Vaginal cuff dehiscence and evisceration are rare but serious complications of pelvic surgery, specifically hysterectomy. The data on risks of vaginal cuff dehiscence are variable, and there is no consensus on how to manage this complication. In our review, we present a summary of the risk factors, symptoms, precipitating events, and treatment options for patients with vaginal cuff dehiscence after pelvic surgery. In addition, we provide a review of the current literature on this important surgical outcome and suggestions for future research on the incidence and prevention of vaginal cuff dehiscence.

**Key words:** dehiscence, evisceration, vaginal cuff

**Hysterectomy** is the most frequently performed major gynecologic surgical procedure. Between 2000 and 2004, 3.1 million hysterectomies were performed in the United States. Vaginal cuff dehiscence and vaginal evisceration, although rare, are serious postoperative complications after hysterectomy or other pelvic surgery. Because the data on the risks of vaginal cuff dehiscence are variable and there is no consensus on how to manage this complication, we performed a review of original research, case reports, and case series that have been published in the past 30 years on vaginal cuff dehiscence. In this review, we present a summary of the published evidence, risk factors, presenting symptoms, precipitating events, and treatment options for patients with vaginal cuff dehiscence after pelvic surgery.

**Limited body of evidence**

Although vaginal cuff dehiscence is a serious complication for the patient and the provider, its low incidence makes it difficult to study. In reviewing the literature, we identified only 44 pertinent publications on vaginal cuff dehiscence, 68% (30/44) of which were case reports that involved ≤2 patients. Overwhelmingly, the published information on vaginal cuff dehiscence consists of case reports, which are inherently problematic because of selection bias. Physicians tend to write up interesting or unusual cases for publication, and because the denominator is unknown, it is not possible to estimate rates. Of the remaining studies that we reviewed, 3 were case series (≥3 patients); 4 were "descriptive studies" (reviewing all hysterectomies that were performed at an institution over a certain time period and specifically detailing vaginal cuff dehiscence); 2 were retrospective cohort studies; 1 was a randomized clinical trial; and 3 were expert opinion articles that contained some discussion of vaginal cuff dehiscence. A summary of the case reports, case series, and descriptive studies are presented in Table 1.

**The incidence and timing of vaginal cuff dehiscence and evisceration**

The exact incidence of vaginal cuff dehiscence is difficult to determine because the definition and the incidence varies from study to study. The rate of vaginal dehiscence ranges from 0.14–4.1% [36,39]; some of the studies that include only robotic hysterectomy and total laparoscopic hysterectomy (TLH) reported higher incidence rates (1–4.1%) [39,40] than studies that included all types of hysterectomy (0.14–0.27%) [36,38]. Similarly, the rates of vaginal evisceration vary based on the surgical approach and range from 0.032–1.2% [37,39].

Vaginal cuff dehiscence can occur at any time after a pelvic surgical procedure and has been reported as early as 3 days and as late as 30 years after the operation. In retrospective cohort studies and larger case series, the mean time to cuff dehiscence varied from 6.1 weeks to 1.6 years (range, 2 weeks to 5.4 years), although this may differ by mode of hysterectomy. One study that combined case reports from individual surgeons who participated in an online “list-server” and published case reports found that the mean time to cuff dehiscence was 7 weeks for patients who had a TLH compared with 13 weeks for patients who had a total abdominal hysterectomy (TAH; P = .01). However, definitive conclusions about mean time to cuff dehiscence cannot be made based on results of individual case reports.

**Risk factors for vaginal cuff dehiscence**

**Mode of hysterectomy**

Vaginal cuff dehiscence and vaginal evisceration had complicated gynecologic surgery long before the advent of laparoscopic and robotic approaches to hysterectomy. In older reviews of vaginal evisceration, most cases that were reported in the literature had occurred after vaginal hysterectomy (63%). However, the distribution of reported cases has changed significantly over the past 5 years. Currently, 50% of the cases that have been reported in the literature occurred after TLH or robotic hysterectomy.
The increased rate of vaginal cuff dehiscence is likely due to the increased use of minimally invasive hysterectomy techniques. Studies have reported rates of 1.1-4.9% for cuff dehiscence after total laparoscopic hysterectomy (TLH) and 3% after robotic hysterectomy, compared with the rates of 0.29% and 0.12% after total vaginal hysterectomy (TVH) and TAH, respectively. One study showed that patients who undergo TLH have 21 and 53.2 times the risk of having a vaginal cuff dehiscence compared with patients who have a TVH or TAH, respectively. The relationship between cuff dehiscence and mode of hysterectomy would be assessed best by a very large randomized controlled trial (RCT) study design. Although RCTs have compared outcomes of different hysterectomy approaches, these studies were not large enough to determine a clinically meaningful difference in cuff dehiscence, given the rarity of this outcome. In the absence of such RCTs, the limited data available from case series and cohort studies suggest the possibility of a higher incidence of vaginal dehiscence after TLH or robotic hysterectomy than after TAH or TVH. Over time, as minimally invasive hysterectomy techniques improve and become more streamlined, we will see whether this trend of increased cuff dehiscence is maintained.

Different methods for vaginal cuff incision and closure at the time of TLH or robotic hysterectomy may alter the risk of vaginal cuff dehiscence. Because studies have pointed to the possibility of in-

<table>
<thead>
<tr>
<th>Study, with brief description</th>
<th>Mean age, y</th>
<th>Type of pelvic surgery</th>
<th>Mean interval to dehiscence (range)</th>
<th>Proportion with evisceration (%)</th>
<th>Method of closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Croak et al: description of all vaginal eviscerations at a single institution from 1970-2001</td>
<td>63</td>
<td>42% TAH; 33% TVH; 25% other/trauma</td>
<td>2.25 y (5 mo–4 y)</td>
<td>50</td>
<td>8% abdominal; 25% vaginal; 5% abdominal combination; 3% vaginal/robotic combination</td>
</tr>
<tr>
<td>Iaco et al: description of all vaginal dehiscences after hysterectomy at a single institution between 1995-2001</td>
<td>57.5</td>
<td>60% TAH; 30% TVH; 10% TLH</td>
<td>1.6 y (2 mo–5.4 y)</td>
<td>70</td>
<td>100% abdominal</td>
</tr>
<tr>
<td>Hur et al: description of all vaginal dehiscences at a single institution from 2000-2006</td>
<td>39.9</td>
<td>10% TAH; 10% TVH; 80% TLH</td>
<td>2.75 mo (1 mo–1 y 3 mo)</td>
<td>60</td>
<td>90% vaginal; 10% vaginal/abdominal combination (to allow concomitant pelvic organ prolapse procedures)</td>
</tr>
<tr>
<td>Agdi et al: series of 16 cases of vaginal cuff dehiscence reported via American Association of Gynecologic Laparoscopists list-server and literature review</td>
<td>NA</td>
<td>6% TAH; 94% TLH</td>
<td>3 wk (3–6.5 wk)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Kho et al: description of all vaginal dehiscences after robotic hysterectomy at a single institution from 2004-2008</td>
<td>45</td>
<td>Robotic hysterectomy, vaginectomy, or trachelectomy</td>
<td>1.5 mo (2 wk–4.5 mo)</td>
<td>29</td>
<td>90% vaginal; 5% vaginal/robotic combination; 5% secondary intention</td>
</tr>
<tr>
<td>Nick et al: retrospective cohort study of TLH and robotic hysterectomy from 2000-2009</td>
<td>30</td>
<td>All TLH and robotic</td>
<td>4.3 mo (1.9–5.8 mo)</td>
<td>43</td>
<td>43% vaginal; 57% secondary intention</td>
</tr>
<tr>
<td>Multiple studies: summary of 32 case reports and series (26 articles with 1 patient, 4 articles with 2 patients, 2 articles with 3 patients)</td>
<td>NA</td>
<td>35% TAH; 45% TVH; 15% TLH; robotic; 2% other</td>
<td>3.93 y (3 d–30 y)</td>
<td>95</td>
<td>52.5% abdominal; 32.5% vaginal; 5% laparoscopic; 10% vaginal/robotic combination</td>
</tr>
</tbody>
</table>

**TABLE 1**

Description of case series and cohort studies on vaginal cuff dehiscence

LAVH, laparoscopically assisted vaginal hysterectomy; NA, not available; TAH, total abdominal hysterectomy; TLH, total laparoscopic hysterectomy; TVH, total vaginal hysterectomy.
creased risk of dehiscence with minimally invasive techniques, it is important to take into account some potential differences in surgical technique that could contribute to this problem. Different from TVH and TAH, for TLHs, electrosurgery is sometimes used for colpotomy; different suturing techniques are used, and a more magnified visualization of the surgical field could lead inadvertently to smaller areas of tissue being sutured. Specific surgical techniques that have been suggested to decrease the risk of cuff dehiscence after TLH or robotic hysterectomy include (1) the use of monopolar current on cutting mode (a continuous, low-voltage current that leads to less thermal spread compared with coagulation mode) to incise the cuff, (2) the achievement of cuff hemostasis with sutures rather than electrocautery, (3) the use of a 2-layer cuff closure with polydioxanone suture that ensures adequate tissue edges when the vaginal cuff is sutured closed, and (4) bidirectional barbed suture for cuff closure. Although 1 small RCT that compared an interrupted figure 8 closure with a 2-layer running closure of the vaginal cuff during TLH found no difference in cuff dehiscence between groups, it likely was underpowered to detect a clinically meaningful difference. The use of bidirectional barbed suture for cuff closure has been shown to decrease the rate of vaginal cuff dehiscence significantly over other methods of closure (0% vs 4.2%; \( P = .008 \)) while not increasing the rate of postoperative bleeding, cuff cellulitis, or granulation tissue. This study, however, was a retrospective review that examined the outcomes during the first year of use of bidirectional barbed suture compared with conventional cuff closure. It is possible that, while learning to use this new suture material and technique, closer attention was paid to ensuring adequate bites of healthy tissue when suturing, which could have contributed further to their positive results. Further research on the impact of these surgical techniques is necessary to determine whether they alter the rate of vaginal cuff dehiscence.

**Other risk factors**

Increased age, increased number of vaginal surgeries, vaginal atrophy, factors that are associated with poor wound healing (including malignancy, chronic steroid use, malnutrition, tissue radiation), increased Valsalva testing (chronic cough), and postoperative vaginal cuff infection or hematoma may be risk factors for vaginal cuff dehiscence. Based on case reports and institutional case series, the mean age of patients who experience a cuff dehiscence is 48.3 years, which is similar to the average age (46 years) of patients who undergo hysterectomy in the United States. Although some studies have reported that most of their patients with dehiscence were postmenopausal, other studies have reported that most of their patients with dehiscence were premenopausal.

Data on additional risk factors for cuff dehiscence are limited and conflicting. Although 1 study reported no difference in age, tobacco use, or diabetes mellitus between women with and without cuff dehiscence, it likely was underpowered to detect a clinically meaningful difference. Although it seems biologically plausible that any condition that could compromise wound healing would increase the risk of vaginal cuff dehiscence, the data on such risk factors are sparse. The inconsistency of the reporting of risk factors in studies and case reports, the rarity of the vaginal cuff dehiscence, and the lack of comparison of risk factors between women with and without dehiscence in most retrospective studies makes it impossible to assess the significance of each of these potential risk factors.

**Clinical presentation and precipitating events**

Patients with vaginal cuff dehiscence can have a combination of several different symptoms, most commonly pelvic or abdominal pain (58-100%) and vaginal bleeding or watery discharge (33-90%). One study reported 2 asymptomatic patients with a cuff dehiscence (in a series of 21 patients) who received a diagnosis at a routine postoperative appointment; however, most patients with cuff dehiscence require medical care within 24 hours of the onset of symptoms. Patients with eversion of bowel or intraabdominal contents into the vagina often describe feeling a mass or pressure. Eversion occurs in up to 70% of vaginal cuff dehiscence cases.

Although intercourse, straining with defecation, or Valsalva testing can precede postoperative dehiscence of the vaginal cuff, many women who experience vaginal cuff dehiscence have no
Methods of repair

Currently, there is no consensus about the ideal method of surgical repair after vaginal cuff dehiscence or evisceration. In the case reports, case series, and retrospective cohort that we reviewed, 51% of dehiscences were repaired vaginally; 32% of dehiscences were repaired abdominally; 2% of dehiscences were repaired laparoscopically (n = 3); 10% of dehiscences were repaired with a combined (abdominal and vaginal or laparoscopic and vaginal) approach (n = 6), and 5% of dehiscences were allowed to heal by secondary intention (n = 7). Of 73 dehiscence repairs that were reported across case series and retrospective cohort studies, only 3 patients (4%) experienced another dehiscence that required a second repair. Although many individual case reports in the literature detail repeat cuff dehiscence, this may represent the fact that physicians are much more likely to submit case reports of unusual or repeated complications.

The current evidence that is available on the approach (vaginal, abdominal, laparoscopic) to the repair of a vaginal cuff dehiscence does not suggest that one approach is preferred over the others. Many factors affect the choice of surgical repair: the clinical stability of the patient, surgeon experience, level of suspicion for damage to intraabdominal organs, whether a bowel eversion is present, the ability to evaluate the bowel for ischemia or damage, the ability to visualize and reapproximate vaginal mucosa adequately, and the ability to perform additional necessary procedures. Because no one method is superior to another, the method of closure is decided by the surgeon on the basis of which closure he or she thinks will allow the best tissue approximation, strength of repair, and ability to assess for additional problems (bowel).

Comment

Vaginal cuff dehiscence and evisceration are serious complications of pelvic surgery, specifically hysterectomy. Although the data are limited, minimally invasive approaches to hysterectomy (such as TLH and robotic hysterectomy) may be associated with a higher risk of vaginal cuff dehiscence. The American College of Obstetricians and Gynecologists recently emphasized that TVH should remain the primary approach to hysterectomy when feasible. Despite these recommendations, TLH and robotic hysterectomy are becoming increasingly common. Because of the possible increased risk of vaginal cuff dehiscence with TLH and robotic hysterectomy, we suggest that gynecologic surgeons may want to discuss this complication with patients and provide them with information about possible symptoms of postoperative cuff dehiscence (pelvic pressure, sudden fluid leaking from the vagina, vaginal bleeding, or pelvic pain). The judicious use of electrocautery at the vaginal cuff and the use of a 2-layer cuff closure or bidirectional barbed suture potentially may decrease the risk of cuff dehiscence, and the extent of the effect that these surgical techniques have on the reduction of the incidence of dehiscence is uncertain. Continuing to identify and definitively investigate surgical techniques that may decrease the risk of cuff dehiscence is paramount.

There is no one standard method for the management of vaginal cuff dehiscence; the cases that are reported in the literature illustrate that vaginal, laparoscopic, abdominal, and combined approaches are all appropriate methods for secondary cuff closure. Each patient and each cuff dehiscence is different, and the surgical approach should be dictated by the clinical circumstances and surgeon’s judgment as to which approach will allow assessment for other problems (examination of the bowel, when there is concern about compromise) and allow optimal tissue approximation.

Unfortunately, much of what we know about vaginal cuff dehiscence comes from case reports and case series, which makes it difficult to truly assess possible risk factors and whether these risk factors differ by type of surgical procedure, mode of hysterectomy, or age. More research is necessary to identify modifiable risk factors for vaginal cuff dehiscence and methods for its prevention. The development of a national reporting system or registries for surgical outcomes would facilitate the investigation of this rare complication and other important surgical complications. A multiinstitutional prospective study that would examine hysterectomy outcomes would be the ideal way to determine true rates and identifiable risk factors for vaginal cuff dehiscence across a multitude of surgical techniques and modalities. This type of study, however, would be quite costly and time-consuming because of the rarity of the outcome, vaginal cuff dehiscence. Given the limited data on vaginal cuff dehiscence, we would recommend that institutions continue to publish their data on surgical outcomes and consider combining their data on cuff dehiscence with other institutions to better evaluate different hysterectomy approaches and specific surgical techniques during hysterectomy. Vaginal cuff dehiscence is a serious complication of hysterectomy and pelvic surgery and warrants additional research into its prevention and optimal management.

REFERENCES
