

Pregnancy, Ectopic

Risk

- Implantation of a fertilized oocyte outside the uterine cavity.
- 1.3–2.4% of all pregnancies, but rate is increasing due to risk factors and better diagnostic methods.
- Risk factors: High-tubal surgery, prior ectopic pregnancy, use of an IUD, interuterine exposure to diethylstilbestrol, moderate assisted reproductive technologies, pelvic inflammatory disease, smoking, tubal pathology; maternal age >40 y.
- Fallopian “tubal” pregnancy is most common (97–99%).

Perioperative Risks

- Leading cause of pregnancy-related maternal deaths in first trimester; 4–10% of all pregnancy-related deaths.
- Mortality rate has declined from 1.15 to 0.5 maternal deaths per 100,000 live births owing to improved detection and treatment. Deaths are 6.8 times more common among African Americans and 3.5 times more common among women >35 y.
- Highest mortality with intraabdominal and interstitial tubal pregnancies because of increased fetal size, blood flow, and subsequent tissue involvement.

Worry About

- Death principally due to hemorrhage, shock, and renal failure
- Blood availability; may need type-specific or O-negative blood
- Full-stomach/aspiration risk
- Physiologic changes of pregnancy (see Pregnancy, Intra-Abdominal)
- Effects of CO₂ insufflation and steep Trendelenburg position on ventilation in the case of laparoscopy

Overview

- Primary concerns for airway, intravascular volume, and blood/coagulation management.
- Approach similar to that in the case of a trauma pt with profound hypovolemia.
- Dx made by history, physical (pelvic pain, 95%; amenorrhea, 75%; uterine bleeding, 60–80%); β-hCG (higher sensitivity of radioimmunoassay method) and ultrasound. 70% are diagnosed prior to rupture.
- Differential Dx: Appendicitis, any intraabdominal infection or process.

Etiology

- Mechanical factors: Salpingitis, peritubal adhesions, previous ectopic, prior tubal surgery, multiple prior abortions

- Functional factors: External ovum migration, menstrual reflux, altered tubal motility

Usual Treatment

- Surgical therapy is indicated if ectopic has ruptured or if there is hemodynamic instability/severe symptoms, if diagnostic laparoscopy is required, or there is a suspected heterotopic (i.e., simultaneous extrauterine and uterine) pregnancy.
 - Tube-preserving surgery (i.e., salpingotomy, partial salpingectomy, transampullary expression) may be considered based on bleeding intensity, size and damage, infertility and Hx of prior tubal pregnancy, and pt's wishes; tube preservation can result in retained tissue (4–15%).
 - Salpingectomy indicated if uncontrolled bleeding or marked tubal destruction.
- Medical management with methotrexate (administered IM single or multidose) ± leucovorin IM. Success rate is 63–97%.
- Combined surgical/medical management: Direct injection of drugs (e.g., methotrexate, potassium, or hyperosmolar glucose) into the ectopic implant by US guidance.
- Expectant management: Primarily used for small ectopics; follow β-hCG.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT		Snoring/difficult airway	Airway exam	
CV	Hypovolemia secondary to hemorrhage	Orthostatic dizziness	Vitals, neck veins, orthostatic vitals Weak thready pulse Vasoconstriction, cold legs and arms	
HEME	Blood loss secondary to rupture Hemoperitoneum/vaginal bleeding	Vaginal bleeding Orthostatic dizziness	Orthostatic vitals	Hct
CNS	Hypoperfusion altering mental status and urine production	History of CNS symptoms	CNS exam	BUN/Cr UA

Key Reference: Mukul LV, Teal SB: Current management of ectopic pregnancy, *Obstet Gynecol Clin North Am* 34(3):403–419, 2007.

Perioperative Implications

Preoperative Preparation

- Assess volume status using clinical and laboratory measures.
- Place two large-bore peripheral IV lines.
- Check blood availability; O-negative, but type-specific preferable.
- Consider full stomach risks.
- Discuss antibiotic use.

Anesthetic Technique

- GA: Preferred with unstable pt, ruptured ectopic, anticipated laparoscopy, or regional contraindication.
- RA: Consider in hemodynamically stable pt; spinal or epidural at T₂–T₄ level.

Monitoring

- Use standard monitors; consider EEG (BIS, Sed-line), particularly if pt is unstable.
- Consider arterial line if pt is unstable, requires aggressive blood replacement, or offers poor access for venous lab tests.
- Consider bedside coagulation monitor (TEG, ROTEM)

Airway

- Alternative airway equipment and devices available; first attempt is the best attempt.
- Rapid-sequence induction and intubation.

Induction/Maintenance

- Propofol; consider etomidate or ketamine if pt is unstable; consider anxiolytic medication.
- Maintenance with O₂ plus inhalational volatile agent, opioid, and muscle relaxants.
- Pt may have uncorrected hypovolemia and full stomach.
- Surgical technique:
 - Laparotomy for ruptured ectopic, hemoperitoneum, or uncontrolled bleeding. Pfannenstiel or low midline approach; abdominal opening may release tamponade, involving severe hypotension.
 - Laparoscopy: Intraumbilical incisions with risk of organ injury with Veress needle insertion. Peritoneal insufflation with CO₂ to <18 mm Hg; potential CO₂ embolus.
 - Dissection: Depends on location of ectopic and degree of bleeding.

Definitive Surgery

- Salpingectomy, ipsilateral oophorectomy: Used for ruptured or interstitial implantation
- Salpingotomy: Used for unruptured or <2 cm ectopic, allows for fallopian tube conservation and use of laparoscope
- Approximate duration: 1–2 h

- Anticipate large hemodynamic and fluid shifts with ruptured ectopic
- Closure: Minimal if laparoscopy; low midline or Pfannenstiel 15–20 min

Extubation

- Awake

Postoperative Period

- Blood loss may be extensive; check Hct.
- Pain score: 4–6 laparoscopy, 5–8 laparotomy.
- PCA or neuraxial opioids; local anesthetic agents if regional ± neuraxial narcotics.

Anticipated Problems/Concerns

- CV: Instability from massive hemorrhage from ruptured ectopic
- GI: Gastric dilation 3%, thrombophlebitis 3%, pulm embolism 2%, ureteral injury/stenosis 1% with laparotomy
- Hematologic: Anemia, coagulation deficit, hemostasis, transfusion reaction
- Infection: Postop infection, abscess
- Musculoskeletal: Postop shoulder and chest pain from unabsorbed gas and peritoneal irritation (30%)
- Pulm: Pulm edema, TRALI, TACO
- Renal: Acute renal insufficiency