Preventing Adhesions in ObGyn Surgery

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Adhesive disease represents a significant cause of morbidity for postoperative patients. ObGyns should keep up-to-date with data concerning adhesion prevention and make a reasonable and informed decision about whether to employ such techniques in their individual practices.

Most surgical procedures performed by ObGyns are associated with pelvic adhesions, with potential serious sequelae of small bowel obstruction, infertility, chronic pelvic pain, and difficulty in postoperative treatment, including complexity during subsequent surgical procedures. More than 400,000 surgical procedures for lysis of adhesions are performed daily in the United States, with an annual economic impact exceeding $1.3 billion.[1] This article will review the adjunctive methods available for the ObGyn to prevent postoperative adhesion formation.

ADHESION-RELATED MORBIDITY

Adhesion-related morbidity can be divided into 2 main categories: physical- and treatment-related. Physical-related morbidity includes small bowel obstruction (SBO), infertility, chronic pain, and dyspareunia. Treatment-related morbidity deals with difficulty with postoperative interventions such as intraperitoneal chemotherapy, radiation, and subsequent complications during repeat operations.

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PREVENTION OF POSTOPERATIVE ADHESIONS

Adhesive disease is a major cause of serious morbidity among women undergoing surgical procedures. As such, adhesion prevention has become an area of interest for many practitioners. Traditionally, good surgical technique has been advocated as the main way to prevent postoperative adhesions. This included strict adherence to the basic surgical principles of minimizing tissue trauma with meticulous hemostasis, minimization of ischemia and desiccation, and prevention of infection and foreign body retention. Historically, peritoneal closure has been performed to reduce postoperative complications, including adhesions. Review of the ObGyn literature does not support the closure of peritoneum to prevent adhesions.[2]

Significant progress has been made on the technology of adhesion prevention. Currently, there are 3 methods approved by the FDA for the prevention of postoperative adhesions: Adept®, Interceed®, and Seprafilm®.

ADHESION BARRIERS

Adept has been recently added to the armamentarium of adhesion prevention as an adjunct to be used intraperitoneally in patients undergoing gynecologic laparoscopic adhesiolysis. Adept is a 4% icodextrin solution made of an α(1-4)-linked glucose polymer. Its mechanism of action is that of hydroflotation. However, its efficacy appears to be limited, as evidenced in a clinical trial that showed only marginal superiority over

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lactated Ringer's solution (LRS) in the prevention of postoperative adhesions.[3] In the study, 402 patients were randomized intraoperatively to Adept (n = 203) or LRS (n = 199), and they returned for a second laparoscopy within 4 to 8 weeks. In the same trial, a number of treatment-related complications were identified, including excessive edema of the labia, vulva, and vagina.

Current adhesion barriers include expanded polytetrafluoroethylene (Gore-Tex®) and the 2 FDA-approved barriers: oxidized regenerated cellulose (Interceed) and sodium hyaluronate and carboxymethylcellulose (Seprafilm). Interceed and Seprafilm are not FDA approved for laparoscopic use. The Table lists adhesion barriers currently available, with their composition, peritoneal residence time, and indication/delivery mode.

Expanded Polytetrafluoroethylene (Gore-Tex)

This adhesion barrier has a microscope structure preventing cellular growth. It is noninflammatory and nonabsorbable. It does not adhere to the tissue and has to be sutured in place. Data on clinical efficacy exist but are limited. In a trial of 27 women, the Myomectomy Adhesion Multicenter Study Group reported a significant reduction in adhesion formation to the uterine surface following Gore-Tex application as compared with controls.[4] In another clinical trial, Haney et al reported an 85% reduction in adhesion formation with Gore- Tex, compared with 65% with Interceed (n=32).[5] In a prospective, multicenter, observational trial, Hurst reported on the long-term follow-up of patients who received Gore-Tex.[6] The subjects were 146 women in whom the membrane was implanted permanently during peritoneal reconstruction from 1991 through 1996. There was a single case of postoperative infection that did not necessitate removal of the membrane; all other patients did well. These data suggest that the membrane can probably be left in place indefinitely.

Oxidized Regenerated Cellulose (Interceed)

The adhesion barrier Interceed is made of oxidized regenerated cellulose and is available in 3×4-in sheets. The efficacy of Interceed has been studied in more than 13 clinical studies that included more than 600 patients. A meta-analysis of 10 randomized controlled studies reported a 24.2% reduction in adhesion formation on the side treated with Interceed compared with the control side.[7] Despite this report, concerns about Interceed continue, especially regarding its efficacy in preventing adhesions and its apparent ineffectiveness in the presence of blood. In this setting, Interceed may aggravate rather than prevent adhesion formation. The safety and effectiveness of Interceed in preventing adhesion formation in laparoscopic surgery or any procedures other than open gynecologic microsurgical procedures have not been established.

Sodium Hyaluronate and Carboxymethylcellulose (Seprafilm)

Seprafilm is perhaps the most widely studied adhesion barrier, with more than 20 published studies including more than 4,600 patients. Seprafilm is composed of chemically modified hyaluronic acid and carboxymethylcellulose. It is designed to separate planes of tissues after surgery for 3 to 7 days.

Writing for the Seprafilm Adhesion Study Group, Diamond reported on the safety and efficacy of Seprafilm in preventing postoperative uterine adhesions after myomectomy.[8] This was a prospective, double-blinded, multicenter, randomized, controlled study. After surgical treatment with or without Seprafilm, all patients were evaluated by early second-look laparoscopy for the incidence, severity, and extent of adhesions.

The Diamond study also evaluated the number of adhesion sites throughout the pelvis and the area of adhesions. In patients undergoing myomectomy, Seprafilm reduced the incidence, severity, extent, and average surface area of uterine adhesions. Approximately 48% of patients randomized to Seprafilm had at least one adnexa free of adhesions, and there was no increased risk of complications such as ileus, intra-abdominal bleeding, and postoperative fever.[8]

Bristow and Montz studied the effectiveness of Seprafilm (n=14) in preventing pelvic adhesions in women undergoing pri-

TABLE. Adhesion Barriers Currently Available

Adhesion Barrier	Composition	Peritoneal Residence Time	Indication/Delivery Mode
Preclude (W. L. Gore)	Expanded polytetrafluoroethlyene membrane	Permanent	Not approved for general adhesion prevention. Pericardial membrane or vessel guard
Interceed (Ethicon; Johnson & Johnson)	Oxidized regenerated cellulose membrane	1-2 weeks	Gynecologic pelvic laparotomy. Not FDA approved for laparoscopic use
Seprafilm (Genzyme)	Hyaluronic acid/ carboxymethylcellulose membrane	7 days	Abdominal or pelvic laparotomy. Not FDA approved for laparoscopic use
Adept (Baxter)	4% Icodextrin instillate	3-4 days	Gynecologic laparoscopy

mary cytoreductive surgery with radical oophorectomy.[9] In this cohort, Seprafilm significantly reduced the mean adhesion score by 84% compared with the internal controls and by 90% compared with historical control groups.

The authors concluded that 73.2% of Seprafilm placement sites were free of adhesions, compared with 35.7% for the abdominal wall and 14.3% for untreated pelvis. Moreover, in those Seprafilm placement sites that did have adhesions, the adhesions were significantly less severe than untreated sites. No complications were attributed to the presence of Seprafilm.

The economic impact of adhesions and the cost-effectiveness of Seprafilm treatment were also studied. By creating a theoretical decision model, researchers concluded that Seprafilm use offers an incremental savings of $383 (payers) and $1,122 (society) per patient over a 10-year period.[10] They concluded that the use of Seprafilm was cost-effective with a threshold of $1,571 (7 sheets).

Concerns about the use of Seprafilm include the learning curve required to achieve optimal placement. Also, Seprafilm cannot be applied laparoscopically.

CESAREAN DELIVERY

Cesarean deliveries and adhesive disease deserve separate discussion. With the rise in cesarean delivery rates and the decline in rates of vaginal birth after cesarean in the United States and worldwide, ObGyns should expect to see a rise in complications due to adhesive disease during repeat cesareans.

Morales et al performed a retrospective study to describe the incidence of adhesions after cesarean delivery.[11] The charts of 542 women who had undergone primary (n=265) or repeat (n=277) cesarean deliveries were reviewed. They reported on the severity and location of adhesions, delivery time, cord blood pH, and Apgar score.

The incidence and severity of adhesions after cesarean delivery increased significantly with each subsequent delivery. As expected, the incision-to-delivery time correlated directly with the presence and severity of adhesions.

The data on adhesion prevention at the time of cesarean delivery are limited to one study. Fushiki and colleagues performed a prospective cohort (n=52) study of Seprafilm placement at the time of primary cesarean delivery with a view to reducing adhesive disease.[12]

In all instances, the presence and severity of adhesions were evaluated at the time of repeat cesarean. The incidence and severity of adhesions were significantly reduced in the Seprafilm group compared with the control group (7.4% vs 48.0%, respectively,

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P=.001; adhesion score, 0.07 vs 1.32, respectively, *P*=.001).

SUMMARY

Despite significant progress in the development of adhesion prevention barriers, adhesive disease continues to be a major cause of morbidity in postoperative patients, with both short- and long-term sequelae. The use of an adhesion prevention barrier should be entertained in all ObGyn abdominal procedures, as well as in cesarean deliveries.

When selecting the most appropriate adhesion barrier, the practitioner should take into consideration the half-life of the barrier in the abdomen, to ensure that it remains "biologically active" for at least 5 to 7 days, its ability to be absorbed, and the inert metabolic products that need to be excreted. For procedures such as myomectomies and cesarean deliveries, where blood loss and contamination of the operative field are inevitable, the clinician should be aware of the effect of blood or inflammation on the adhesion prevention barrier.

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Despite significant progress in the development of adhesion prevention barriers, adhesive disease continues to be a major cause of morbidity in postoperative patients.

Dr González-Quintero reports that he is a speaker for Genzyme Corporation. Drs Stephan and Cruz-Pachano report no actual or potential conflicts of interest in relation to this article.

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