

Ectopic Pregnancy

Pathogenesis · Morphology · Clinicopathologic correlation

A pathology-based lecture

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Learning objectives

Define

Identify abnormal implantation sites

Explain

Relate tubal scarring to ectopic implantation

Recognize

Interpret tubal distention, villi, and hemorrhage

Correlate

Connect morphology to pain, bleeding, and shock

Diagnose

Explain laboratory, imaging, and tissue findings

Apply

Reason through focused pathology cases

Pregnancy disorders: Why location matters

- Normal gestation requires implantation within the uterine cavity.
- Disorders of implantation can jeopardize maternal health independent of fetal development.
- Ectopic pregnancy is distinguished primarily by implantation site, not by an unusual type of trophoblast.
- Anatomy and the consequences of tissue invasion explain its clinical urgency.

Definition: Intrauterine versus ectopic implantation

Normal intrauterine gestation

- Implantation occurs in the uterine cavity
- Trophoblast invades maternal endometrial tissue
- The uterus accommodates advancing gestation

Ectopic gestation

- Implantation occurs outside the normal uterine cavity
- Trophoblast may invade a structurally vulnerable extrauterine site
- Expanding implantation can produce serious hemorrhage

Frequency in confirmed pregnancy

2%

Of confirmed pregnancies

Ectopic pregnancy in approximately two of every hundred confirmed pregnancies. This is a population frequency, not the probability that an individual symptom represents ectopic pregnancy.

Fallopian tube: The dominant site

~90%

Tubal sites

Most ectopic gestations implant in the fallopian tube. Non-tubal implantation is less common but remains clinically relevant.

Recognized ectopic implantation sites

Fallopian tube

By far the most frequent location

Ovary

Gestation associated with the
ovary

Abdominal cavity

Gestation outside the
reproductive-tract lumen

Cesarean scar

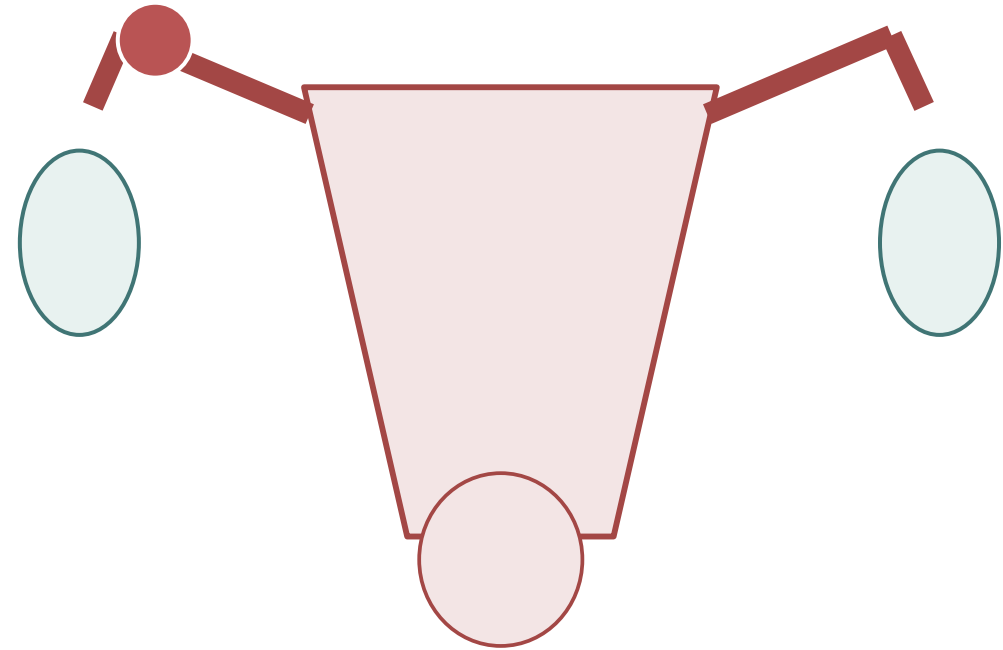
Implantation into a prior uterine
scar

Interstitial tube

Intrauterine portion of the
fallopian tube

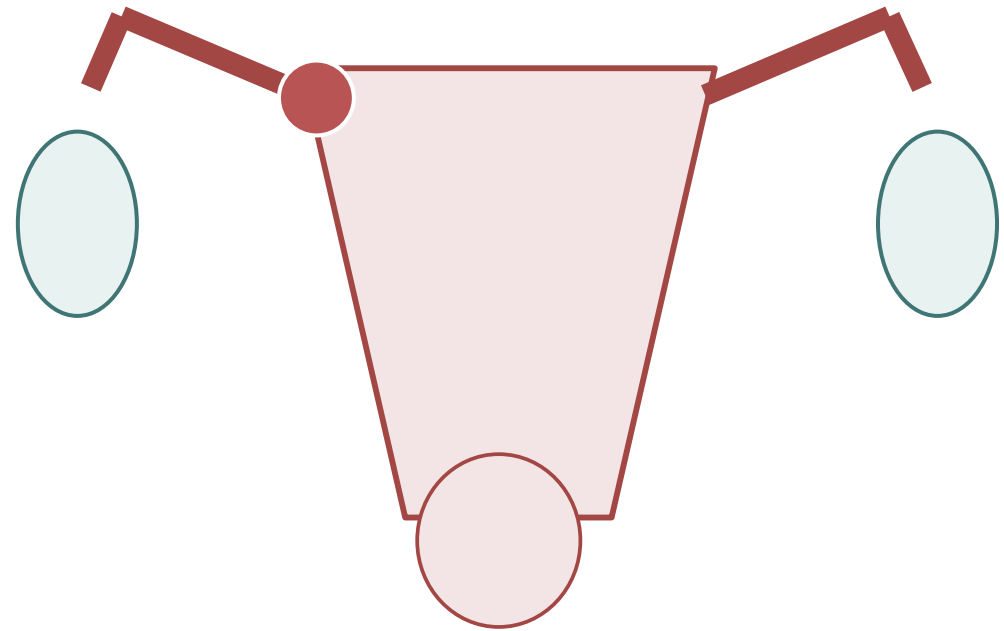
Anatomic localization of a tubal ectopic pregnancy

- A gestation implants in the fallopian tube rather than the uterine cavity.
- The tubal wall is exposed to invasive gestational tissue.
- Tubal location is responsible for the characteristic risk of rupture.



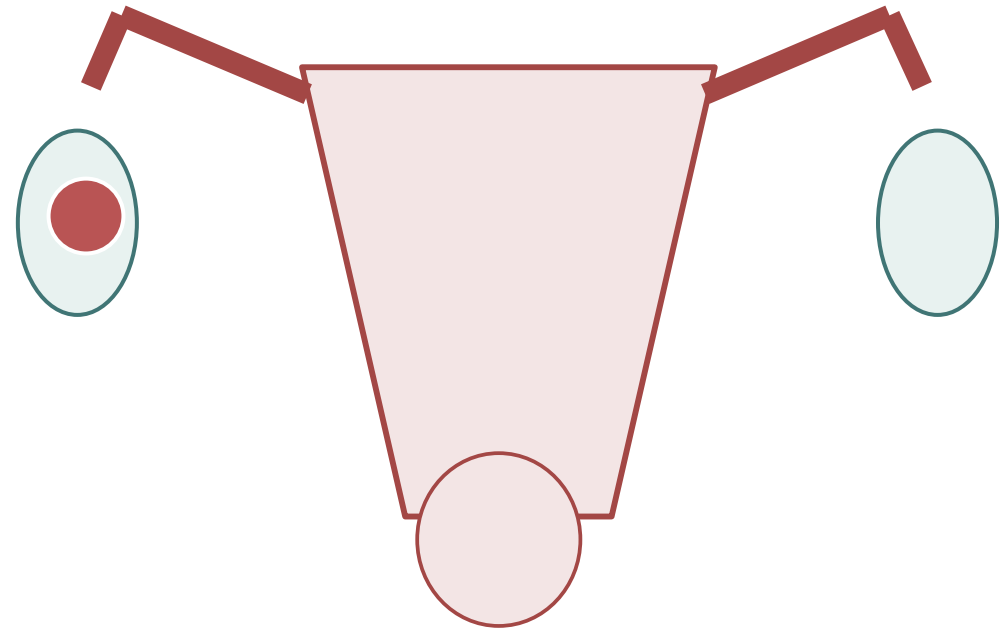
Interstitial (cornual) implantation

- The intrauterine portion of the fallopian tube among ectopic sites.
- The term “cornual” in the source refers to this tubal location.
- It is anatomically distinct from a normally implanted uterine-cavity gestation.



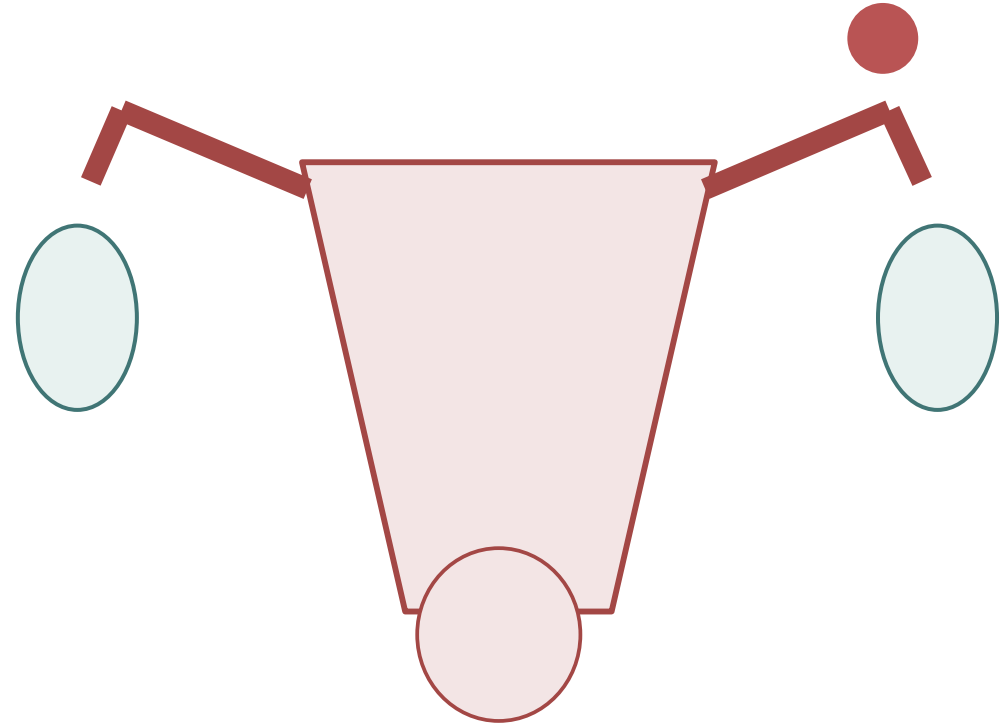
Ovarian implantation

- Implantation is associated with the ovary rather than the tube or uterine cavity.
- Trapping of a fertilized ovum within the follicle at rupture.
- Placental and embryonic tissues may still form at this abnormal site.



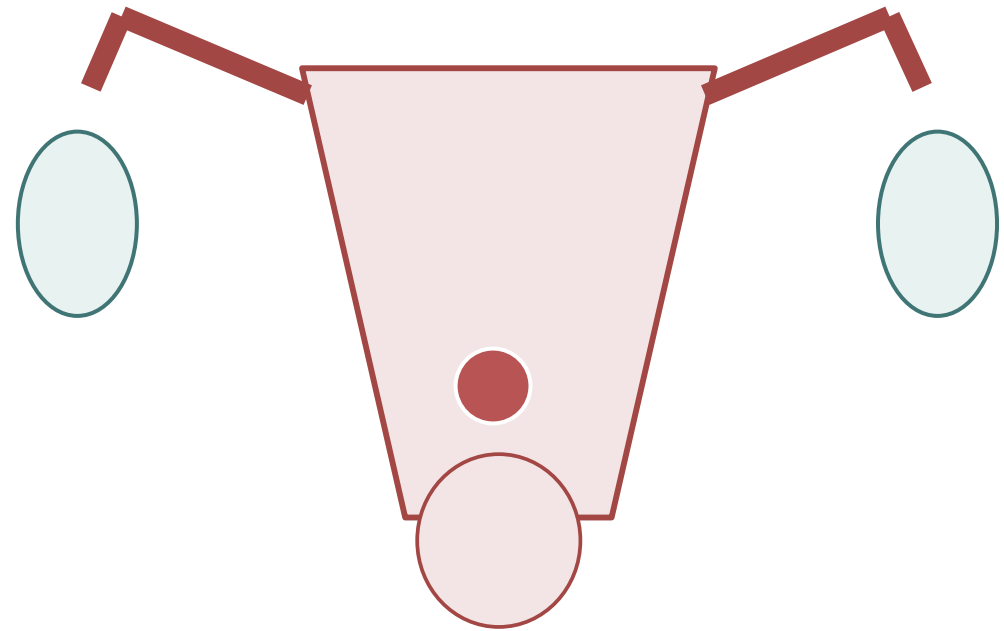
Abdominal implantation

- Abdominal pregnancy may follow failure of the fertilized ovum to enter the tube.
- It may also follow passage out of the fimbriated tubal end.
- Gestational tissue establishes itself outside the usual uterine site.

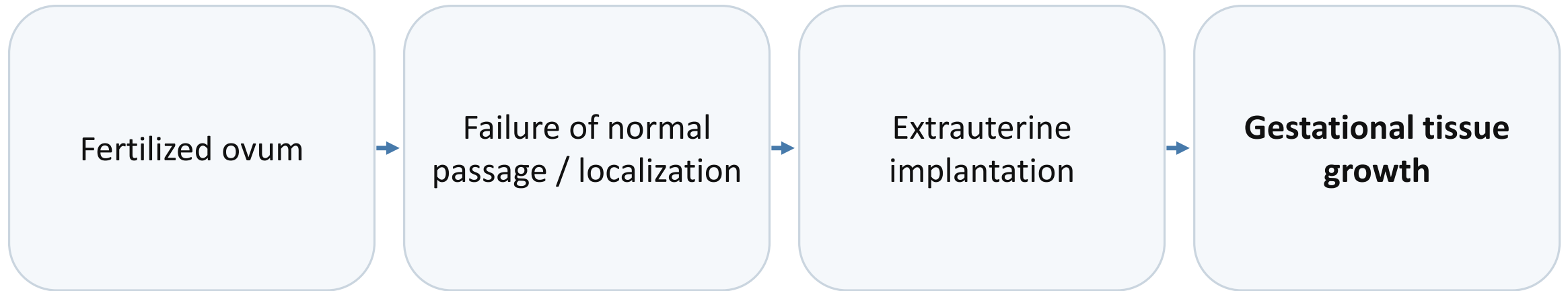


Implantation in a previous cesarean scar

- Previous cesarean section scars are included among recognized ectopic sites.
- The site is abnormal despite being within the uterine region.
- Risk is related to localization of implantation at a prior surgical scar.



From normal fertilization to abnormal implantation

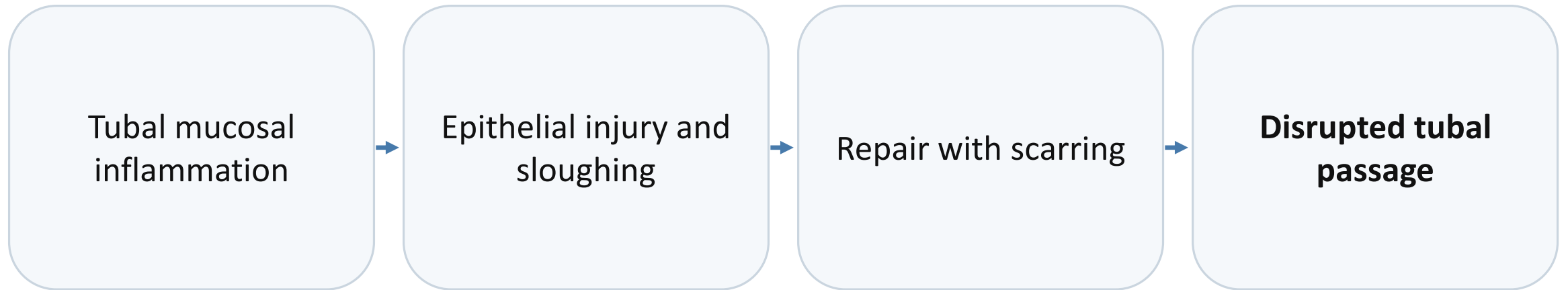


The mechanistic problem is abnormal localization of an otherwise developing gestation.

Most important predisposing condition: Chronic salpingitis

- Tubal scarring after pelvic inflammatory disease is the leading condition emphasized by Robbins.
- Intraluminal adhesions can alter passage through the tube.
- Prior infection can leave permanent architectural damage after active inflammation has resolved.
- This morphological link connects infection, infertility, and ectopic pregnancy.

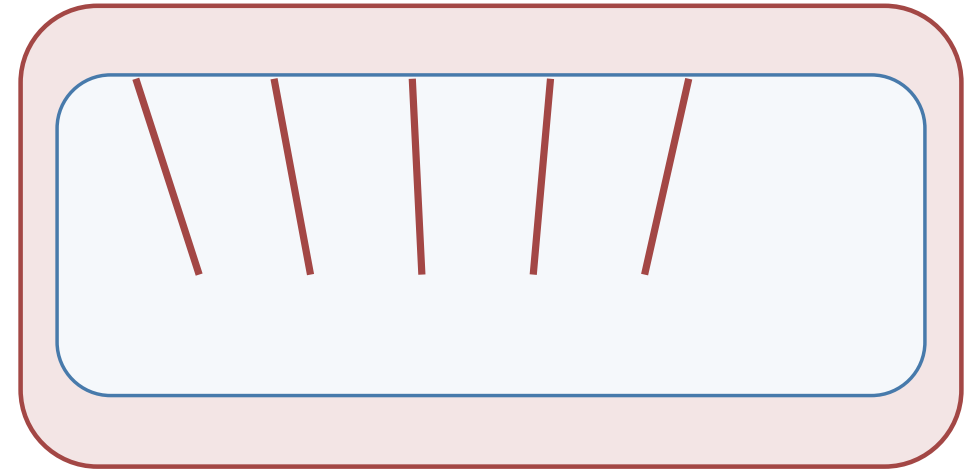
Acute salpingitis can produce lasting injury



Infection is an initiating event; Healed architecture may remain abnormal.

Tubal mucosal injury precedes scarring

- Acute salpingitis may injure and denude the tubal epithelium.
- Mucosal plicae become inflamed and may lose epithelial coverage.
- Subsequent repair can create adhesions within the lumen.

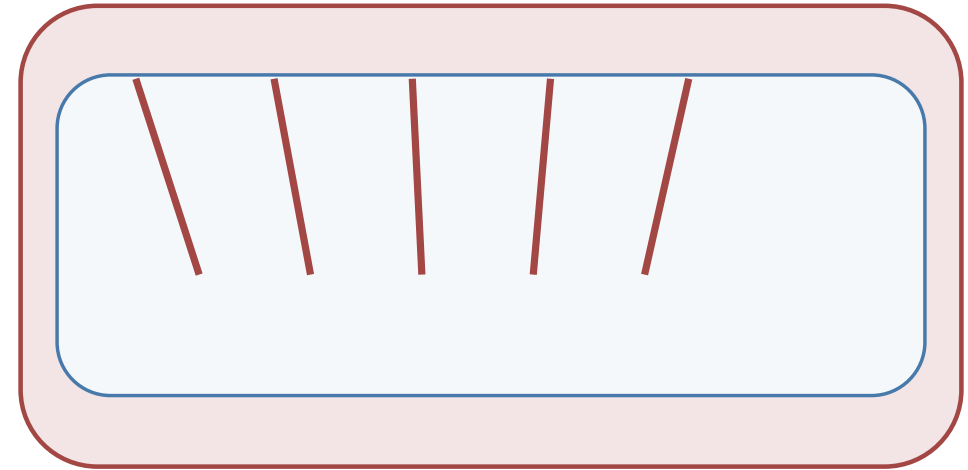


Mucosal scarring / adhesions

Schematic

Chronic salpingitis: Distorted tubal architecture

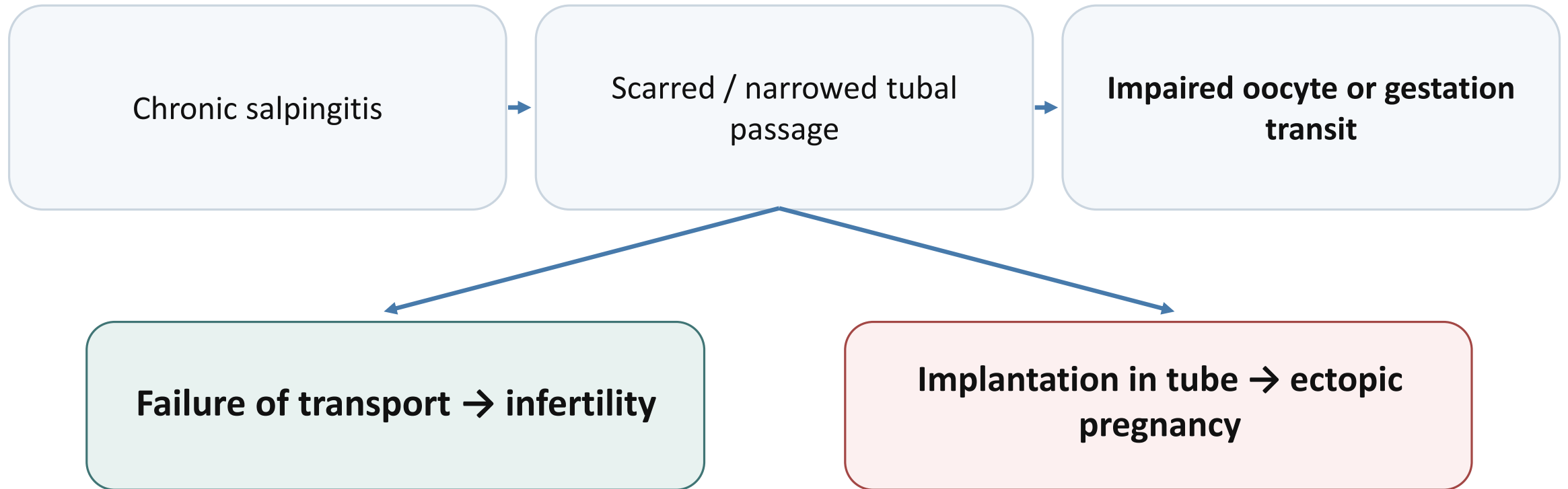
- Adherent tubal plicae slowly fuse during healing.
- Fibrotic changes can form blind pouches and glandlike spaces.
- Persistent structural change offers a substrate for disordered tubal transit.



Mucosal scarring / adhesions

Schematic

Chronic tubal scarring: Two reproductive outcomes



Intraluminal scarring is common in affected patients

35–50%

With tubal scarring

Intraluminal fallopian-tube scarring associated with chronic salpingitis in this proportion of patients with ectopic pregnancy. It is a predisposing condition—not a universal prerequisite.

Intraluminal versus peritubal disease

Intraluminal scarring

- Within the fallopian tube lumen
- Follows chronic salpingitis
- Can interfere directly with intratubal passage

Peritubal adhesions

- Around the external tubal surfaces
- Can follow pelvic inflammation or other abdominal disease
- May distort normal tubal relationships

Peritubal adhesions: Extra-luminal risk

- Fibrous adhesions around the tube may increase ectopic pregnancy risk.
- The tube can become tethered or anatomically distorted by adjacent disease.
- This differs from scarring of mucosal plicae within the lumen.
- Extraluminal disease is a separate anatomical pathway to abnormal implantation.

Appendicitis as an antecedent risk

- Appendicitis as a potential cause of peritubal scarring.
- The clinically relevant consequence is adhesive disease near the fallopian tube.
- A remote inflammatory event may matter even when no active appendicitis remains.
- The causal link is peritubal structural change, not direct invasion by pregnancy tissue.

Endometriosis and peritubal adhesions

- Endometriosis is listed among causes of scarring and adhesions.
- Adhesions can affect the anatomic environment surrounding the tube.
- Endometriosis-associated ectopic risk is linked to peritubal disease.
- It should not be confused with an ectopic pregnancy itself.

Prior abdominal or pelvic surgery

- Surgery can be followed by adhesions involving the pelvis.
- Robbins recognizes previous pelvic or abdominal operations as risk factors.
- The relevant pathology is disruption of normal tubo-pelvic anatomy.
- A surgical history is therefore relevant to a pregnancy implanted outside the uterus.

Ectopic pregnancy without visible tubal disease

- Some patients have fallopian tubes that appear morphologically normal.
- Absence of obvious scarring does not eliminate ectopic pregnancy.
- Tubal injury explains many cases, but not all.
- Location of gestation remains the defining diagnostic feature.

Intrauterine contraceptive device: Interpret carefully

- A twofold association with ectopic pregnancy in its source narrative.
- This figure must not be equated with an increased absolute pregnancy risk in device users.
- The clinically relevant denominator and study design are not given in the excerpt.
- Use current contraception evidence separately before applying this statistic to counseling.

Risk-factor map: Mechanism is transport disruption

Mucosal scarring

PID → intraluminal fibrosis

External adhesions

Appendicitis · endometriosis · surgery

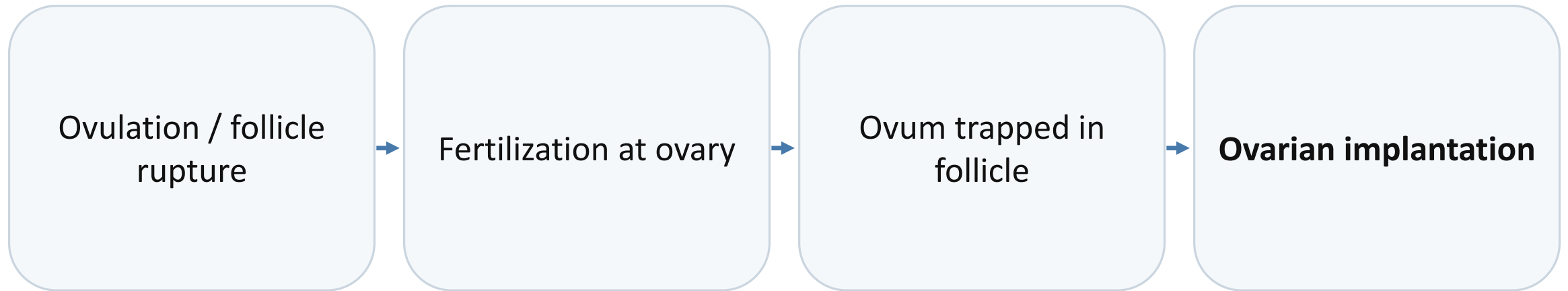
Non-tubal sites

Ovary · abdomen · scar · interstitial tube

No gross abnormality

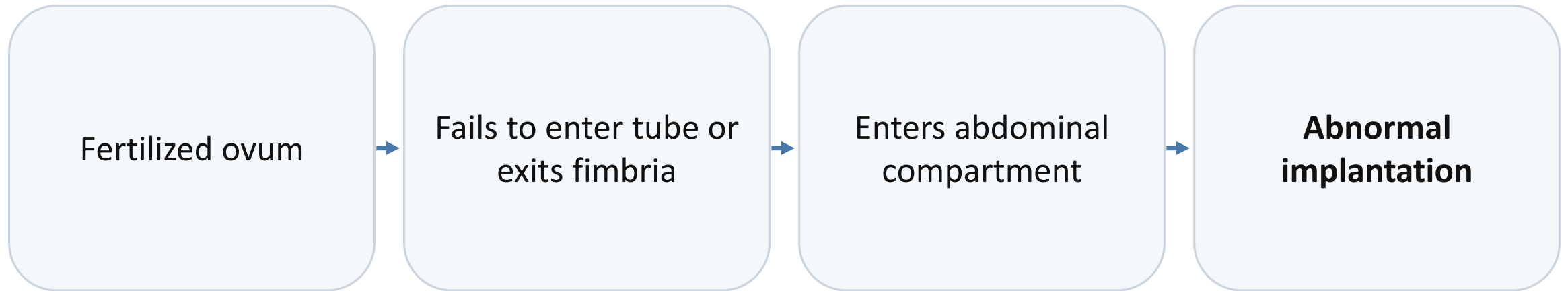
Normal-appearing tubes in some cases

Ovarian pregnancy: Proposed sequence



This is a mechanism described, not a universal explanation of every ovarian ectopic.

Abdominal pregnancy: Proposed routes



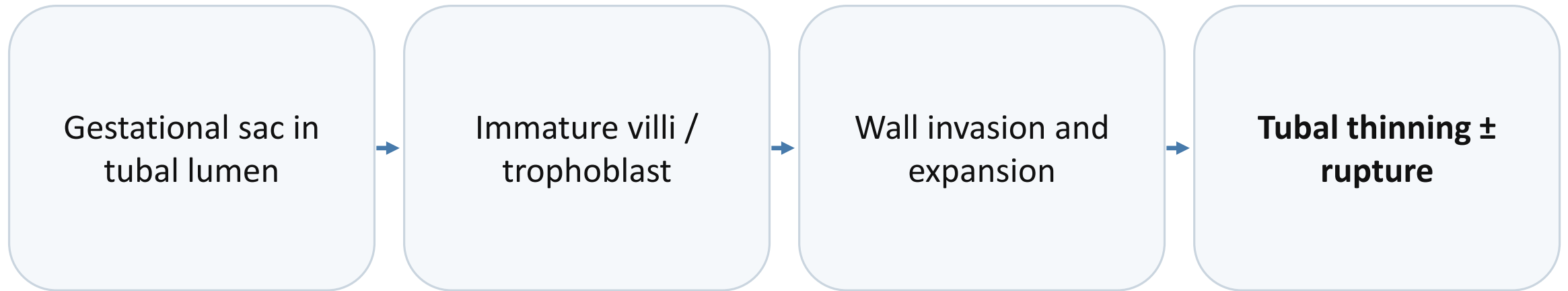
Gestational differentiation may proceed normally

- Even in an abnormal location, the fertilized ovum may develop gestational structures.
- Placental tissue, amniotic sac, and fetus at extrauterine sites.
- The immediate danger arises from implantation into tissues unsuitable for sustained expansion.
- “Ectopic” describes the site; The gestational tissue is not inherently a tumor.

Decidual reaction can occur outside the uterus

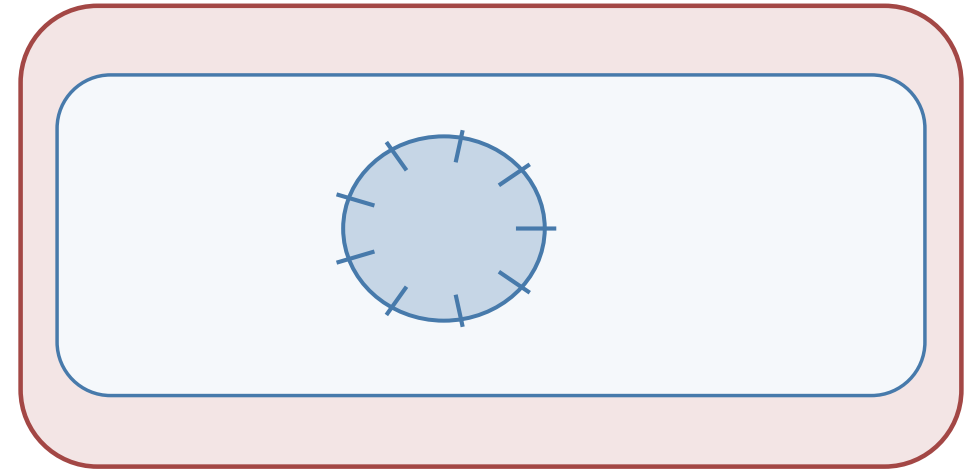
- The extrauterine implantation site may undergo decidual changes.
- Decidual tissue reflects a tissue response to implantation and pregnancy hormones.
- Decidual change alone does not locate a pregnancy or establish tubal implantation.
- Identify chorionic or trophoblastic tissue when assessing an ectopic site.

Tubal pregnancy: The morphologic sequence



Early tubal implantation: Sac and villi

- The embryonic sac initially occupies the lumen of the fallopian tube.
- Immature chorionic villi surround the gestational sac.
- The tube is the implantation environment instead of endometrium.

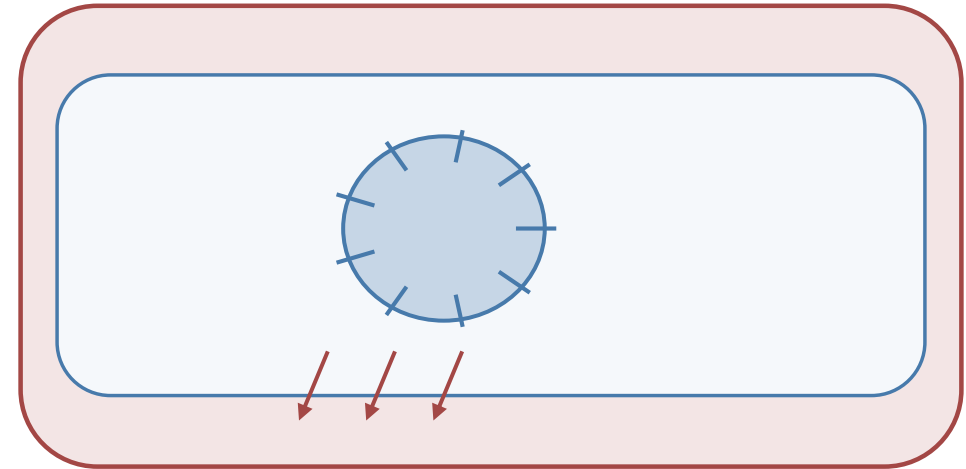


Gestational tissue within lumen

Schematic

Trophoblastic invasion penetrates the tubal wall

- Trophoblast and chorionic villi extend into the tubal wall.
- The invasive behavior is analogous to normal implantation in the uterus.
- The anatomic location makes the invasion potentially destructive.

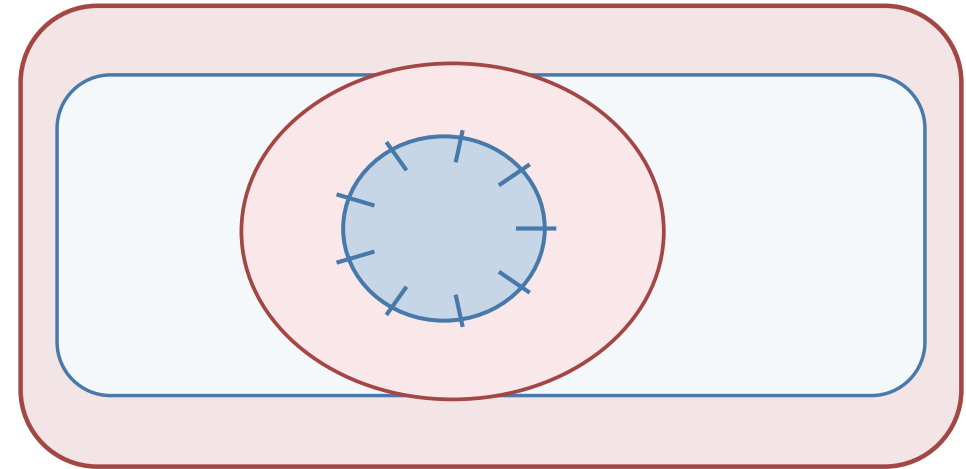


Wall invasion by trophoblast

Schematic

Progressive distention compromises tubal integrity

- The gestational sac grows and enlarges the involved tube.
- Expansion progressively stretches and thins the wall.
- Marked thinning creates the structural basis for rupture.

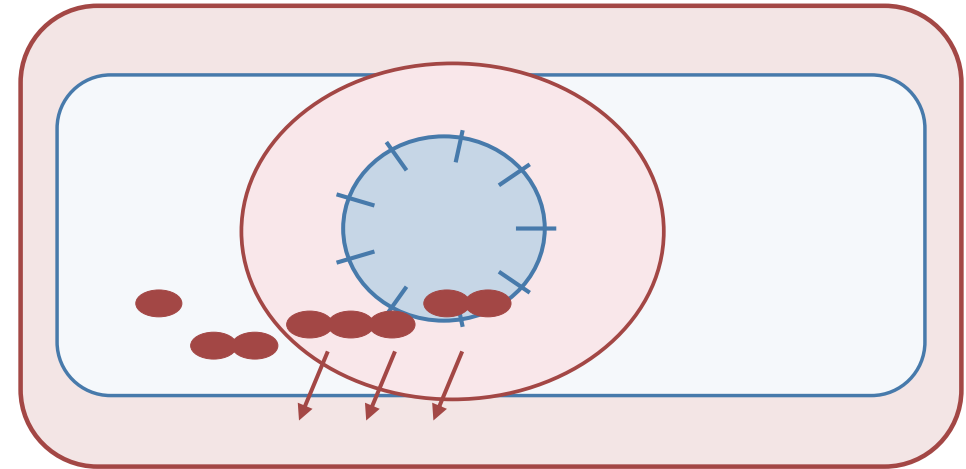


Gestational tissue within lumen

Schematic

Hematosalpinx: Blood within the tube

- Hematosalpinx is a blood-filled fallopian tube.
- Tubal pregnancy is emphasized as its most common cause.
- Blood accumulation can accompany invasive tubal gestational tissue.
- Gross hemorrhage should prompt a search for villi and trophoblast.

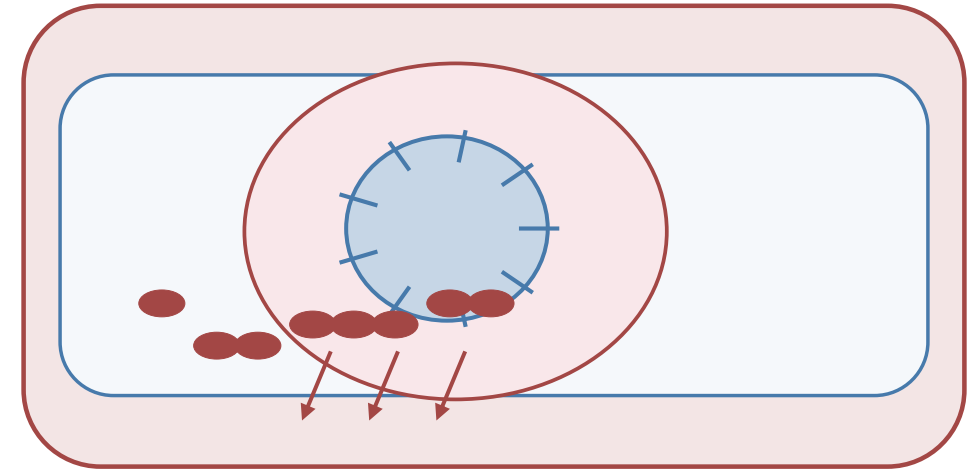


Blood in distended tube

Schematic

A tubal hematoma should trigger ectopic suspicion

- A tubal hematoma is a gross hemorrhagic finding, not a specific histologic diagnosis.
- The textbook explicitly advises considering tubal pregnancy when hematoma is found.
- Confirmation depends on identifying gestational tissue in the relevant anatomic setting.

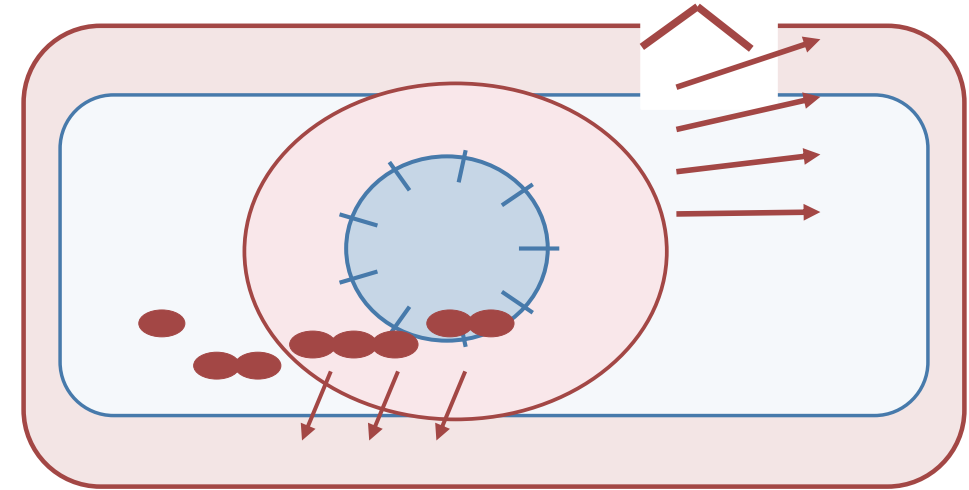


Blood in distended tube

Schematic

Tubal rupture: A structural catastrophe

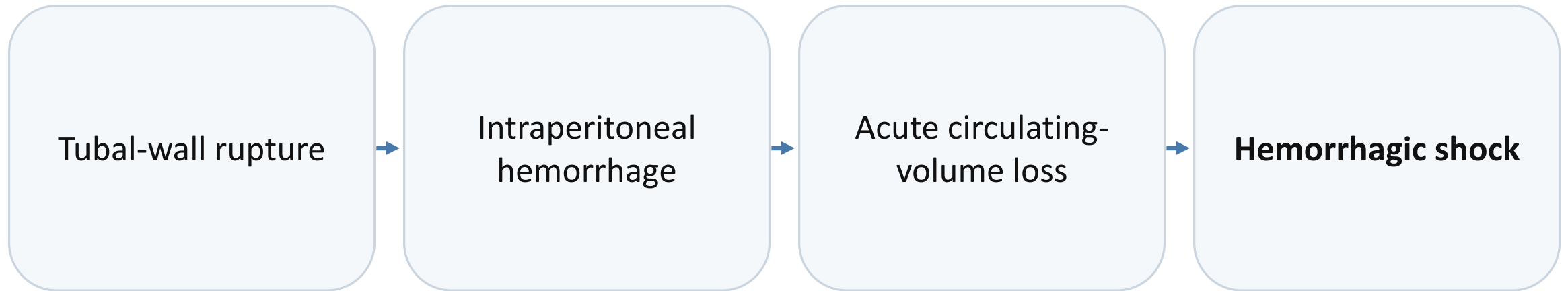
- Expansion may exceed the mechanical capacity of the tubal wall.
- Rupture opens the hemorrhagic implantation site to the peritoneal cavity.
- The resulting blood loss may be massive and life-threatening.



Rupture and bleeding

Schematic

Why rupture can become fatal



Urgent management is required; This is not a treatment-algorithm slide.

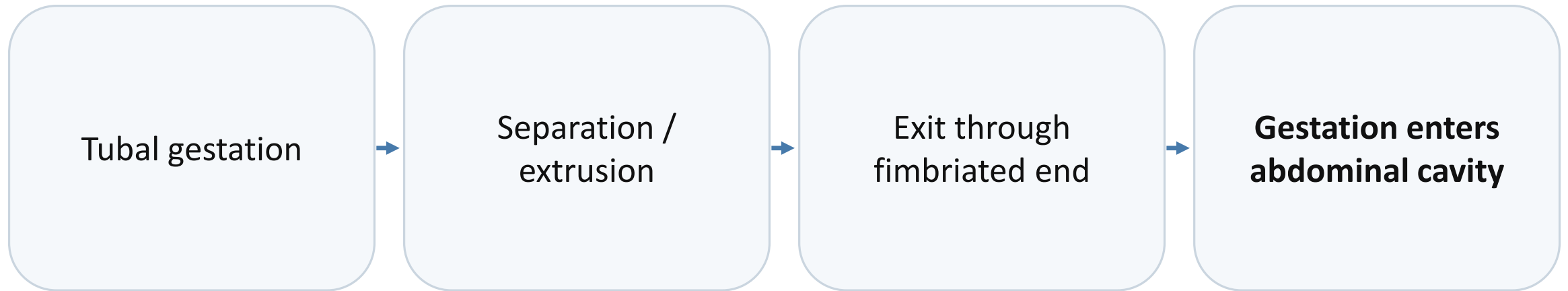
Hemoperitoneum in ectopic pregnancy

- A ruptured tubal implantation may discharge blood into the peritoneal cavity.
- Intraperitoneal bleeding can be severe even when vaginal bleeding is limited.
- Abdominal pain and signs of an acute abdomen correlate with major pathology.
- The central emergency is internal hemorrhage and possible shock.

Spontaneous regression and resorption

- Not every tubal pregnancy progresses to frank rupture.
- Spontaneous regression with resorption as one possible course.
- This is a potential natural-history outcome, not a basis for ignoring suspected ectopic pregnancy.
- Clinical instability or suspected rupture still requires urgent assessment.

Tubal abortion: Extrusion via the fimbria



Three morphologic pathways after tubal implantation

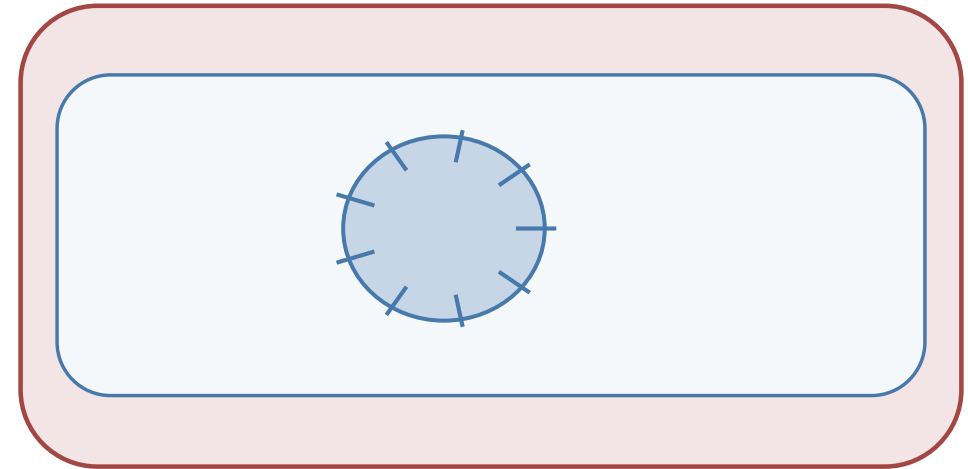
Course	Tissue event	Clinical-pathologic consequence
Rupture	Progressive distention and wall failure	Major intraperitoneal hemorrhage possible
Regression	Spontaneous involution and resorption	Gestational tissue decreases
Tubal abortion	Extrusion through fimbriated end	Tissue enters abdominal cavity

Gross morphology: What the pathologist may see

- A fallopian tube enlarged by intraluminal gestation and hemorrhage.
- A distended or thinned tubal wall; Rupture may be apparent.
- Intratubal blood clot or hematoma obscuring smaller gestational structures.
- Rupture-associated hemorrhage in the abdominal cavity.

Microscopy: Immature chorionic villi

- Immature chorionic villi are described around the tubal gestational sac.
- Villi establish the presence of gestational tissue in the specimen.
- Their relation to the tubal lumen and wall is decisive for localization.

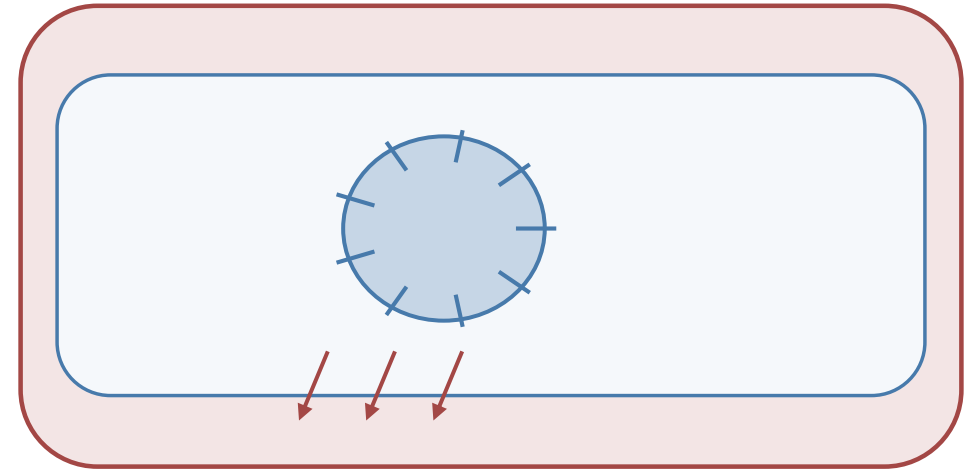


Gestational tissue within lumen

Schematic

Microscopy: Trophoblast and tubal wall

- Trophoblastic cells accompany chorionic villi at the implantation site.
- The gestational tissue infiltrates the tube wall.
- Location within the tube differentiates it from a normal uterine implantation.



Wall invasion by trophoblast

Schematic

Histologic interpretation depends on location

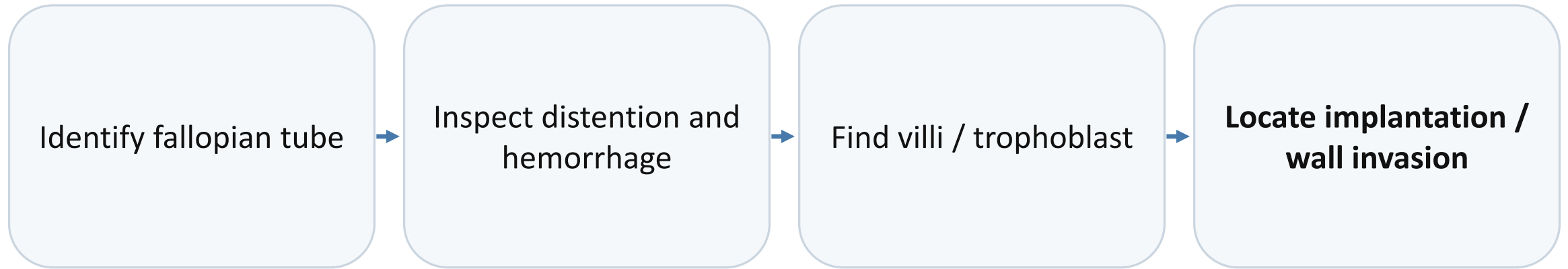
Gestational tissue

- Chorionic villi can occur in both normal and ectopic gestation
- Trophoblastic invasion is part of implantation
- These features are not inherently malignant

Anatomic interpretation

- Intrauterine site is the normal implantation location
- Tubal lumen / wall is an ectopic implantation site
- Diagnosis requires site-specific tissue context

A useful surgical-pathology assessment sequence



A hematoma raises suspicion; Gestational tissue in an ectopic anatomic site supports the diagnosis.

Hematosalpinx versus proven tubal gestation

Hematosalpinx

- Blood-filled fallopian tube
- Morphologic pattern of hemorrhage
- Commonly associated with tubal pregnancy

Tubal ectopic pregnancy

- Gestational sac and / or chorionic villi
- Trophoblast associated with fallopian tube
- Anatomic localization establishes ectopic pregnancy

Clinical presentation: Timing

- Symptomatic tubal ectopic pregnancy around 6–8 weeks after the last menstrual period.
- This timing correlates with tubal expansion and potential rupture.
- Symptom timing is typical, not an exclusion rule.
- An anatomically abnormal pregnancy may be dangerous before definitive histology is available.

Abdominal pain and vaginal bleeding

- Moderate to severe abdominal pain is a cardinal described symptom.
- Vaginal bleeding may accompany the pain.
- Tubal distention or rupture links anatomic pathology to acute symptoms.
- Clinical severity is determined in part by the extent of internal hemorrhage.

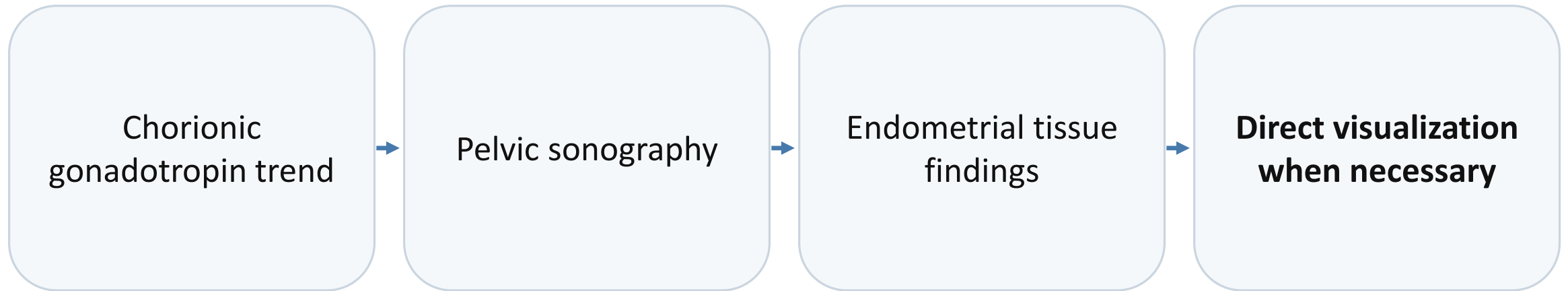
Acute abdomen: A manifestation of rupture

- A ruptured tubal pregnancy can produce abrupt severe abdominal findings.
- The peritoneal cavity may contain substantial hemorrhage.
- Abdominal signs must be interpreted with the possibility of hemodynamic deterioration.
- Pathology and bedside severity may evolve rapidly.

Hemorrhagic shock: The critical consequence

- Rupture can produce major blood loss into the peritoneal cavity.
- Hypovolemia may progress to hemorrhagic shock.
- The possibility of rapid deterioration.
- Suspected rupture is a medical emergency, not an outpatient pathology exercise.

Diagnostic inputs are complementary



Interpret the pattern and clinical condition together rather than any single result in isolation.

Chorionic gonadotropin: Abnormal serial pattern

- Inappropriately rising chorionic gonadotropin titers.
- Serial change may support concern for abnormal early pregnancy.
- A hormone trend by itself does not show the precise implantation site.
- No fixed numerical rise threshold is asserted by this source excerpt.

Pelvic sonography: Localizing the pregnancy

- Pelvic sonography is a core diagnostic modality identified.
- Its role is assessment of the pelvis and potential site of gestation.
- Imaging findings should be read alongside symptoms and biochemical results.
- A source-specific diagnostic threshold is not provided in the chapter excerpt.

Endometrial biopsy: A diagnostic distinction

- Endometrial decidua without chorionic villi in ectopic pregnancy.
- Trophoblast or a placental implantation site is likewise absent from the uterine biopsy.
- This shows a gestational endometrial response without demonstrated uterine implantation.
- A decidua-only biopsy is not, by itself, proof that an ectopic site has been localized.

Laparoscopy: Visualization of an ectopic site

- Laparoscopy is among the diagnostic modalities named.
- It permits direct assessment of the adnexa and possible hemorrhage.
- Observed tubal morphology may explain acute symptoms.
- The need for urgent operative care depends on clinical stability and findings.

Diagnostic reasoning: What each modality contributes

Evidence	Principal contribution	Important limitation
Clinical assessment	Pain, bleeding, acute abdomen, shock	Symptoms do not alone localize implantation
Serial hCG	Abnormal pregnancy-associated hormone trend	Not anatomically specific
Pelvic sonography	Anatomic assessment of gestation	Must be integrated with clinical context
Endometrial tissue	Decidual reaction without uterine gestational tissue	Alone does not prove ectopic site
Laparoscopy	Direct pelvic/tubal visualization	Used selectively in clinical context

Ectopic pregnancy versus spontaneous abortion

Ectopic pregnancy

- Implantation outside the normal uterine cavity
- Tubal distention / rupture is a key threat
- Tubal chorionic villi support ectopic localization

Spontaneous abortion

- Loss of pregnancy before 20 weeks (Robbins definition)
- Pregnancy loss may have fetal or maternal causes
- Uterine gestational tissue may be present or passed

Case: Tubal scarring and a subsequent pregnancy

A patient has a history of pelvic inflammatory disease. A fallopian tube shows fibrous fusion of mucosal folds and blind pouches. A later pregnancy implants within that tube.

Which pathological mechanism links these findings?

Discussion answer: Chronic salpingitis disrupts intratubal passage, predisposing to tubal implantation.

Case: Hematosalpinx with acute abdominal pain

A patient presents after a short interval of missed menses with severe abdominal pain. Surgery identifies a markedly distended, blood-filled tube.

Which gestational pathology must be suspected?

Discussion answer: Tubal ectopic pregnancy; Examine for villi and trophoblast.

Case: Chorionic villi in a tubal specimen

Sections from a hemorrhagic fallopian tube demonstrate immature chorionic villi and associated trophoblastic tissue extending toward the wall.

How does anatomy establish the diagnosis?

Discussion answer: Pregnancy tissue is localized in the fallopian tube, an ectopic site.

Case: Rupture and sudden deterioration

A patient with early pregnancy develops severe abdominal pain and rapidly worsening circulatory status. The tube is found ruptured with major intraperitoneal hemorrhage.

What is the mechanism of shock?

Discussion answer: Acute internal hemorrhage causing hypovolemia and hemorrhagic shock.

Common interpretation errors

“No scarring, so no ectopic”

Some affected tubes look normal

“Hematosalpinx proves pregnancy”

Search for gestational tissue

“Decidua means uterine implantation”

Decidua may be present without uterine villi

“Only vaginal blood loss matters”

Intraperitoneal bleeding can dominate

Maternal danger: Interpret the mortality statistic

4–10%

Pregnancy-related deaths

This fraction of pregnancy-related deaths as attributable to ectopic pregnancy. It must not be confused with a 4–10% case-fatality rate. Context, region, and period are not stated in the excerpt.

Core pathogenesis in five stages



The mechanism connects anatomic localization to a potentially fatal acute abdomen.

Pathology essentials to retain

- Ectopic pregnancy is defined by extrauterine implantation; The tube accounts for most cases.
- Chronic salpingitis and pelvic adhesions explain a substantial proportion of cases.
- Immature villi and trophoblast may invade and expand the tubal wall.
- Hematosalpinx, rupture, hemoperitoneum, and shock are the critical consequences.

References and scope

Primary textbook

Robbins, Cotran & Kumar: Pathologic Basis of Disease. The lecture draws on the ectopic pregnancy section and its supporting discussions of salpingitis, placental anatomy, and early gestational disorders.

Scope note

This lecture teaches textbook pathology and source-listed diagnostic principles. It does not provide modern patient-management algorithms, medication regimens, or numerical hCG/ultrasound thresholds.