

Puerperal Infection

PUERPERAL PELVIC INFECTION

- ▶ Although the woman who recently gave birth is susceptible to
- ▶ several potentially serious complications, pelvic infection continues
- ▶ to be the most important source of maternal morbidity and mortality.


- ▶ Traditionally, the term *puerperal infection* describes any
- ▶ bacterial infection of the genital tract after delivery. These infections
- ▶ as well as preeclampsia and obstetrical hemorrhage formed the lethal
- ▶ triad of maternal death causes before and during the 20th century

Puerperal Fever

- ▶ Several infective and noninfective factors can cause puerperal
- ▶ fever—a temperature of 38.0°C (100.4°F) or higher. *Most persistent*
- ▶ *fevers after childbirth are caused by genital tract infection.*

- ▶ about 20 percent of women febrile within the first
- ▶ 24 hours after vaginal delivery were subsequently diagnosed with
- ▶ pelvic infection. This was in contrast to 70 percent of those after
- ▶ cesarean delivery.

- ▶ It must be emphasized that spiking fevers of 39°C
- ▶ or higher that develop within the first 24 hours postpartum may be
- ▶ associated with virulent pelvic infection caused by group A
- ▶ streptococcus,.

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- ▶ Other causes of puerperal fever include breast engorgement;
 - ▶ infections of the urinary tract, of perineal lacerations, and of
 - ▶ episiotomy or abdominal incisions; and respiratory complications
 - ▶ after cesarean delivery

Breast engorgement

- ▶ Approximately 15 percent of women who do not breastfeed develop postpartum fever from *breast engorgement*.
- ▶ The incidence of fever is lower in breastfeeding women.
- ▶ “Breast fever” rarely exceeds 39°C in the first few postpartum days and usually lasts <24 hours.

- ▶ *Urinary infections* are uncommon postpartum because of
- ▶ the normal diuresis encountered then. *Acute pyelonephritis* has a
- ▶ variable clinical picture. The first sign of renal infection may be
- ▶ fever, followed later by costovertebral angle tenderness, nausea, and
- ▶ vomiting.


- ▶ *Atelectasis* following abdominal delivery is caused by
- ▶ hypoventilation and is best prevented by coughing and deep
- ▶ breathing on a fixed schedule following surgery

Uterine Infection

- ▶ Postpartum uterine infection involves not only the decidua but also the
- ▶ myometrium and parametrial tissues prefer the inclusive term
- ▶ *metritis with pelvic cellulitis*

Predisposing Factors

- ▶ The route of delivery is the single most significant risk factor for
- ▶ the development of uterine infection a nearly 25-fold
- ▶ increased infection-related mortality rate with cesarean versus
- ▶ vaginal delivery

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- ▶ Antimicrobial prophylaxis has done more to decrease the incidence and
 - ▶ severity of postcesarean delivery infections than any other intervention in
 - ▶ the past 30 years. Such practices decrease the puerperal pelvic infection risk
 - ▶ by 65 to 75 percent

Important risk

- ▶ factors for infection following surgery included prolonged labor,
- ▶ membrane rupture, multiple cervical examinations, and internal fetal monitoring
- ▶ lower socioeconomic status
- ▶ *colonization* of the lower genital tract with certain
- ▶ microorganisms—for example, group B streptococcus, *Chlamydia*
- ▶ *trachomatis*, *Mycoplasma hominis*, *Ureaplasma urealyticum*, and
- ▶ *Gardnerella vaginalis*

Important risk

- ▶ Other factors associated with an increased infection risk
- ▶ include general anesthesia, cesarean delivery for multifetal gestation,
- ▶ young maternal age and nulliparity, prolonged labor induction,
- ▶ obesity, and meconium-stained amnionic fluid

- ▶ Women with all these factors who were not given
- ▶ perioperative prophylaxis had a 90-percent serious postcesarean
- ▶ delivery pelvic infection rate

Clinical Course

- ▶ *Fever is the most important criterion for the diagnosis of*
- ▶ *postpartum metritis*. Intuitively, the degree of fever is believed
- ▶ proportional to the extent of infection and sepsis syndrome.
- ▶ Temperatures commonly are 38 to 39° C. Chills that accompany
- ▶ fever suggest bacteremia or endotoxemia

- ▶ Women usually complain of abdominal pain, and parametrial tenderness is
- ▶ elicited on abdominal and bimanual examination.
- ▶ Leukocytosis may range from 15,000 to 30,000 cells/ μ L, but recall that delivery itself increases the leukocyte count
- ▶ Although an offensive odor may develop, many women have foul-smelling
- ▶ lochia without evidence for infection, and vice versa. Some other infections,
- ▶ notably those caused by group A β -hemolytic streptococci, may be associated with scant, odorless lochia

Treatment

- ▶ If nonsevere metritis develops following vaginal delivery, then
- ▶ treatment with an oral or intramuscular antimicrobial agent may be
- ▶ sufficient. For moderate to severe infections, however, intravenous therapy
- ▶ with a broad-spectrum antimicrobial regimen is indicated
- ▶ The woman may be discharged home after she has been
- ▶ afebrile for at least 24 hours, and further oral antimicrobial therapy
- ▶ is not needed

- ▶ Improvement follows in 48 to 72 hours in nearly 90 percent of women treated
- ▶ with one of several regimens. Persistent fever after this
- ▶ interval mandates a careful search for causes of refractory pelvic infection.

Choice of Antimicrobials

- ▶ Although therapy is empirical, initial treatment following
- ▶ cesarean delivery is directed against elements of the mixed flora
- ▶ For infections following vaginal delivery, as many as 90 percent of women
- ▶ respond to regimens such as ampicillin plus gentamicin. In contrast, anaerobic
- ▶ coverage is included for infections following cesarean delivery

TABLE 37-2 Antimicrobial Regimens for Pelvic Infections Following Cesarean Delivery

Regimen	Comments
Clindamycin + gentamicin	“Gold standard,” 90–97% efficacy, once-daily gentamicin dosing acceptable <i>PLUS</i> Ampicillin added to regimen with sepsis syndrome or suspected enterococcal infection
Clindamycin + aztreonam	Gentamicin substitute for renal insufficiency
Extended-spectrum penicillins	Piperacillin, piperacillin tazobactam, ampicillin/sulbactam, ticarcillin/clavulanate
Cephalosporins	Cefotetan, cefoxitin, cefotaxime
Vancomycin	Added to other regimens for suspected <i>Staphylococcus aureus</i> infections
Metronidazole + ampicillin + gentamicin	Metronidazole has excellent anaerobic coverage
Carbapenems	Imipenem/cilastatin, meropenem, ertapenem reserved for special indications

Perioperative Prophylaxis

- ▶ Single-dose prophylaxis with a 2-g dose of ampicillin or a first-generation cephalosporin is ideal. Both equal the efficacy of broad-spectrum agents or multiple-dose regimens

- ▶ For obese women, evidence supports a 3-g dose of cefazolin to reach optimal tissue concentrations
- ▶ Extended-spectrum prophylaxis with azithromycin added to standard single-dose prophylaxis further reduced postcesarean metritis rates
- ▶ It is controversial whether the infection rate is lowered further if the antimicrobial is given before the skin incision compared with after umbilical cord clamping
- ▶ The American College of Obstetricians and Gynecologists (2016b) has concluded that the evidence favors predelivery administration

- ▶ Abdominal preoperative skin preparation with
- ▶ chlorhexidine-alcohol is superior to iodine-alcohol for preventing
- ▶ surgical-site infections. Additive salutary effects may
- ▶ be gained by preoperative vaginal cleansing with povidone-iodine
- ▶ rinse or application of metronidazole

Other Methods of Prophylaxis

- ▶ Allowing the placenta to separate spontaneously compared with removing it manually lowers the infection risk.
- ▶ Exteriorizing the uterus to close the hysterotomy may decrease febrile morbidity
- ▶ Although closure of subcutaneous tissue in obese women does not lower the wound infection rate, it does decrease the wound separation incidence

Complications of Uterine and Pelvic Infections

- ▶ In more than 90 percent of women, metritis responds to
- ▶ antimicrobial treatment within 48 to 72 hours. In some of the
- ▶ remainder, any of several complications may arise. These include
- ▶ wound infections, complex pelvic infections such as phlegmons or
- ▶ abscesses, and septic pelvic thrombophlebitis

Abdominal Incisional Infections

- ▶ Incisional infection risk factors include
- ▶ obesity, diabetes, corticosteroid therapy, immunosuppression,
- ▶ anemia, hypertension, and inadequate hemostasis with hematoma
- ▶ formation.

Treatment

- ▶ Treatment includes antimicrobials and surgical drainage and
- ▶ debridement of devitalized tissue
- ▶ Local wound care thereafter is completed twice
- ▶ daily.
- ▶ The fascia is carefully inspected to document integrity.
- ▶ the wound is repacked with moist gauze.
- ▶ At 4 to 6 days, healthy granulation tissue is typically present,
- ▶ and secondary en bloc closure of the open layers can usually be
- ▶ accomplished

- ▶ polypropylene or nylon suture of appropriate gauge enters 2 to 3 cm
- ▶ from one wound edge. It crosses the wound to incorporate the full
- ▶ wound thickness and emerges 3 cm from the other wound edge.
- ▶ These are placed in series to close the opening. In most cases, sutures
- ▶ may be removed on postprocedural day 10.

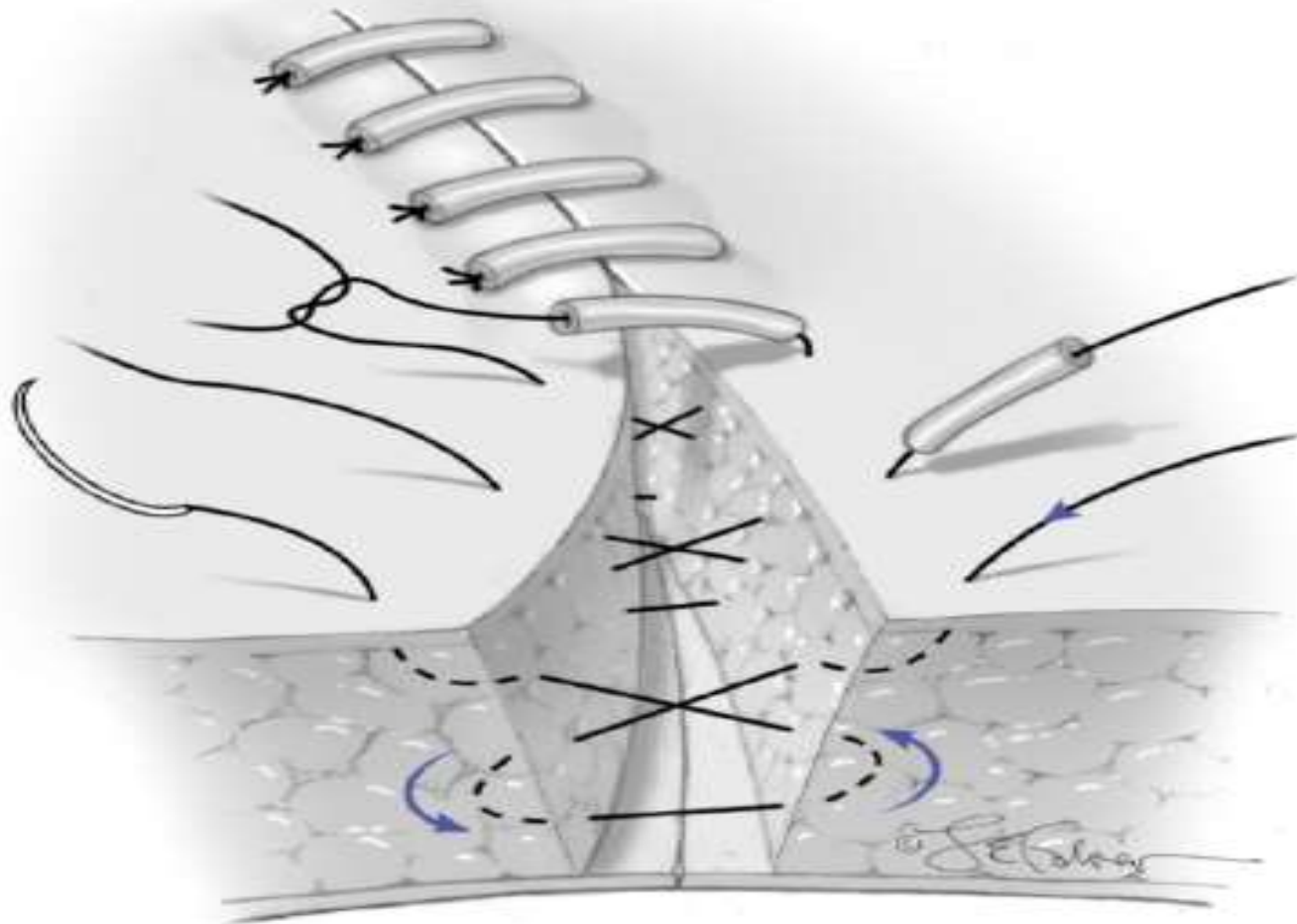


Figure 37-1: Secondary abdominal wound closure technique. After closure of the wound, the wound edges are approximated with sutures.

FIGURE 37-1: Secondary abdominal wound closure technique. (From Worley KC: Postoperative complications. In Yeomans ER, Hoffman BL, Gilstrap LC III, et al (eds): Cunningham and Gilstrap's Operative Obstetrics, 3rd ed. New York, McGraw Hill Education, 2017.)

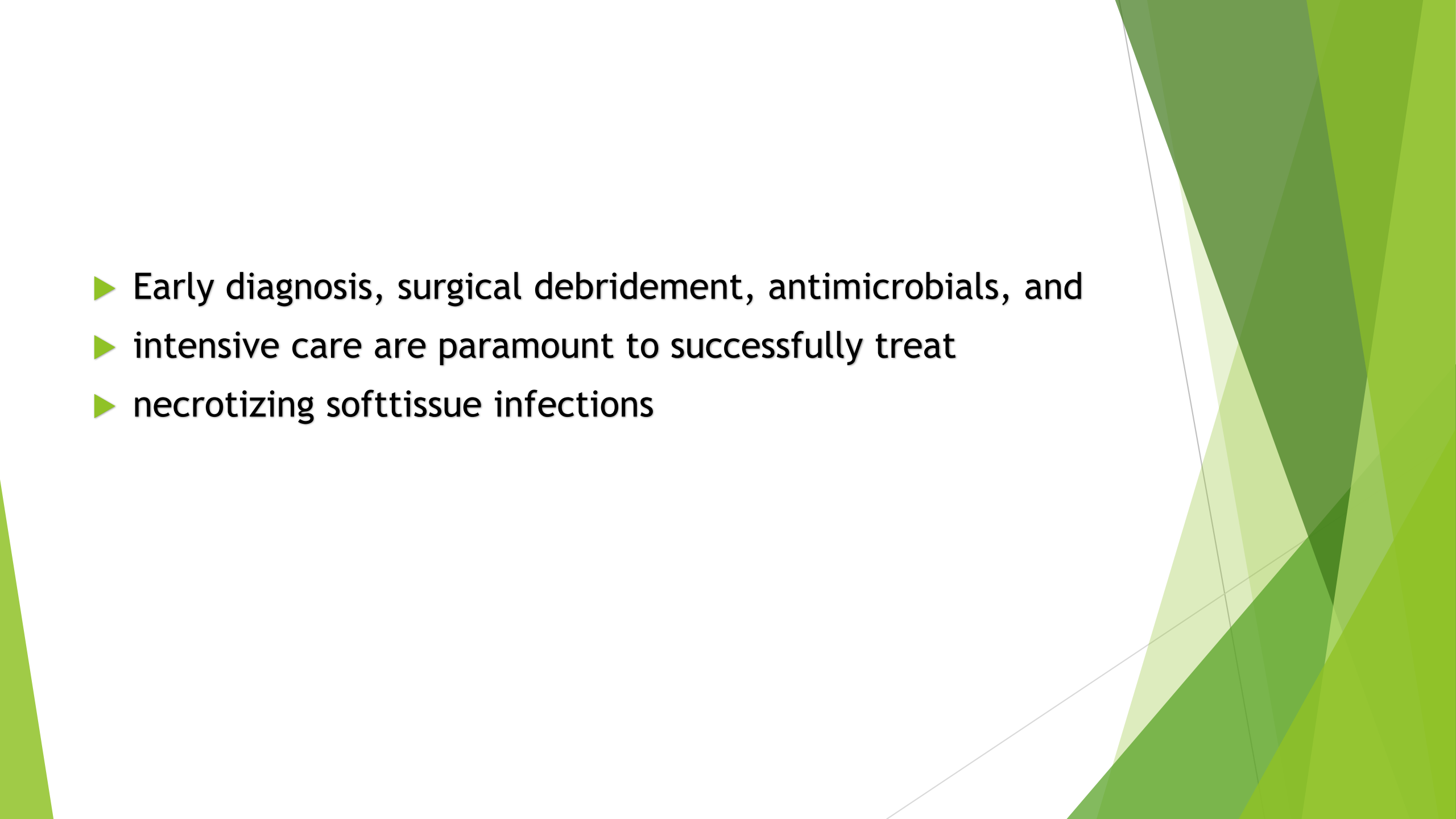
Wound Dehiscence

- ▶ Wound disruption or dehiscence refers to separation of the
- ▶ fascial layer. This is a serious complication and requires secondary
- ▶ closure of the incision in the operating room
- ▶ obesity may be a risk factor
- ▶ Most disruptions manifested on about the
- ▶ fifth postoperative day and were accompanied by a serosanguinous
- ▶ discharge.

Necrotizing Fasciitis


- ▶ the risk factors for fasciitis three of these—**diabetes**, **obesity**, and
- ▶ **hypertension**—are relatively common in gravidas
- ▶ Infection may involve skin, superficial and deep subcutaneous
- ▶ tissues, and any of the abdominopelvic fascial layers
- ▶ muscle is also involved—*myofasciitis*

- ▶ Clinical findings vary, and it is frequently difficult to
- ▶ differentiate more innocuous superficial wound infections from an
- ▶ ominous deep fascial one. A high index of suspicion, with surgical
- ▶ exploration if the diagnosis is uncertain, may be lifesaving

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- The background of the slide features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.
- ▶ Early diagnosis, surgical debridement, antimicrobials, and
 - ▶ intensive care are paramount to successfully treat
 - ▶ necrotizing softtissue infections

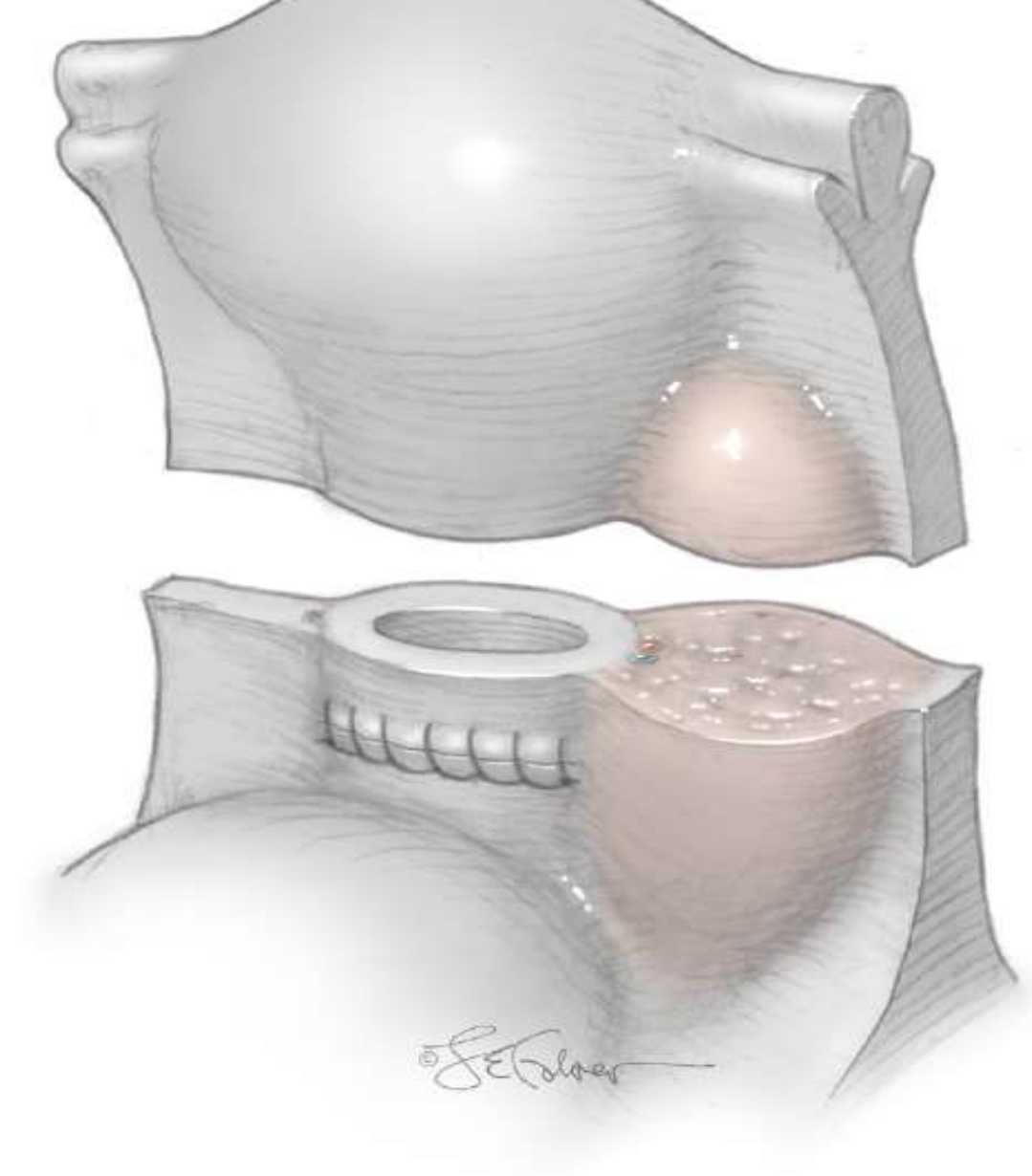
Adnexal Abscesses and Peritonitis

- ▶ The abscess is usually unilateral, and women typically present 1 to 2 weeks after delivery. Rupture is common, and peritonitis may be severe
- ▶ Peritonitis in Postpartum women, abdominal rigidity may not be prominent with puerperal because of physiological abdominal wall laxity from pregnancy.
- ▶ Pain may be severe, but frequently, the first symptoms of peritonitis are those of *adynamic ileus*

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- ▶ If the infection begins in an intact uterus and extends into the
 - ▶ peritoneum, antimicrobial treatment alone usually suffices.
 - ▶ Conversely, peritonitis caused by uterine incisional necrosis, or from bowel
 - ▶ perforation, must be treated promptly with surgical intervention.

Parametrial Phlegmon

- ▶ Metritis develops following cesarean delivery, parametrial cellulitis is intensive and forms an area of induration—a *phlegmon*—within the leaves of
- ▶ the broad ligament These infections are considered when fever persists longer than 72 hours despite intravenous antimicrobial therapy
- ▶ Persistent puerperal infections can be evaluated using computed tomography (CT) or magnetic resonance (MR) imaging



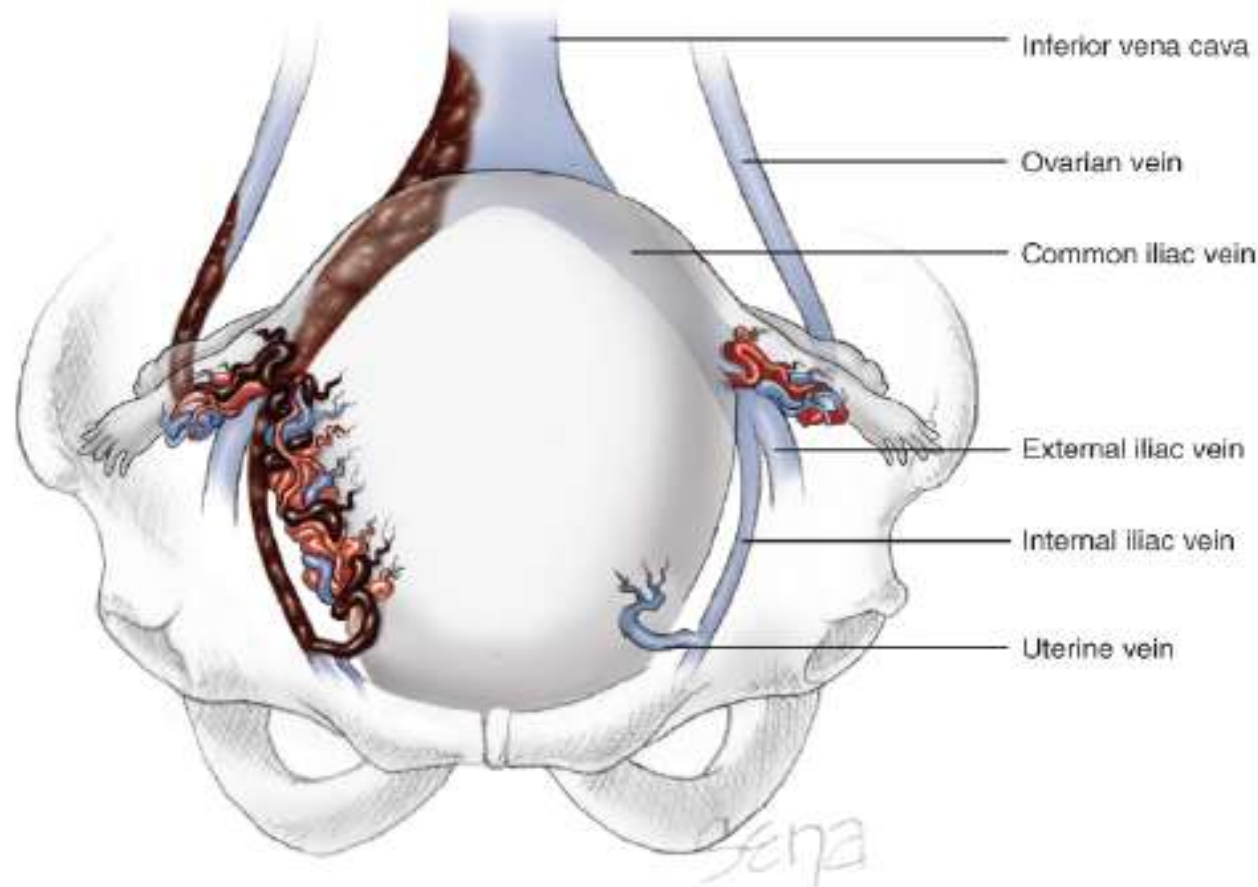
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FIGURE 37-3: Left-sided parametrial phlegmon: cellulitis causes induration in the parametrium adjacent to the hysterotomy incision. (From Worley KC: Postoperative complications. In

- ▶ **Phlegmons are usually unilateral, and they frequently are limited**
- ▶ **to the parametrium at the base of the broad ligament**
- ▶ **treatment with a broad-spectrum antimicrobial regimen.**
- ▶ **Typically, fever resolves in 5 to 7 days, but in some cases, it persists**
- ▶ **longer. Absorption of the induration may require several days to**
- ▶ **weeks.**
- ▶ **Surgery is reserved for women in whom uterine incisional necrosis**
- ▶ **is suspected because of ileus and peritonitis. For most, hysterectomy**
- ▶ **and surgical debridement are needed and are predictably difficult**
- ▶ **because the cervix and lower uterine segment are involved with an**
- ▶ **intense inflammatory process that extends to the pelvic sidewall**

Septic Pelvic Thrombophlebitis

- ▶ Septic phlebitis arises as an extension along venous routes and may cause thrombosis
- ▶ Women with septic thrombophlebitis usually have symptomatic improvement with antimicrobial treatment, however, they continue to have fever. Although pain occasionally is noted in one or both lower quadrants, patients are usually asymptomatic except for chills.
- ▶ the addition of heparin to antimicrobial therapy for septic pelvic thrombophlebitis did not hasten recovery or improve outcome.
- ▶ Certainly, no evidence supports long-term anticoagulation



Source: F. Gary Cunningham, Kenneth J. Leveno, Steven L. Bloom, Catherine Y. Spong, Jodi S. Dashe, Barbara L. Hoffman, Brian M. Casey, Joanna S. Sheffield: *Williams Obstetrics*, 26th Edition.
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FIGURE 37-6: Septic pelvic thrombophlebitis: uterine and parametrial infection may extend to any pelvic vessel as well as the inferior vena cava. The clot in the right common iliac vein extends from the uterine and internal iliac veins and into the inferior vena cava. The ovarian vein septic thrombosis extends halfway to the vena cava.

Perineal Infections

- ▶ Episiotomy dehiscence is most commonly associated with
- ▶ infection. Other factors include coagulation disorders, smoking, and
- ▶ human papillomavirus infection
- ▶ Local pain and dysuria, with or without urinary retention, are frequent symptoms

Treatment

- ▶ Drainage is established, and in most cases, sutures
- ▶ are removed and the infected wound debrided
- ▶ Early episiotomy repair after infection subsided
- ▶ Postoperative care includes local wound care, stool softeners, and
- ▶ nothing per vagina or rectum until healed.

TABLE 37-3 Preoperative Protocol for Early Repair of Episiotomy Dehiscence

Open wound, remove sutures, begin intravenous antimicrobials

Wound care

Sitz bath several times daily or hydrotherapy

Adequate analgesia or anesthesia—regional analgesia or general anesthesia may be necessary for the first few debridements

Scrub wound twice daily with a povidone-iodine solution

Debride necrotic tissue

Closure when afebrile and pink, healthy granulation tissue predominates

Bowel preparation for fourth-degree repair