Preoperative vaginal preparation with baby shampoo compared with povidone-iodine before gynecologic procedures

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Abstract

STUDY OBJECTIVE: The objective of this study was to compare the postoperative infection rates between patients receiving either povidone-iodine (PI) or baby shampoo vaginal preparations before gynecologic surgery.

DESIGN: Cohort study (Canadian Task Force classification II-2).

SETTING: University referral center for gynecologic endoscopy.

PATIENTS: All patients underwent minimally invasive gynecologic surgery including hysteroscopy or laparoscopy.

INTERVENTIONS: The agents used for vaginal preparation were either baby shampoo in a 1:1 dilution with sterile normal saline solution or PI 7.5% scrub solution.

MEASUREMENTS AND MAIN RESULTS: Charts were reviewed for evidence of infection within 30 days of surgery (symptoms of urinary tract infection, abdominal or vaginal wound infections, temperature > 100.4° F, and fungal or bacterial vaginitis). A total of 249 cases were collected; 96 subjects underwent surgery before the change to baby shampoo and 153 subjects after. Both groups were well matched for the types of surgery performed, age, risk factors for postoperative infections, and the postoperative diagnosis. The infection rates were 14/96 (14.6%) with PI preparation versus 18/153 (11.8%) with baby shampoo (p = .52).

CONCLUSION: Baby shampoo should be studied as an alternative to PI because it is a nonirritating, inexpensive mild detergent. This preliminary study suggests that baby shampoo is as effective as PI in preventing postoperative infection.
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A preoperative external and internal preparation is used to decrease the bacteria load in an effort to prevent postoperative infection after gynecologic surgery.[1] Although pov-

idone-iodine (PI) is typically used as a skin, as well as a vaginal, preparation and has been shown to prevent postoperative infections,[1,2] it can be the source of significant postoperative irritation.[3] Evidence in the literature suggests that it is the mechanical washing, not the use of an antiseptic agent such as PI, that is responsible for the efficacy of vaginal preparations. For example, before oocyte retrieval, vaginal preparation is performed by use of irrigation with normal saline solution. During this invasive vaginal proce-

dure, infection rates with normal saline solution are similar to those treated with PI.[4] In addition, a normal saline solution preparation done at the time of vaginal surgery has been shown to be as effective as PI at preventing postoperative infections.[5] These studies suggest that an antiseptic preparation such as PI may not be necessary to prevent postoperative infections.

Because the vagina has a unique microbial environment and the optimal vaginal preparation solution is unknown, we sought to compare 2 commonly used vaginal preparations at our institution: PI and a mild detergent (baby shampoo). Baby shampoo is a mild detergent that has inherent bactericidal properties but has never been studied as a preoperative vaginal or skin preparation. Because baby shampoo is mild, nonirritating, and colorless, it provides surgeons with an alternative to other more irritating agents. It is a readily available and inexpensive alternative to PI for preoperative vaginal preparation ($0.38/oz for PI vs $0.26/oz for baby shampoo). The objective of this study was to compare the postoperative infection rates between patients receiving either PI or baby shampoo vaginal preparations before minimally invasive gynecologic surgery.

Materials and methods

This was a retrospective analysis of 2 cohorts of patients in a tertiary care referral center. After approval was obtained from the Stanford University institutional review board, charts were reviewed from surgical patients seen in our institution from June 1999 through April 2006. All patients underwent minimally invasive gynecologic surgery, including hysteroscopy (diagnostic or operative) and operative laparoscopy with treatment of endometriosis, lysis of adhesions, myomectomy, or hysterectomy (total or supracervical) with techniques as previously described.[6] We compared 2 periods: June 1999 through June 2003 and July 2003 through April 2006. In July 2003, a mild detergent (baby shampoo) was introduced at our institution as an alternative to PI vaginal preparation. Our patients who underwent gynecologic surgery before July 2003 received a standard PI preparation, and patients who had surgery after July 2003 received a vaginal preparation with baby shampoo.

Mechanical preparation, number and type of sponges used, and method of preparation were identical for both preparations throughout the study. The agents used for vaginal preparation were either baby shampoo (Johnson's Baby Shampoo; Johnson and Johnson Consumer Companies, Inc., Skillman, NJ) in a 1:1 dilution with sterile normal saline solution or a PI 7.5% scrub solution. All patients had indwelling urinary catheters placed after vaginal preparation, which remained in place until the end of the procedure. PI scrub solution or 4% chlorhexidine gluconate was used for the abdominal preparation.

All patients included were interviewed and examined 1 week and 6 weeks after their surgery. Charts were reviewed for evidence of infection within 30 days of surgery (symptoms of urinary tract infection, abdominal or vaginal wound infections, temperature greater than 100.4° F, and fungal or bacterial vaginitis). Patient demographic data and surgical data were obtained from the operative report and the anesthesia records. Statistical analysis was done with χ^2 or Wilcoxon signed rank test where appropriate.

Results

Two hundred sixty charts were reviewed for this study. Eleven subjects were excluded because of inadequate follow-up (7 before the change and 4 after the change in practice). Complete data were available for 249 subjects; 96 patients underwent minimally invasive gynecologic surgery before July 2003 (PI group) and 153 subjects after July 2003 (baby shampoo group). The 2 groups were matched for predictors of postoperative infections (Table 1). The p values comparing age, American Society of Anesthesiologists classification, body mass index (BMI), tobacco use, diabetes, operative time, length of hospital stay, and intraoperative complications were all greater than p = .05, suggesting similarity between the 2 groups. The use of perioperative antibiotics was not significantly different in the 2 groups. In the PI group, 95.8% of cases were given perioperative antibiotics versus 98.6% of cases in the baby shampoo group (p = .05). There was slightly more blood loss in the PI group (mean = 96.5 mL ± 174 mL, 95% CI 61.7–131.3) versus the baby shampoo group (mean = 57.2 mL ± 150 mL, 95% CI 33.3–81.1); p = .03.

The procedures performed and the preoperative and postoperative diagnoses are listed in Table 2 for both study groups. Most subjects had more than 1 procedure performed and were given more than 1 diagnosis. The characteristics of the procedures between the 2 groups are similar. The PI group had fewer appendectomies performed (12 vs 42; p = .01) and ovarian cystectomies performed (19 vs 49; p = .04).

The overall infection rates were similar between the 2 groups (Table 3). The infection rate for the PI group was 14.6% as opposed to 11.8% for the baby shampoo group (p = .52). The relative risk of infection with baby shampoo compared with PI was 0.807 (95% confidence interval 0.421 to 1.546). With 96 subjects in the control group and 153 subjects in the study group, this study was powered to detect a 10% difference in infection rates. The PI group was found to have more wound infections than the baby shampoo group (8 vs 2; p = .01).

Discussion

Preoperative vaginal preparation with an antiseptic agent is a routine procedure at the time of gynecologic surgery. It is clear that a vaginal scrub reduces the rate of postoperative infection at the time of obstetric or gynecologic surgery.[1,2]

Table 1 Patient demographics

	Povidone-iodine (n = 96)	Baby shampoo (n = 153)	p
Mean age (year)	39.3 (19–65)	37.4 (18–55)	.2
Mean BMI (kg/m²)	24.8 (17.5–57.5)	24.5 (16.1–43.5)	.82
Obese patients (BMI > 30)	9 (9.4%)	15 (9.8%)	.91
Mean ASA score	1.5 (1–2)	1.5 (1–3)	.37
Smoker	4 (4.2%)	10 (6.5%)	.37
Diabetic patients	2 (2.1%)	4 (2.6%)	.56
Postmenopausal patients	15 (15.6%)	15 (9.2%)	.22
Perioperative antibiotics	92 (95.8%)	151 (98.6%)	.05
EBL (mL)			
Mean (SD)	96.5 (±174)	57.2 (±150)	.03*
Median (range)	0 (min–1000)	0 (min–1000)	
Operative time (min)			
Mean (SD)	153.8 (±78.7)	154.2 (±67.9)	
Median (range)	140 (40–420)	145 (40–480)	
Mean length of stay (days)	1.1 (1–6)	1.1 (1–3)	.95
Intraoperative complications†	1 (1%)	1 (1%)	1

ASA = American Society of Anesthesiologists; BMI = body mass index; EBL = estimated blood loss.
Values are n (range or percent where indicated).
*p value <.05 is statistically significant.
†Intraoperative complications consisted of 1 intraoperative hemorrhage and 1 cystotomy.

In our retrospective study, we have shown that a mild detergent (baby shampoo) is similar to PI in preventing postoperative infections.

Many agents are available for preoperative skin preparation. The factors that are considered when selecting an agent are ability to prevent infection, the bactericidal and bacteriostatic ability of the agent, and skin sensitivity to the agent. PI has been shown to provide all of these yet is a known skin irritant.[3] Our study sought to compare a mild detergent to an accepted preoperative surgical scrub. In our

institution, before July 2003, all preoperative vaginal preparations were done with PI. Patient discomfort and sensitivity reactions motivated a change in practice.

Many perioperative therapies have been shown to reduce postoperative infection rates, such as perioperative antibiotics. Most of our patients did receive antibiotics at the time of surgery, and there was no significant difference between antibiotic usage between the 2 study groups.

Risk factors for postoperative infection have been well described and include length of surgery (>400 minutes),

Table 2 Procedure characteristics

Procedure	Povidone-iodine (n = 96) No. (%)	Baby shampoo (n = 153) No. (%)	p
Hysteroscopy-diagnostic	66 (68.8)	105 (68.6)	.98
Hysteroscopy-operative	7 (7.3)	27 (17.6)	.02*
Endometrial biopsy	47 (49)	80 (52.3)	.91
Treatment of endometriosis	69 (71.9)	110 (71.9)	.997
Treatment of bowel endometriosis	2 (2.1)	15 (9.8)	.02*
Chromotubation	34 (35.4)	49 (32)	.58
Myomectomy	31 (32.3)	46 (30)	.71
Hysterectomy	10 (10.4)	19 (12.4)	.63
Supracervical hysterectomy	4 (4.2)	10 (6.5)	.43
Minilaparotomy	9 (9.4)	7 (4.6)	.13
Enterolysis	35 (36.5)	55 (35.9)	.93
Lysis of adhesions	35 (36.5)	54 (35.2)	.85
Cystoscopy	52 (54.2)	92 (60.1)	.35
Proctoscopy	21 (21.9)	50 (32.7)	.052
Ovarian cystectomy	19 (19.8)	49 (32)	.04*
Bilateral salpingoophorectomy	7 (7.2)	11 (7.2)	.98
Unilateral salpingoophorectomy	6 (6.3)	9 (5.9)	.91
Salpingectomy	7 (7.3)	9 (5.9)	.66
Appendectomy	12 (12.5)	42 (27.5)	.01*

*p value <.05 is statistically significant.

Table 3 Postoperative infection

	Povidone-iodine (n = 96) No. (%)	Baby shampoo (n = 153) No. (%)	p
Total	14 (14.6)	18 (11.8)	.52
Urinary tract infection	5 (5.2)	12 (7.8)	.42
Wound infection*	8 (8.3)	2 (1.3)	.01†
Vaginitis	2 (2.1)	3 (2)	.94
Fever	1 (1)	3 (2)	.57

*Wound infections consisted of abdominal wound infections; no vaginal wound infections were noted.
†p value <.05 is statistically significant.

diabetes mellitus, obesity (BMI > 30 kg/m^2), length of hospital stay, smoking, and preoperative antibiotics.[7–9] Our 2 study populations were similar with respect to these known risk factors. The estimated blood loss was slightly different between our 2 study groups; however, the mean blood loss was less than 100 mL in both groups, and therefore it is unlikely that this difference played a major role in the infection rates seen in our population.

At the time of laparoscopy, a uterine manipulator is placed to assist with traction during the procedure. Although this is placed at the beginning of the procedure, the manipulator remains in the vagina and is often moved during the procedure by the surgeon. Great care is taken to prevent cross-contamination from the vagina to the abdominal field, although absolute separation is difficult to maintain. Given the inherent communication between the vaginal field and the abdominal field, all wound infections (abdominal and vaginal) were considered during our data collection. In this study, we did not see any vaginal wound infections, endometritis, or pelvic infections, although this may also be a function of our relatively small sample size and the fact that only 10% to 12% of patients had hysterectomies (most of the procedures performed were at low risk for infection). In addition, the population studied is a low-risk population (average age < 40, 10% obese, 4% to 6% smokers, and 2% to 3% diabetics), which may have contributed to our overall low infection rates.

One statistically significant finding was that the PI group had more abdominal wound infections than the baby shampoo group (8 vs 2; p = .01). This difference may be due to confounders such as patient age, menopausal status, use of antibiotics, abdominal scrub agent, estimated blood loss or other factors that may have changed over time. Because of the small size of this study (our study did not have the power to detect a small difference in infection rates) and the potential confounders, we do not conclude that baby shampoo is better than PI in preventing postoperative infections; however, our study suggests that it is at least as effective as PI.

This study was conducted in a specialized, high-volume referral practice, and therefore all the procedures were performed at the same location with the same primary surgeon (C.N.). The patient population, indications for surgery, and methods of performing the procedures remained constant throughout the study periods. The only significant change in July 2003 was the change from PI to baby shampoo. That said, it should be noted that the abdominal preparation was changed from PI to 4% chlorhexidine gluconate in July 2004 as standard in practice. This was done to eliminate all iodine-containing substances from the surgical preparation. Chlorhexidine gluconate is another widely accepted surgical scrub and has been shown to be as good as PI in preventing postoperative infections.[10] Given this, we expected that this change was of little significance to the infection rates seen between the 2 groups; however, it is a potential contributor to the decrease in abdominal wound infections seen in the latter group.

Conclusion

Although a prospective randomized controlled trial is needed, our analysis suggests that preoperative vaginal preparation with a mild detergent such as baby shampoo is as effective as the standard agent (PI) at preventing postoperative infections at the time of laparoscopic surgery for benign gynecologic conditions.

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