet Gynecol* 2008;198:600 e1–4
- Iwase K, Higaki J, Tanaka Y, et al: Running closure of clean and contaminated abdominal wounds using a synthetic monofilament absorbable looped suture. *Surg Today* 1999;29:874–879
- Katz S, Izhar M, Mirelman D: Bacterial adherence to surgical sutures: A possible factor in suture induced infection. *Ann Surg* 1981;194:35–41
- Strauss EJ, Ishak C, Jazrawi L, et al: Operative treatment of acute Achilles tendon ruptures: An institutional review of clinical outcomes. *Injury* 2007;38:832–838