



Clinical Guidebook for Placental Pathology

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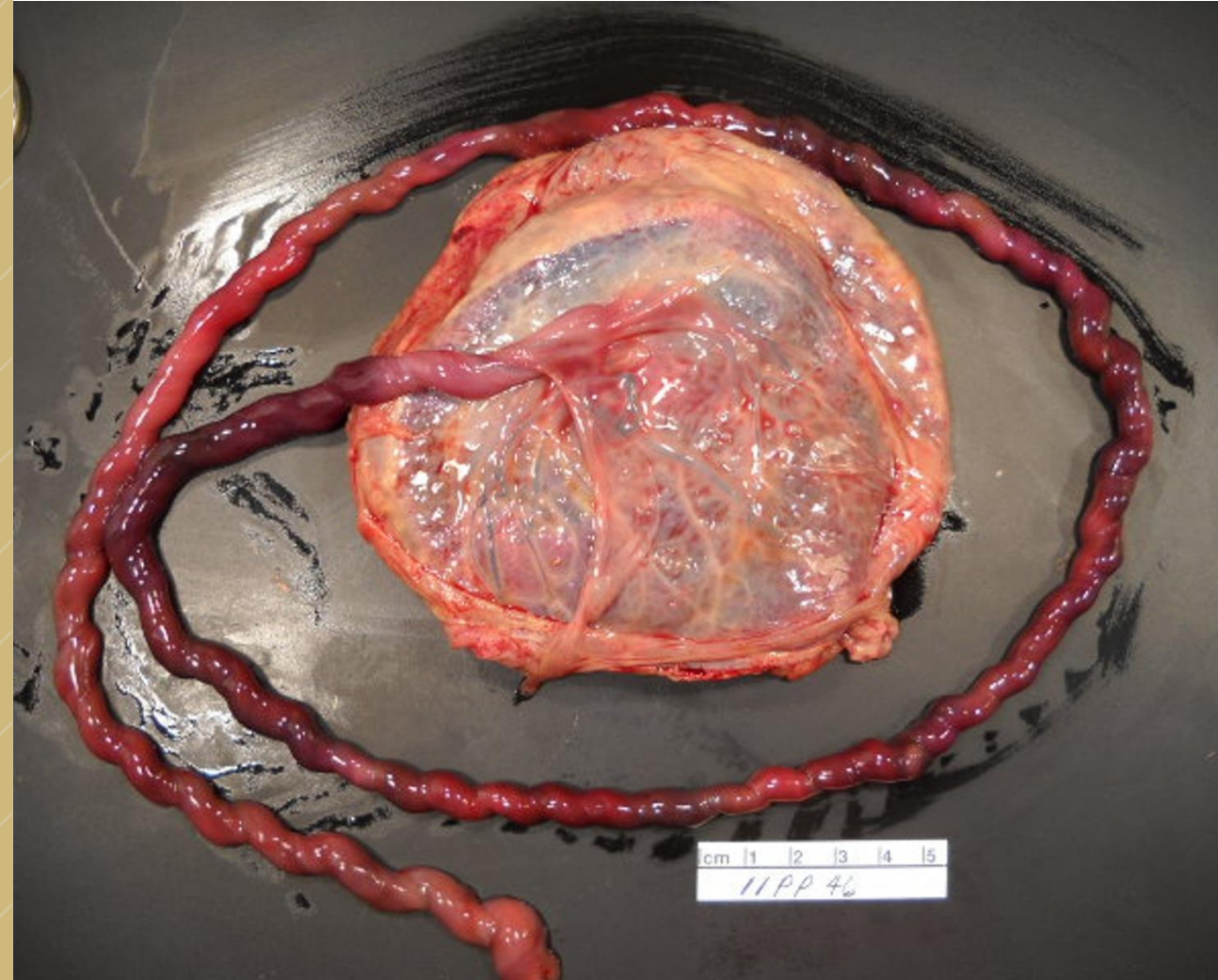


Disclosures

No financial disclosures

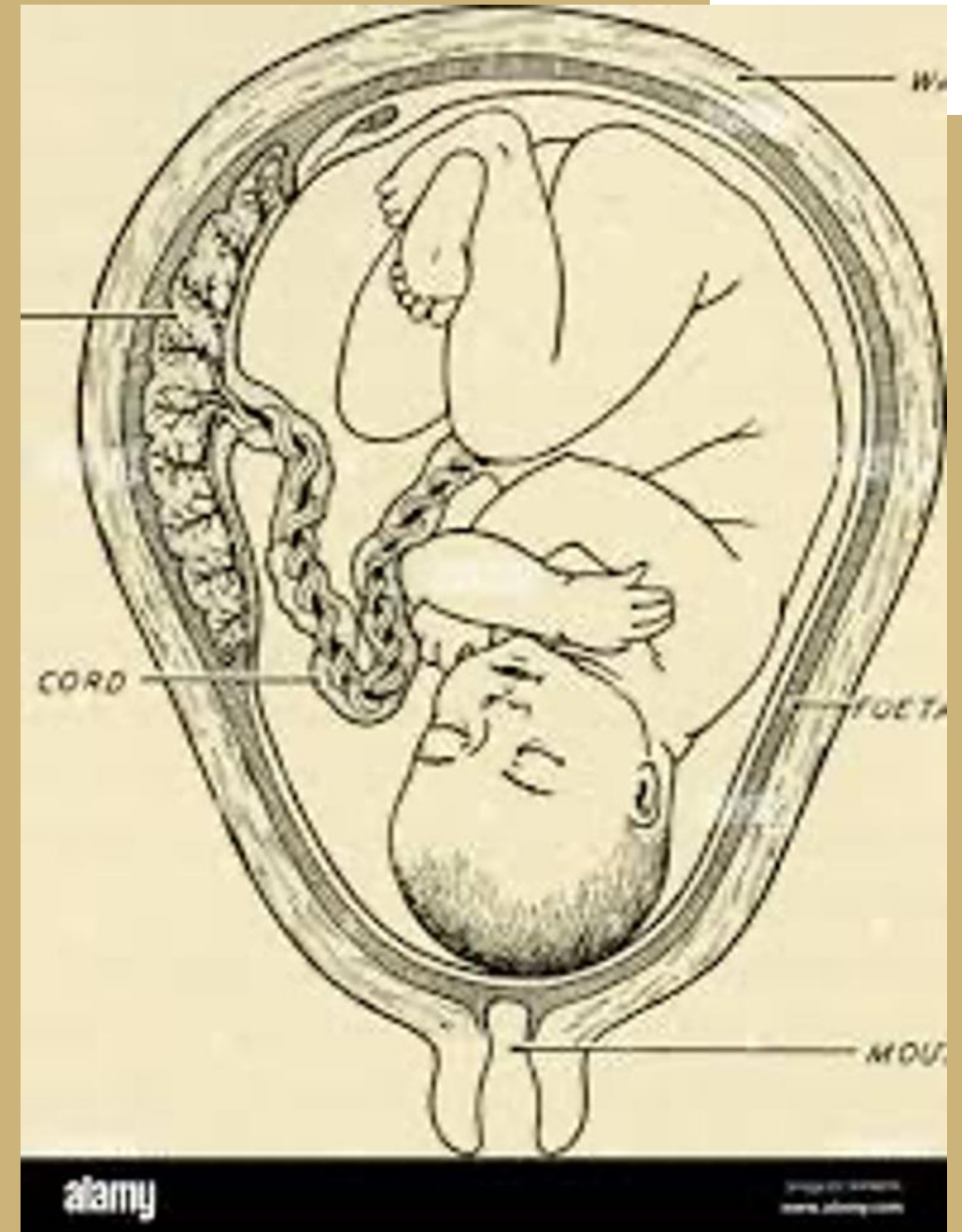
Learning Objectives

- Review the clinical indications for placental examination in general obstetric practice and how to triage placentas for submission
- Discuss a framework for understanding placental lesions using relevant clinical examples
- Review how placental pathology can be implemented into your practice and impact patient care



WHY?

- Guide neonatal or maternal management
- Differentiate between acute and chronic processes
- Clarify unexpected or adverse outcome
- Give prognostic information
- Inform recurrence risk for future pregnancies



Standardization of Placental Exam

- College of American Pathologists:
 - Working group on indications for placental examination, 1991 (ref 2)
 - Placental pathology practice guideline development task force, 1997 (ref 3)
- Amsterdam Placental Workshop Group Consensus Statement, 2016 (ref 4)
 - Four major patterns of placental injury: a stepwise guide for understanding and implementing the 2016 Amsterdam consensus, 2021 (ref 5)
 - Life After Amsterdam: Placental Pathology Consensus Recommendations and Beyond, 2022 (ref 6)
- Criteria for placental examination for obstetrical and neonatal providers, 2023 (ref 7)
 - Am J Obstet Gynecol 2023; 228:497

Clinical Indications

- Criteria for placental examination for obstetrical and neonatal providers
 - Antepartum
 - Maternal, obstetric, fetal
 - *Preterm*
 - Intrapartum
 - Neonatal
 - Placental
- Recommend triage at time of delivery

Special Report

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Criteria for placental examination for obstetrical and neonatal providers



Drucilla J. Roberts, MD; Rebecca N. Baergen, MD; Theonia K. Boyd, MD; Chrystalle Katte Carreon, MD; Virginia E. Duncan, MD; Linda M. Ernst, MD; Ona M. Faye-Petersen, MD; Ann K. Folkins, MD; Jonathon L. Hecht, MD, PhD; Amy Heerema-McKenney, MD; Debra S. Heller, MD; Rebecca L. Linn, MD; Carolyn Polizzano, MHS, PA (ASCP); Sanjita Ravishankar, MD; Raymond W. Redline, MD; Carolyn M. Salafia, MD, MPH; Vanda F. Torous, MD; Eumenia C. Castro, MD

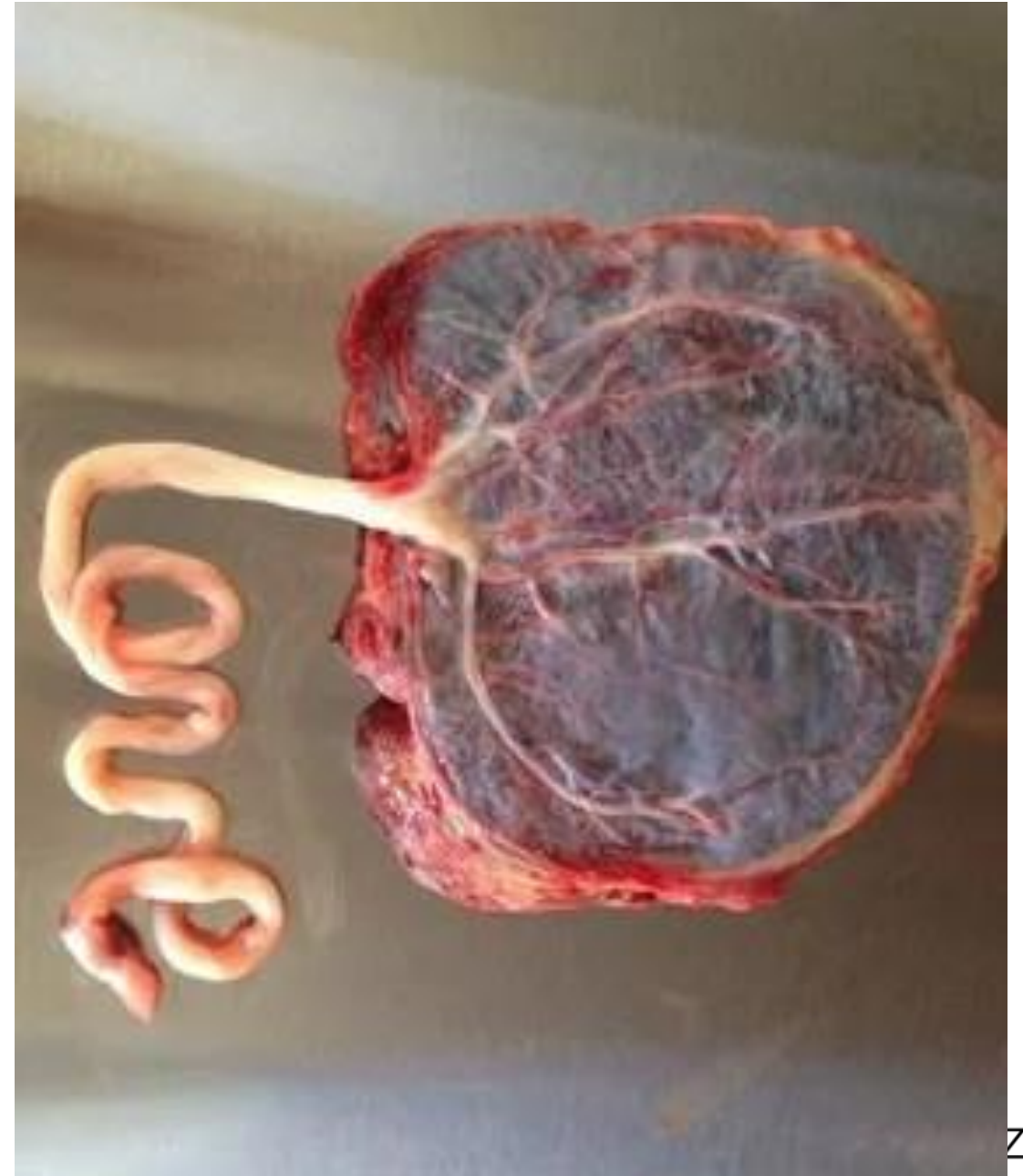
Pathologic examination of the placenta can provide insight into likely (and unlikely) causes of antepartum and intrapartum events, diagnoses with urgent clinical relevance, prognostic information for mother and infant, support for practice evaluation and improvement, and insight into advancing the sciences of obstetrics and neonatology. Although it is true that not all placentas require pathologic examination (although alternative opinions have been expressed), prioritization of placentas for pathologic examination should be based on vetted indications such as maternal comorbidities or pregnancy complications in which placental pathology is thought to be useful for maternal or infant care, understanding pathophysiology, or practice modifications. Herein we provide placental triage criteria for the obstetrical and neonatal provider based on publications and expert opinion of 16 placental pathologists and a pathologists' assistant, formulated using a modified Delphi approach. These criteria include indications in which placental pathology has clinical relevance, such as pregnancy loss, maternal infection, suspected abruption, fetal growth restriction, preterm birth, nonreassuring fetal heart testing requiring urgent delivery, preeclampsia with severe features, or neonates with early evidence of multiorgan system failure including neurologic compromise. We encourage a focused gross examination by the provider or an attendant at delivery for all placentas and provide guidance for this examination. We recommend that any placenta that is abnormal on gross examination undergo a complete pathology examination. In addition, we suggest practice criteria for placental pathology services, including a list of critical values to be used by the relevant provider. We hope that these sets of triage indications, criteria, and practice suggestions will facilitate appropriate submission of placentas for pathologic examination and improve its relevance to clinical care.

Key words: critical values in placental pathology, guidelines for placental pathologic examination, indications for placental examination, placental diseases, placental gross examination, placental handling, placental pathology, placental triage

Ref 7. Am J Obstet Gynecol 2023; 228:497.

Clinical Exam for Triage

- Umbilical cord: length (<35 cm, >70 cm), color, coils, surface lesions, knots, insertion, vessel number
- Membranes: insertion, color and clarity, vessels, masses or clot
- Disk
 - Size: Diameter: <15 cm, >25 cm; Thickness: <1.5 cm, > 4 cm
 - Fetal surface: vascular distribution, thrombi, hemorrhage
 - Parenchyma: Discoloration, thrombi, masses
 - Maternal surface: disruption, adherent clot



Pathology Protocol

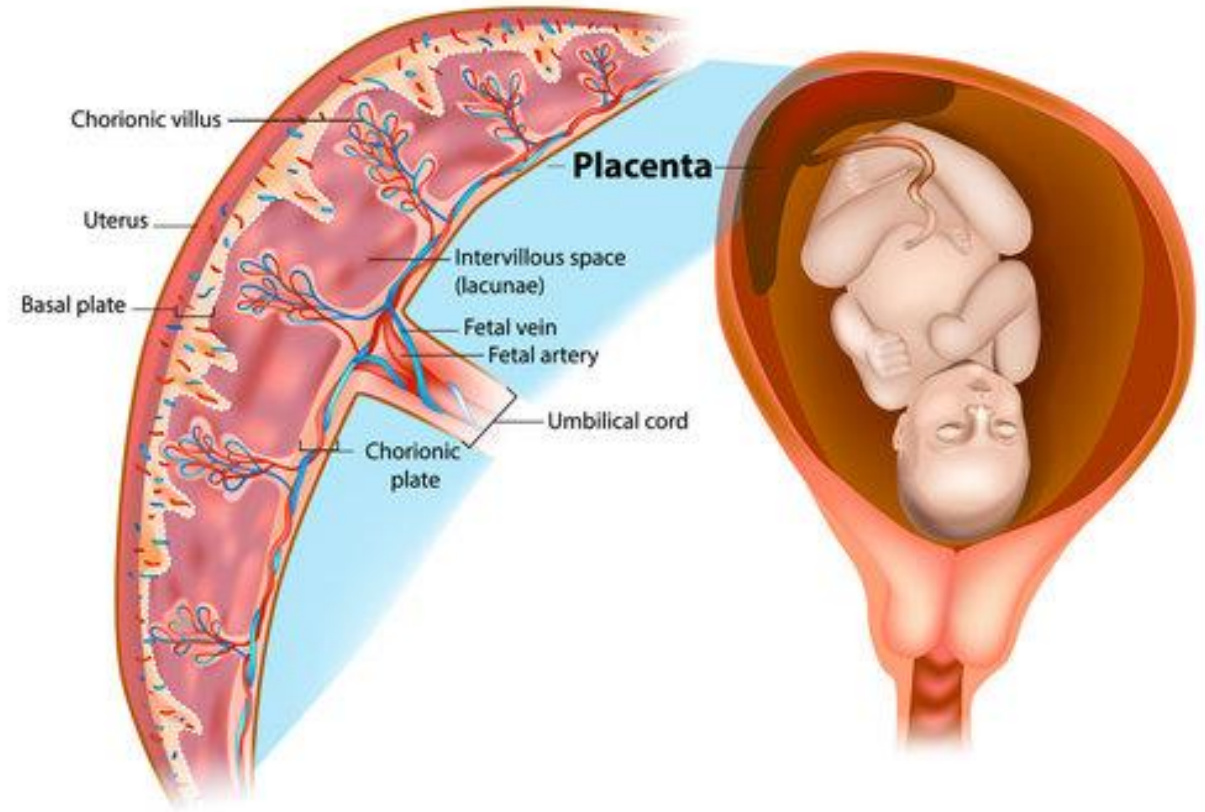
- Review Clinical History
- Gross Examination
 - Obtain trimmed weight and measurements
 - Examine and describe fetal & maternal surfaces, parenchyma and lesions
- Sample membranes, cord, 3+ full thickness sections, lesions, areas of disruption
- Retention policies
 - Formalin fixed tissue
 - Reports, slides, blocks



Classification of Placental Pathophysiology

Classification

1. Maternal Vascular Malperfusion
2. Abnormalities of Villous Maturation
3. Fetal Vascular Malperfusion
4. Inflammatory Disorders
 1. Infection
 2. Immune mediated
5. Membranes
6. Implantation disorders
7. Neoplasm

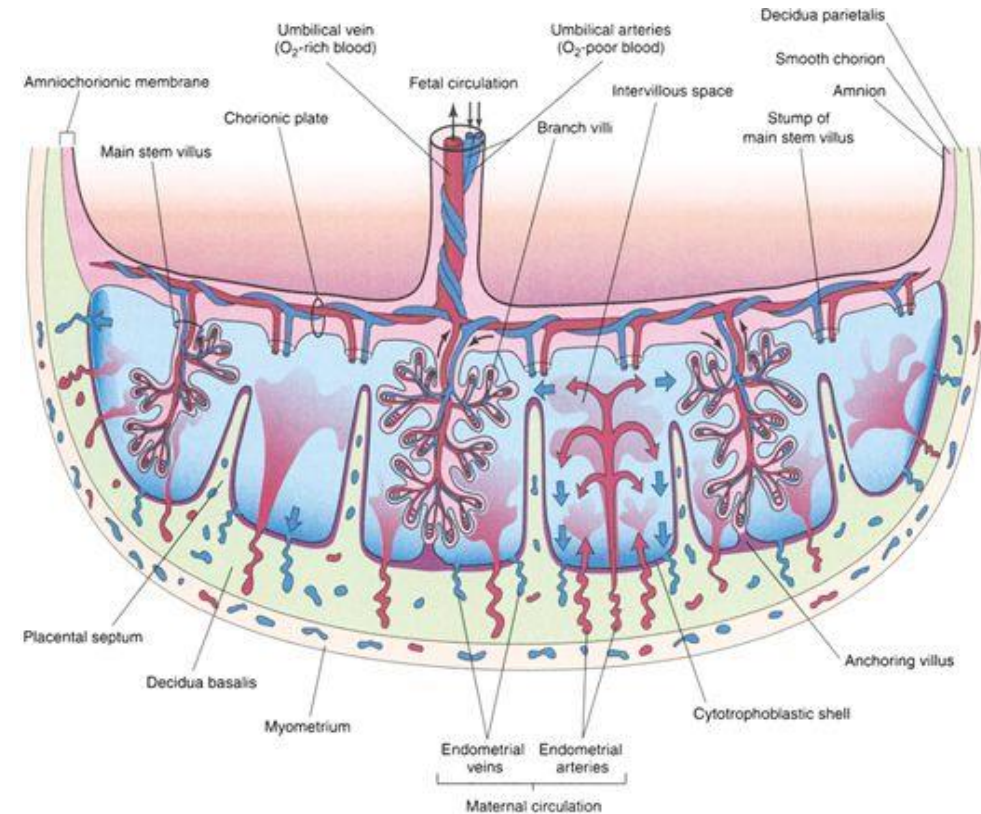


Maternal Vascular Malperfusion

- Clinical history
 - Fetal growth restriction
 - Maternal hypertension
 - Preeclampsia
- Gross findings
 - Weight-size
 - Infarcts
 - Retroplacental hemorrhage
- Microscopic findings
 - Decidual arteriopathy
 - Accelerated villous maturation
 - Infarct

Clinical Importance

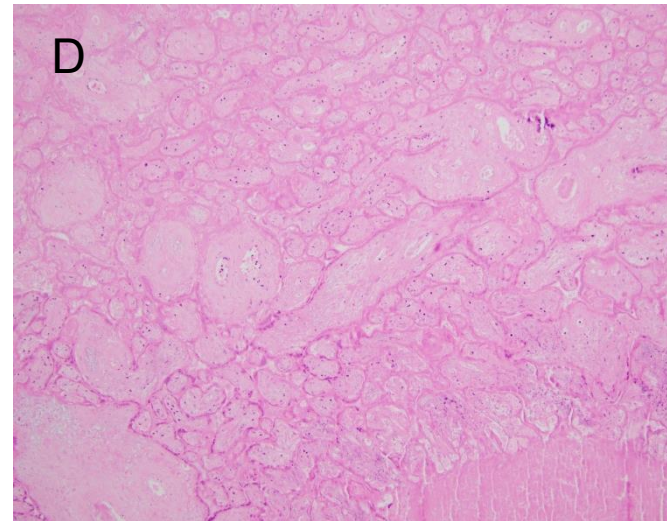
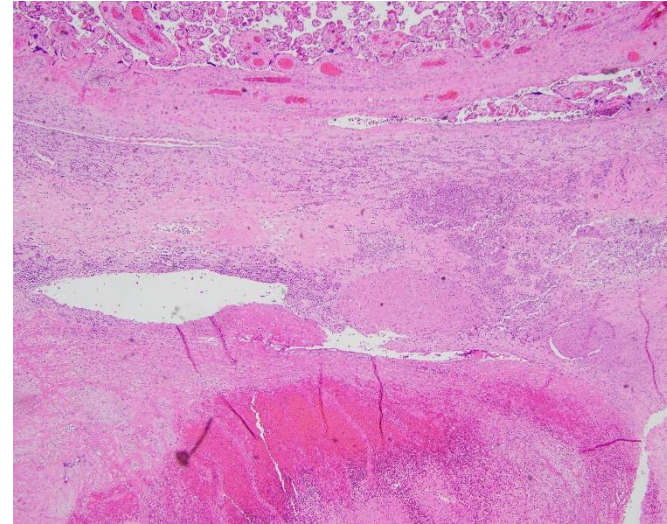
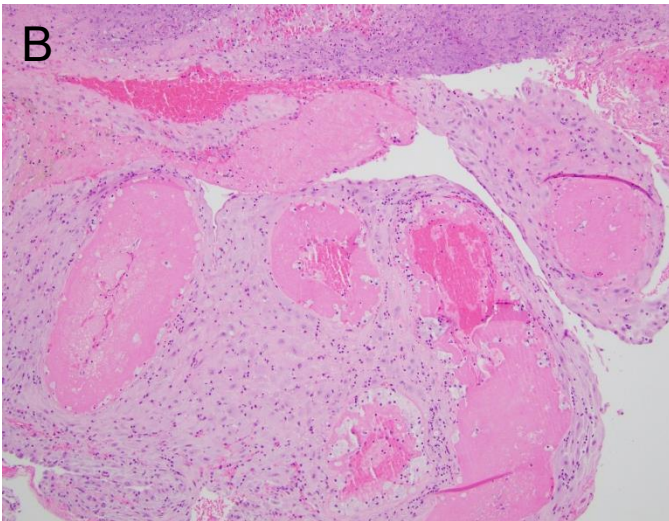
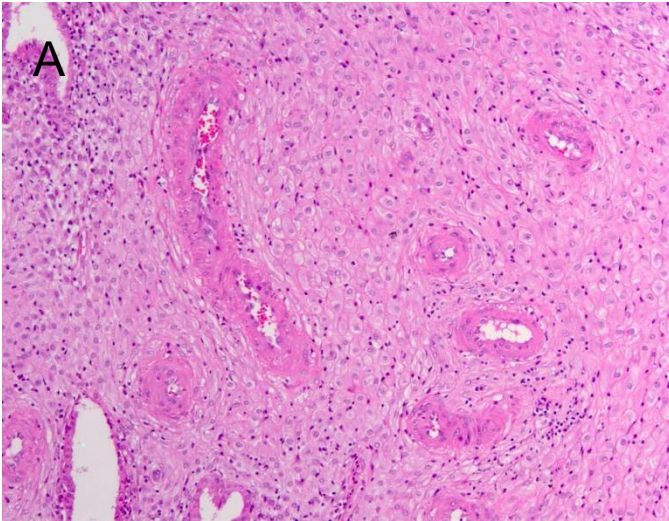
Information re current pregnancy
Maternal co-morbidities
Recurrence risk



Source: A.C. Fleischer, J.S. Abramowitz, L.F. Gonçalves, F.A. Manning, A. Monteagudo, I.E. Timor, E.C. Toy: Fleischer's Sonography in Obstetrics and Gynecology: Textbook and Teaching Cases, Eighth Edition Copyright © McGraw-Hill Education. All rights reserved.

Ref 8. Moore KL, Persaud TVN, Torchia MG. The Developing Human: Clinically Oriented Embryology. 10th ed. Philadelphia:Saunders, 2016.)

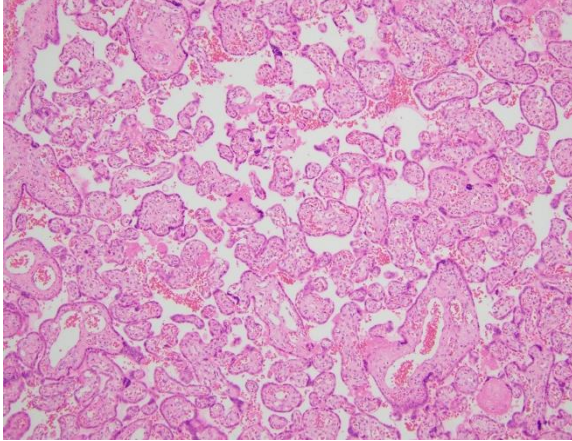
MVM: histologic features



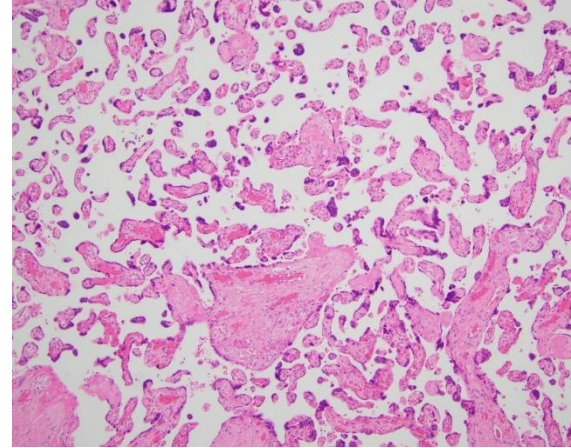
A. Hypertrophic decidual vessels
B. Fibrinoid necrosis and atherosclerosis

C. Retroplacental hematoma
D. Infarct

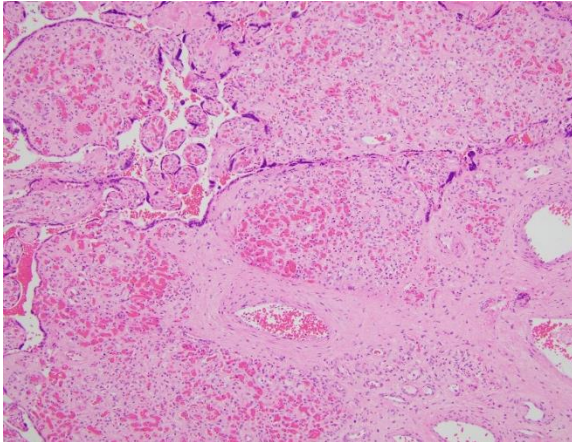
Abnormalities of Villous Maturation



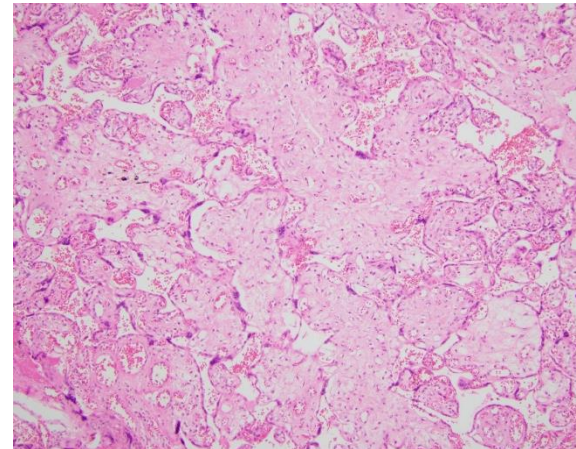
Normal term villi



Distal villous hypoplasia



Chorangiomas



Delayed villous maturation

Clinical Importance

- *Information re current pregnancy*
- *Maternal co-morbidities*
- *Recurrence risk*

Fetal Vascular Malperfusion

- Closed circuit so placental findings indicate abnormal blood flow in fetus
- Gross and microscopic findings indicate alterations in fetal-placental vascular system
- Etiology
 - Obstruction of umbilical cord*
 - Membranous vessels
 - Inflammation
 - Hypercoaguable states
 - Fetal cardiac disease
 - Multifactorial

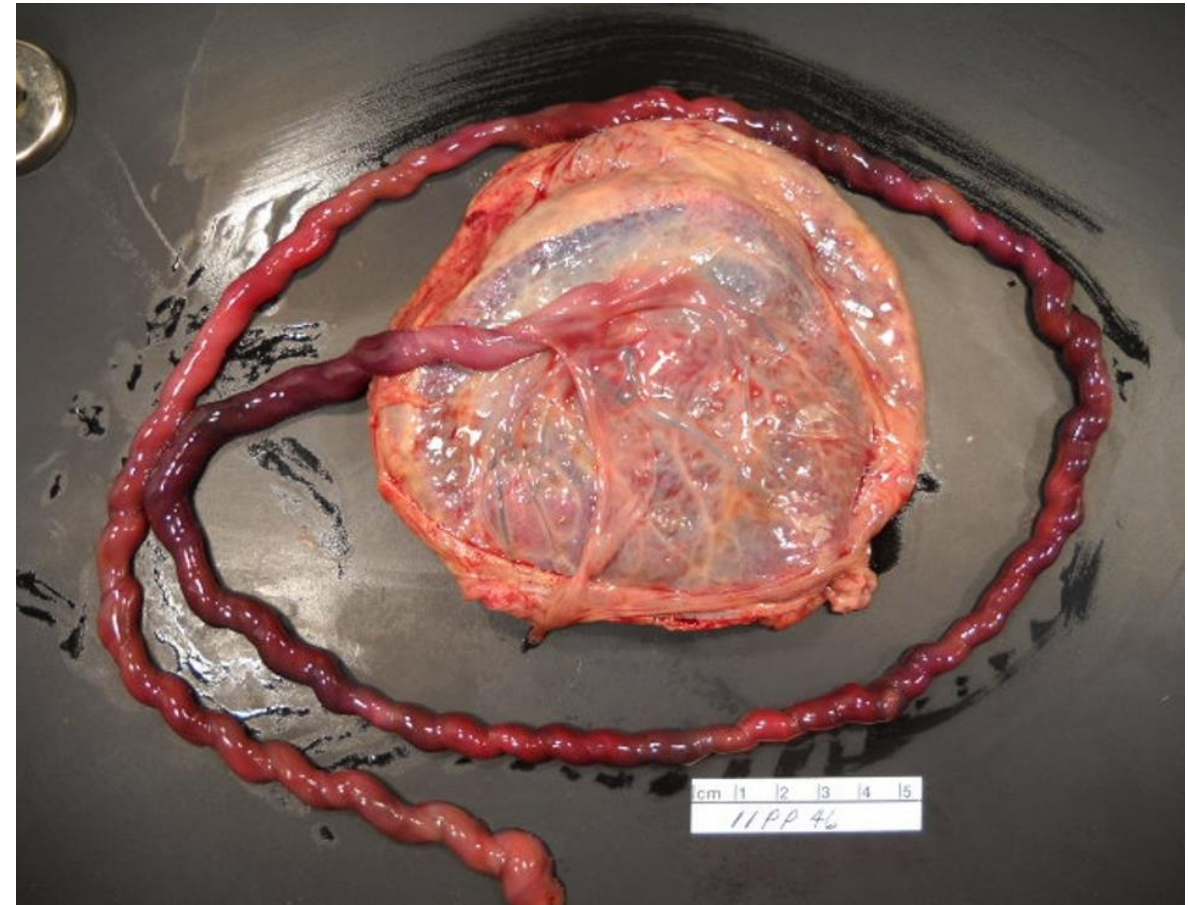
Clinical Importance

Immediate care

Information re current pregnancy

Timing of events

Prognostic information



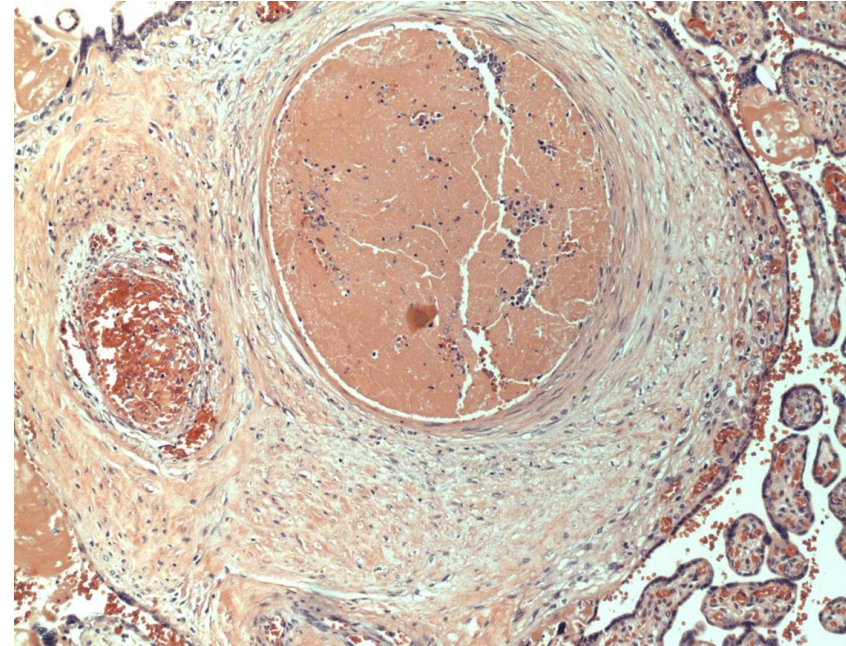
Fetal Vascular Malperfusion



FVM: thrombosis

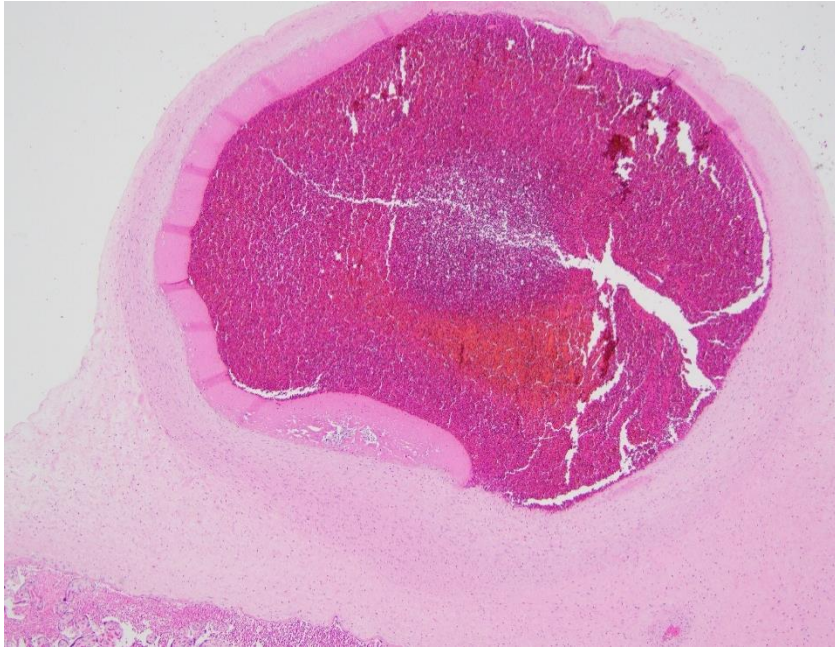


Fetal plate thrombus

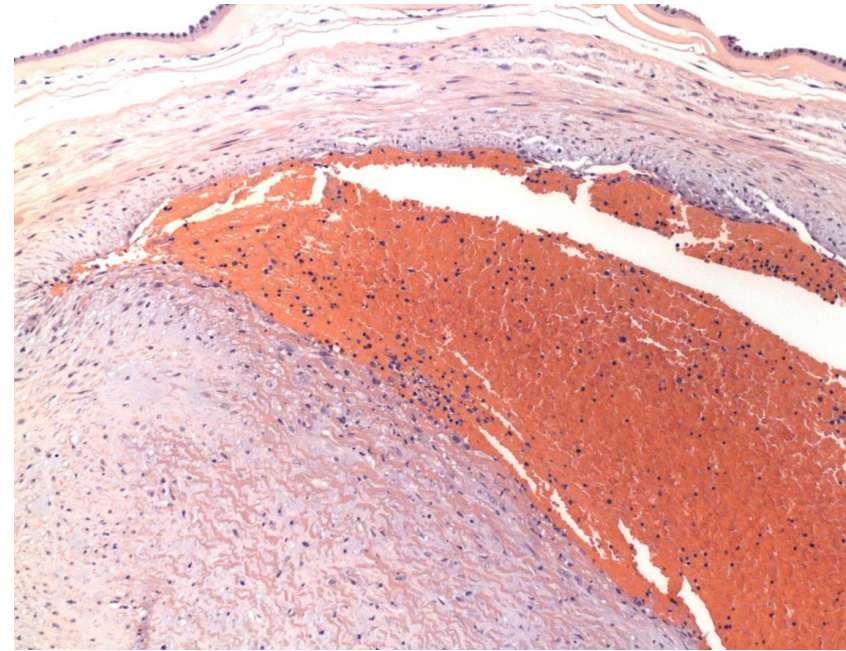


Stem villous vessel thrombus

Fetal Vascular Malperfusion

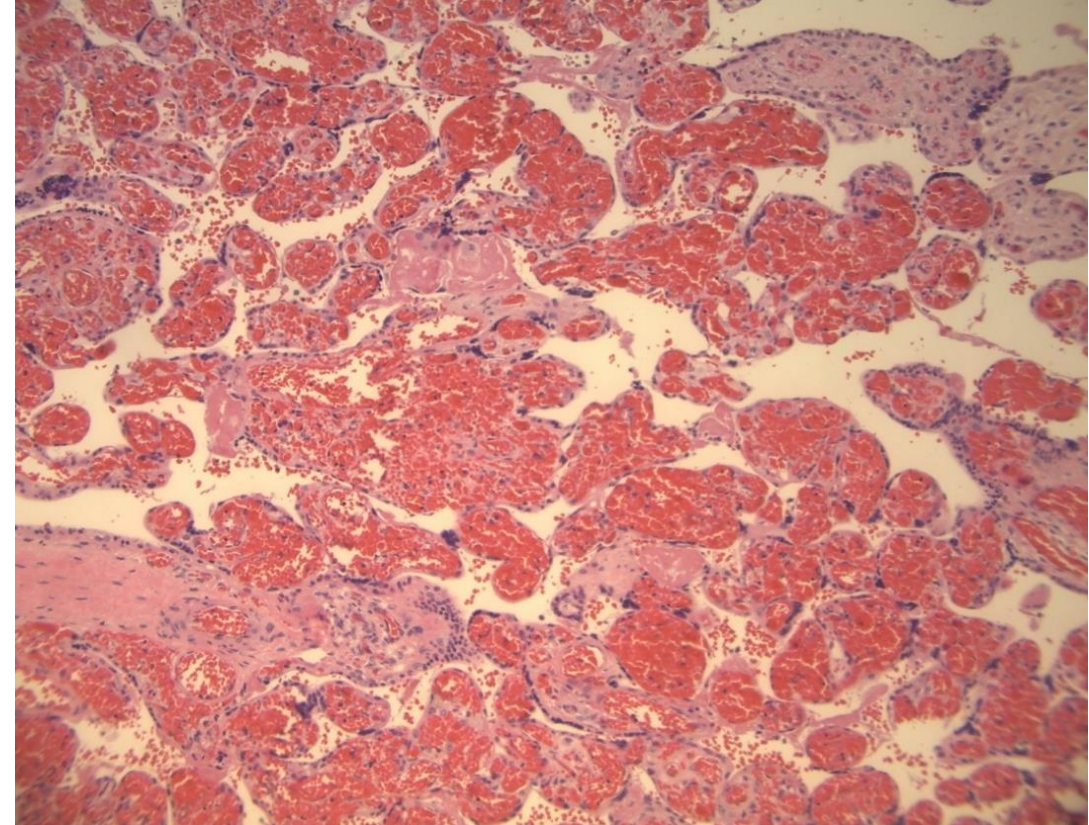
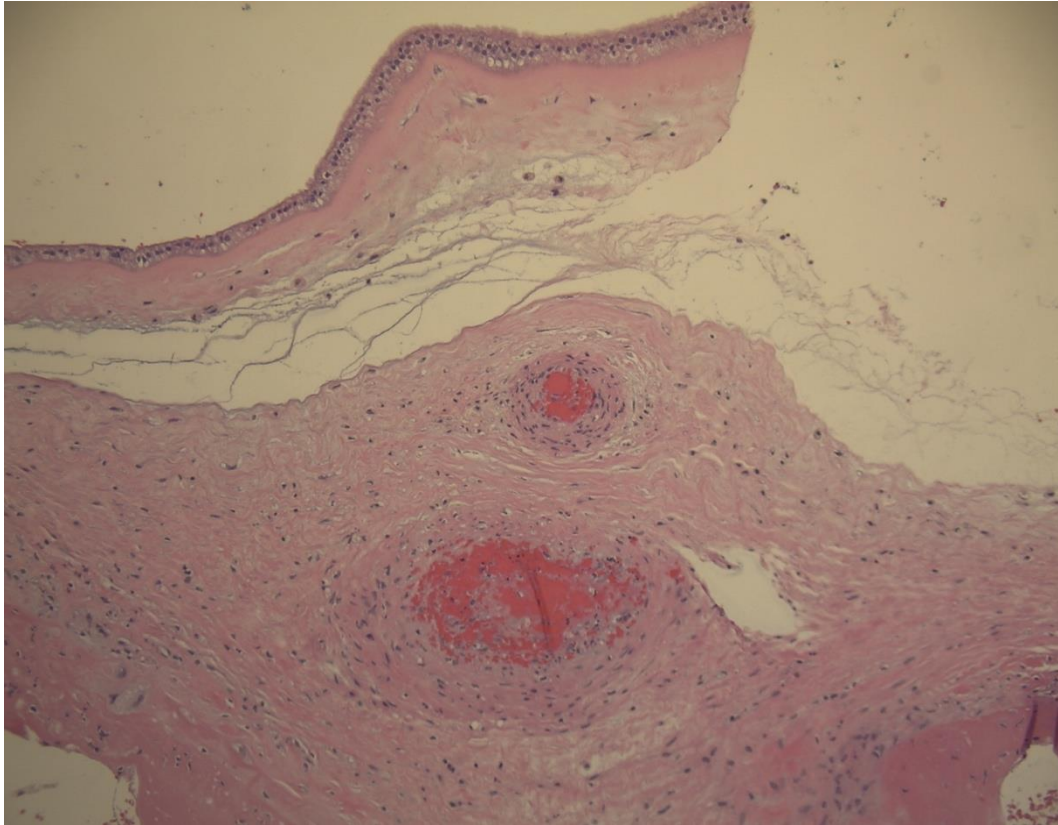


Nonocclusive thrombus



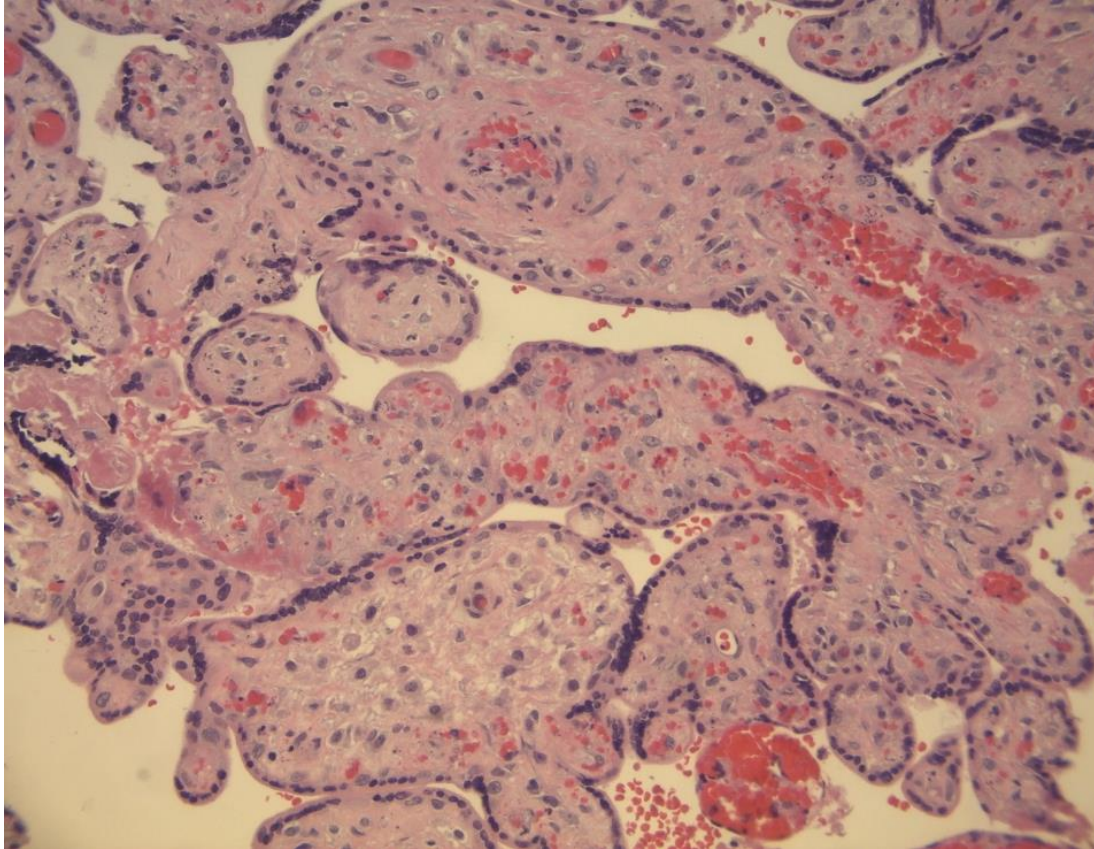
Intimal fibrin deposition

Fetal Vascular Malperfusion

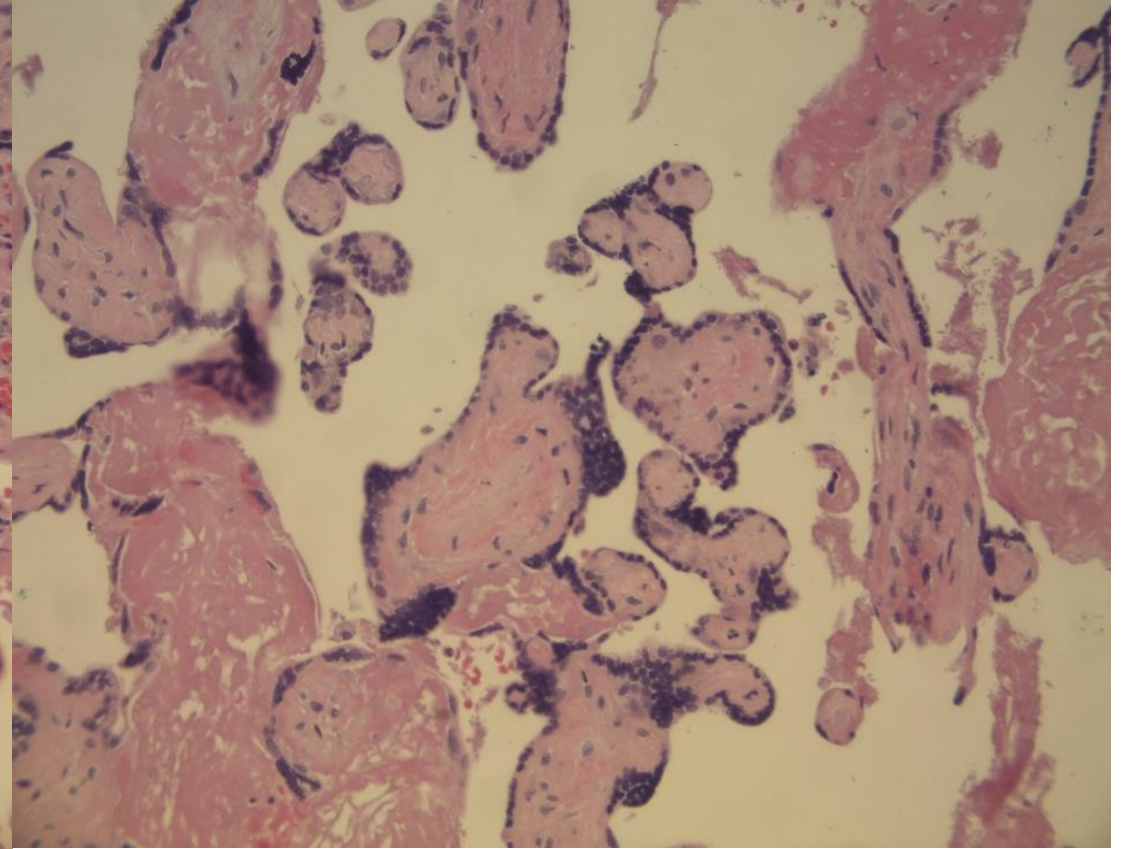


Villous stromal hemorrhage

FVM: Villous changes



Villous stromal vascular karyorrhexis



Avascular villi

Inflammatory Disorders

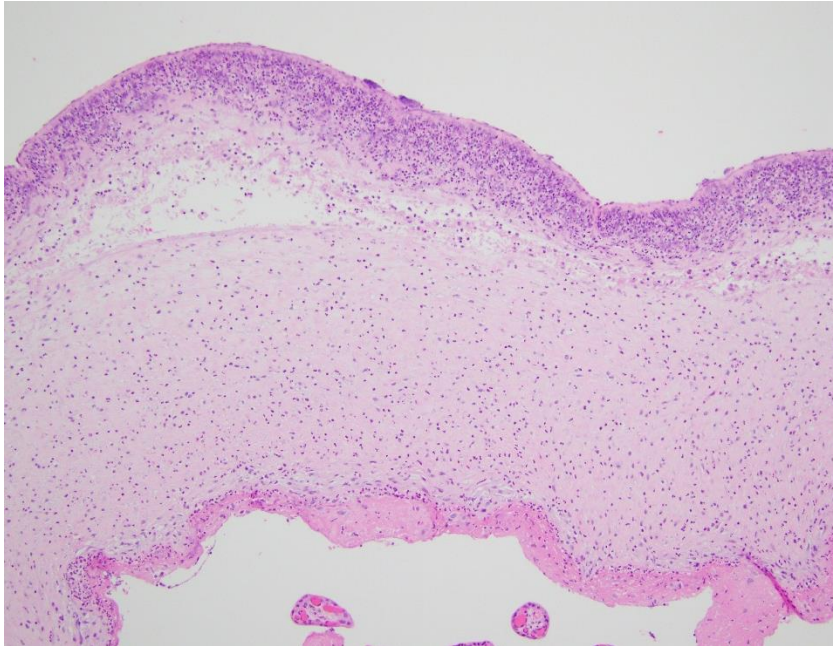
Infectious

- Ascending
 - Bacterial
 - Candida
- Hematogenous
 - Viral
 - Bacterial
 - Parasitic
- *Clinical importance*
 - Immediate Care*
 - Information re current pregnancy*

Immune mediated

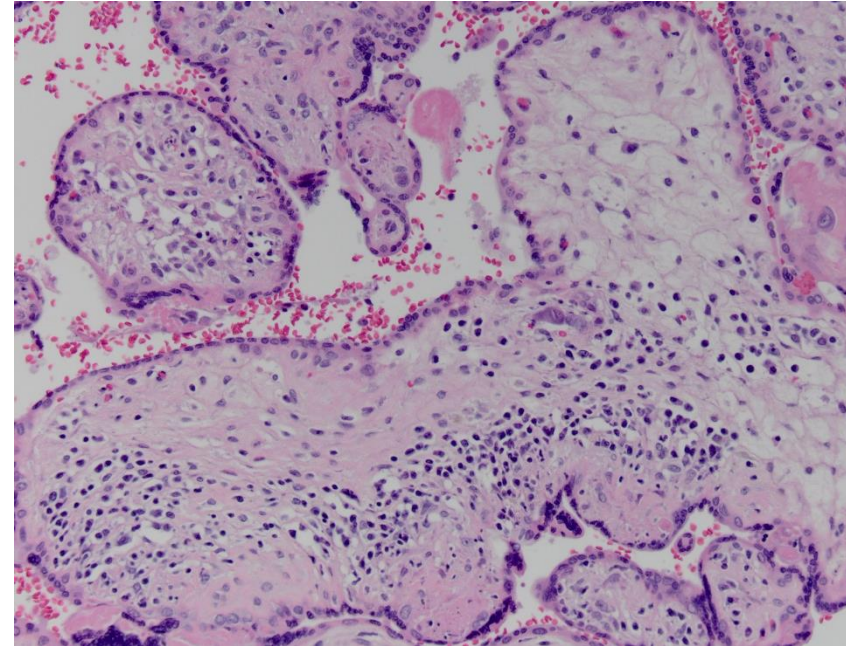
- Villitis of unknown etiology
- Maternal floor infarction/Massive perivillous fibrin
- Chronic histiocytic intervillitis
- *Clinical importance*
 - Information re current pregnancy*
 - Recurrence risk*

Infection



Ascending infection

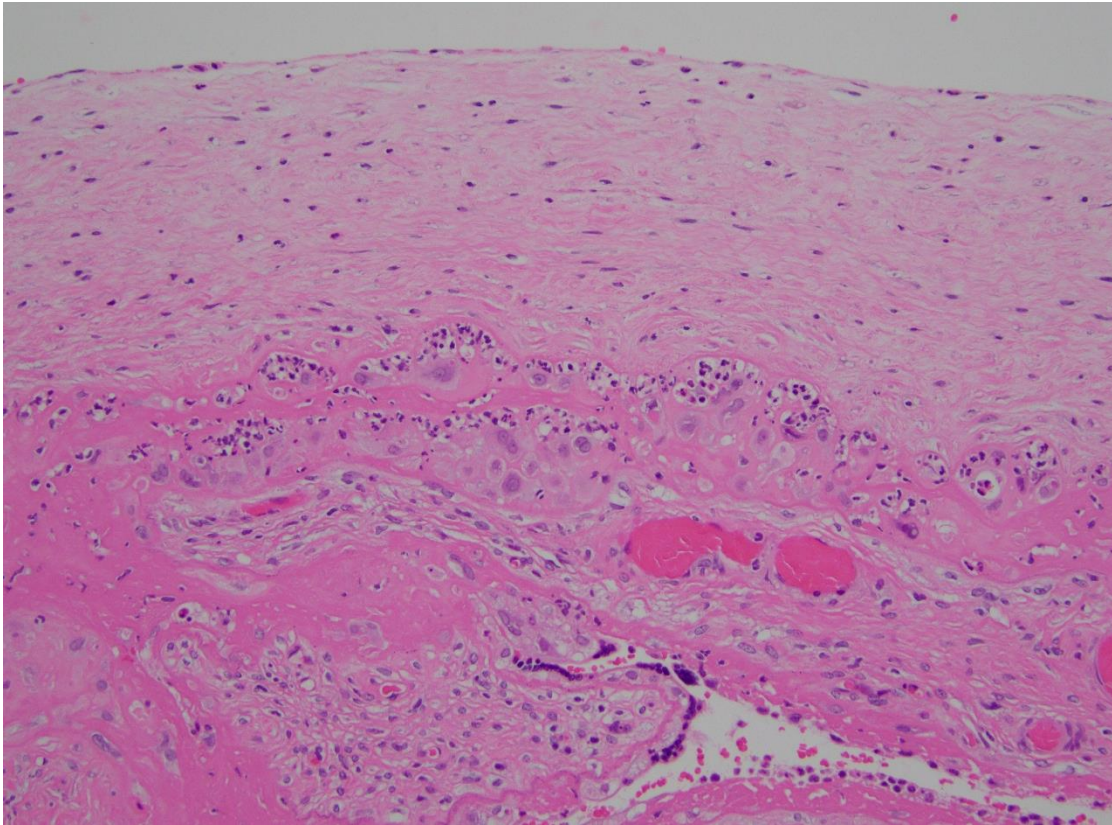
- Bacterial
- Response in membranes and cord
- Maternal response: chorioamnionitis
- Fetal response: funisitis, chorionic plate vasculitis



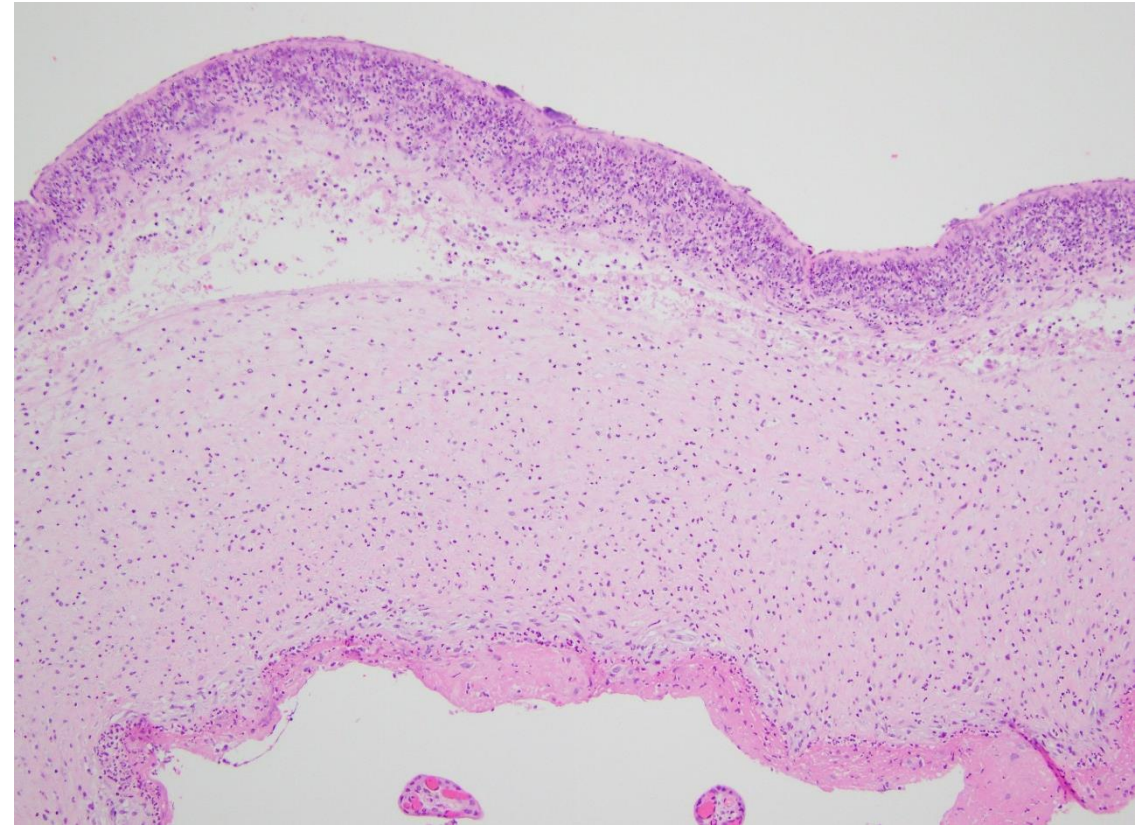
Hematogenous spread

- Viral
- Parasitic
- Bacterial
- Villitis, frequent pattern

Ascending Infection: maternal

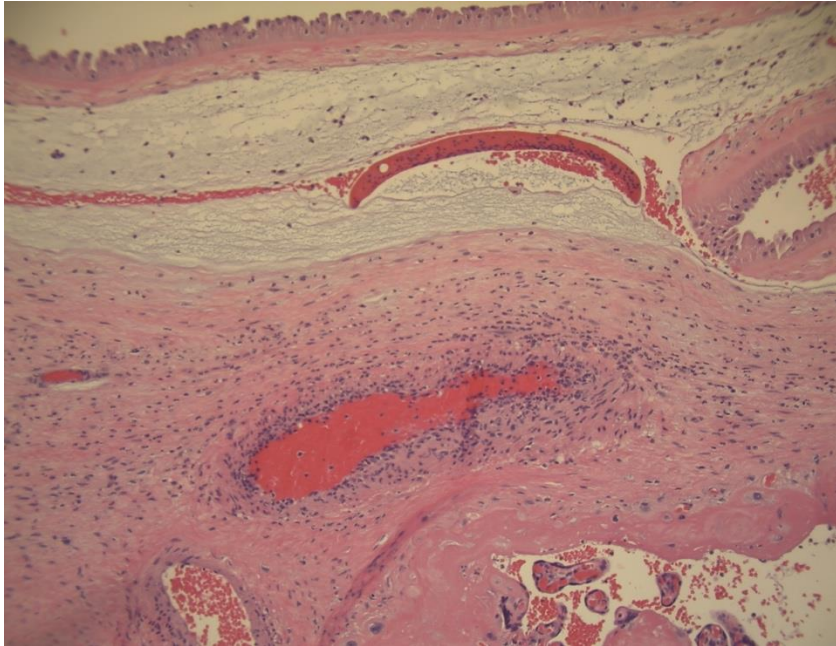


Chorioamnionitis

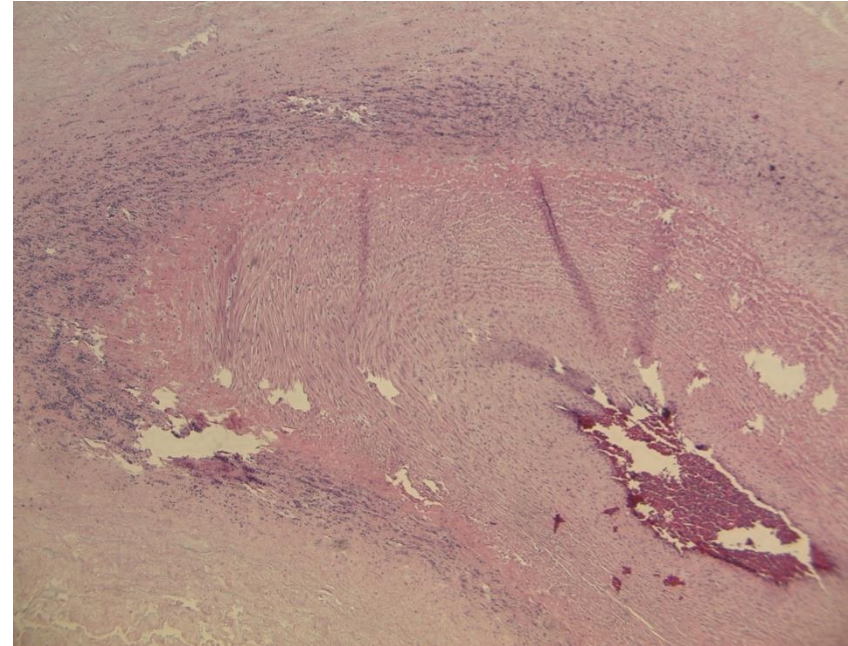


Necrotizing Chorioamnionitis

Ascending Infection: fetal

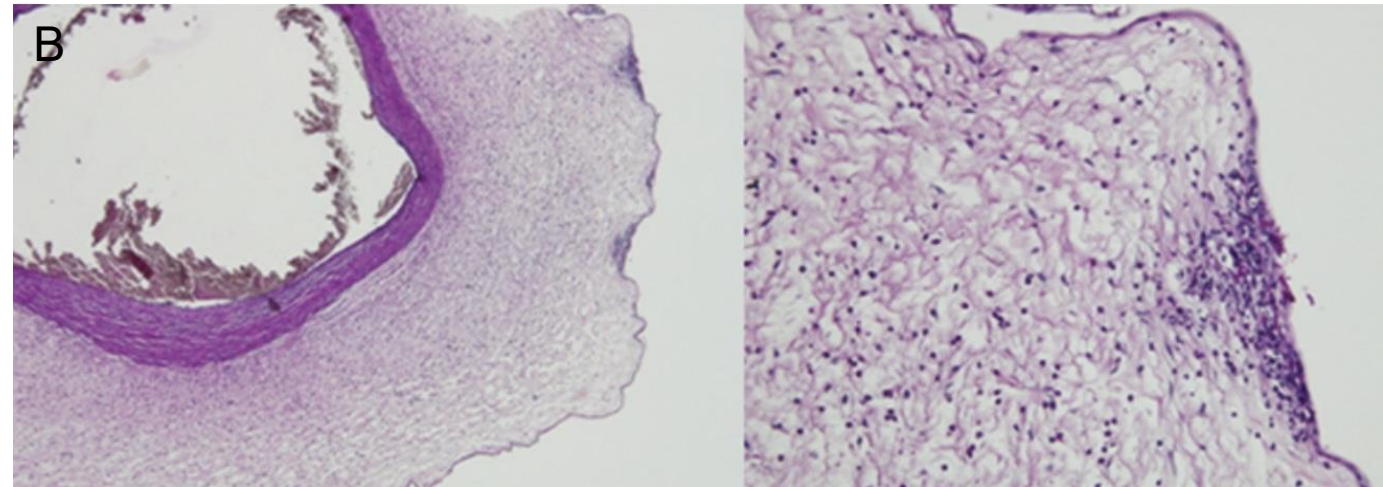
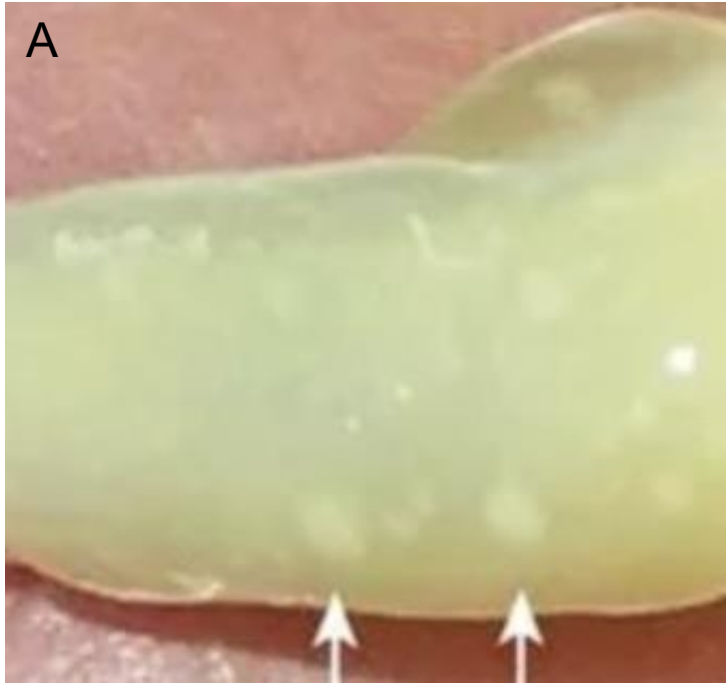


Chorionic plate vasculitis



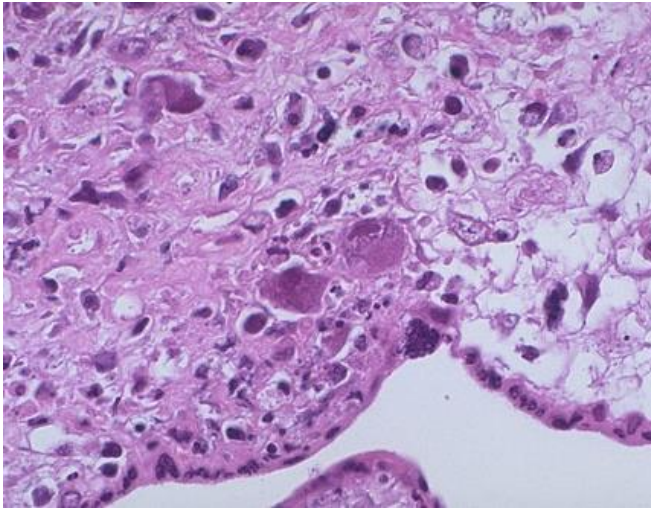
Funisitis
phlebitis and arteritis

Ascending Infection: candida

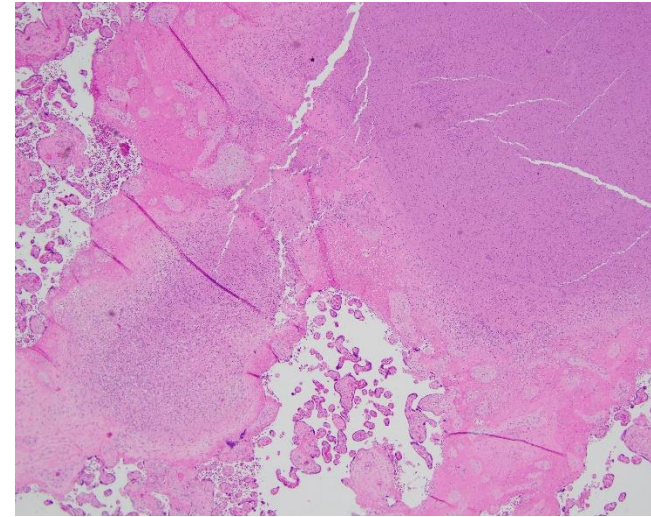


- A. Ref 9
- B. Ref 10

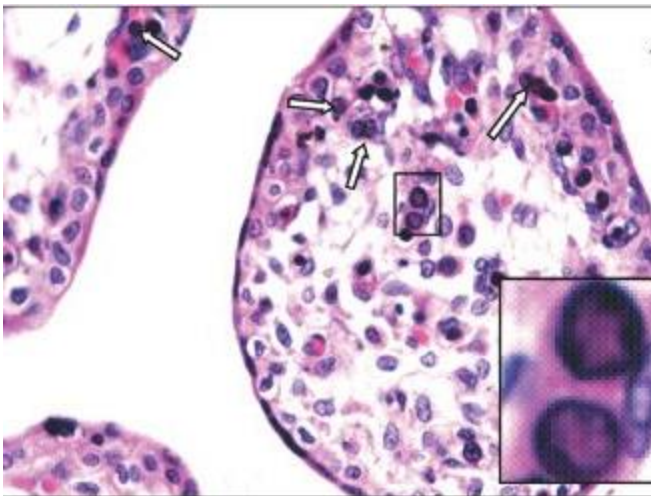
Hematogenous Spread of Infection



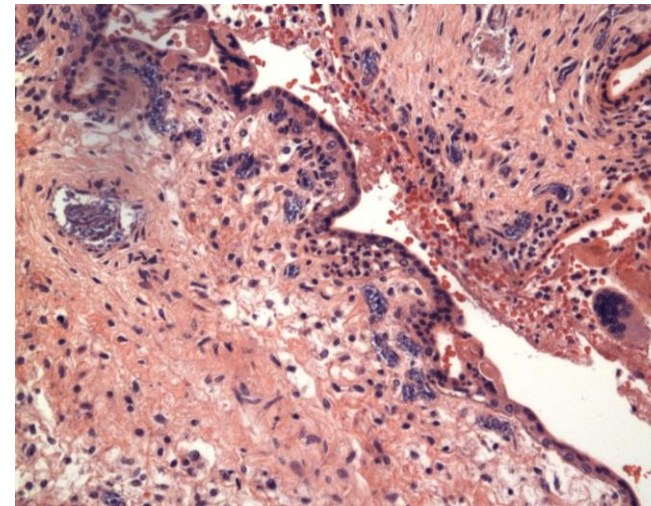
CMV (ref 11)



Listeria

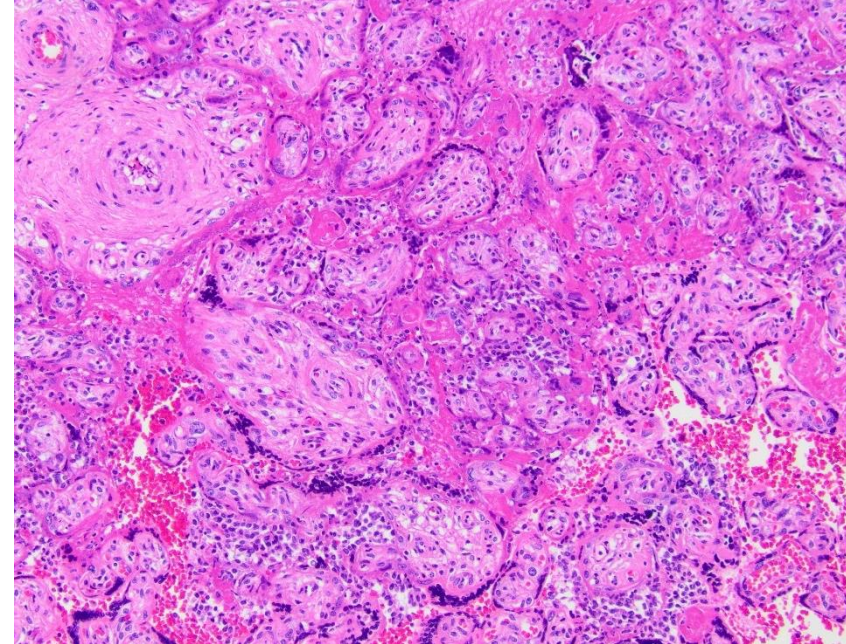
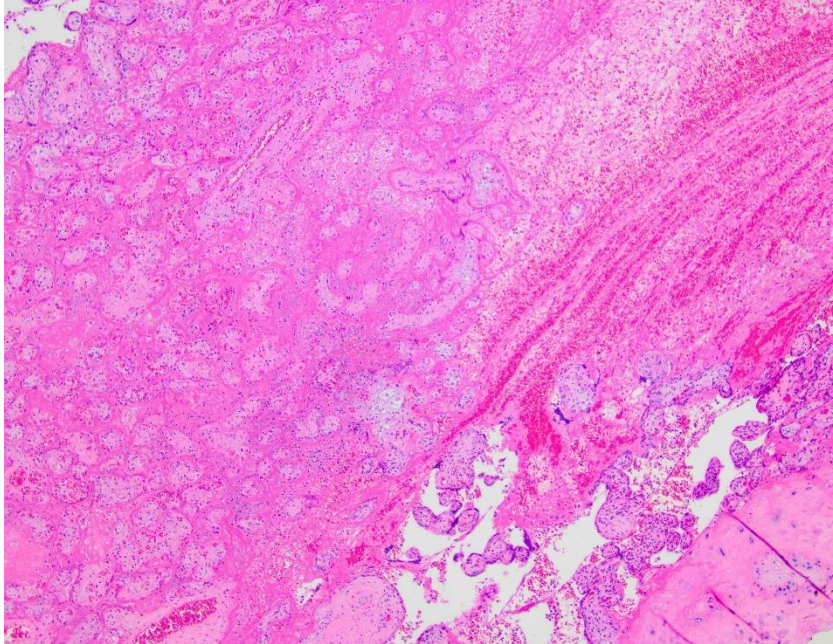


Parvovirus (ref 12)



GBS villitis

COVID Placentitis



Resembles immune mediated disorders with perivillous fibrin and intervillitis

Inflammatory and Immune Mediated Disorders

Immune response to foreign antigens in fetal tissue

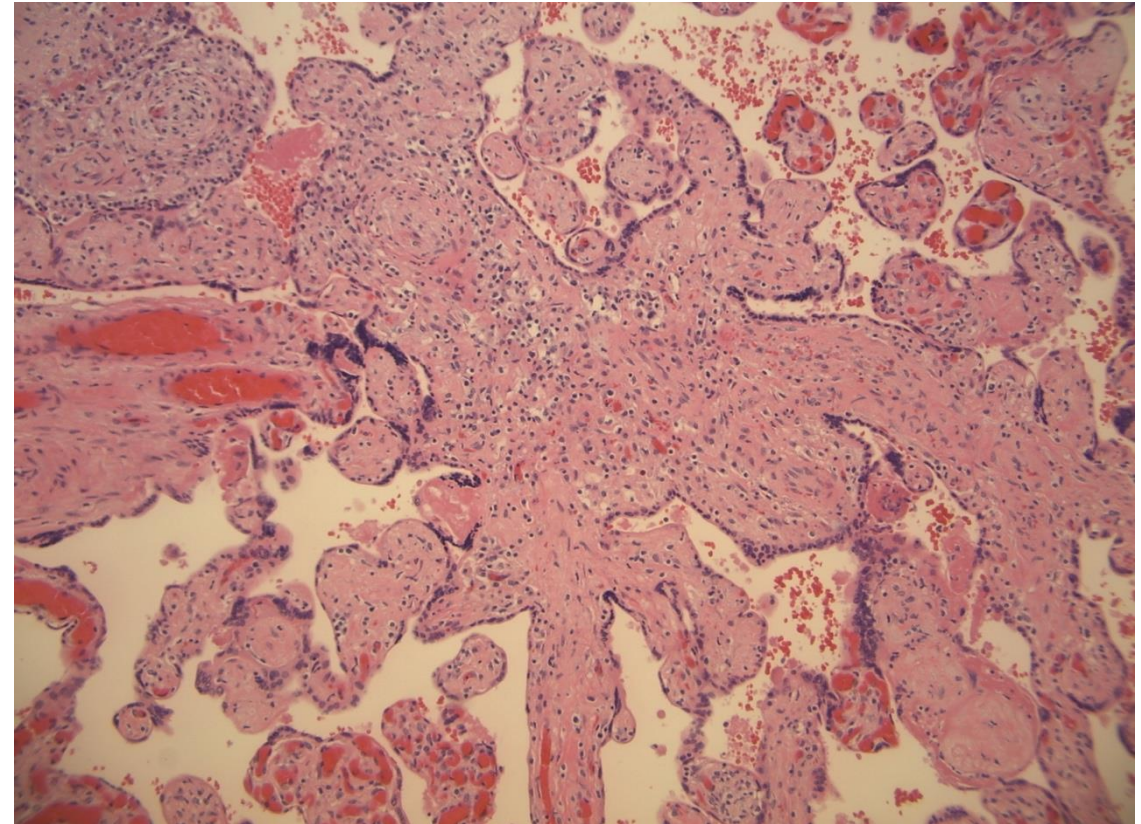
- Villitis of unknown etiology
- Maternal floor infarction
- Massive perivillous fibrin deposition
- Massive histiocytic intervillitis

Clinical Importance

Immediate care of newborn

Information re current pregnancy

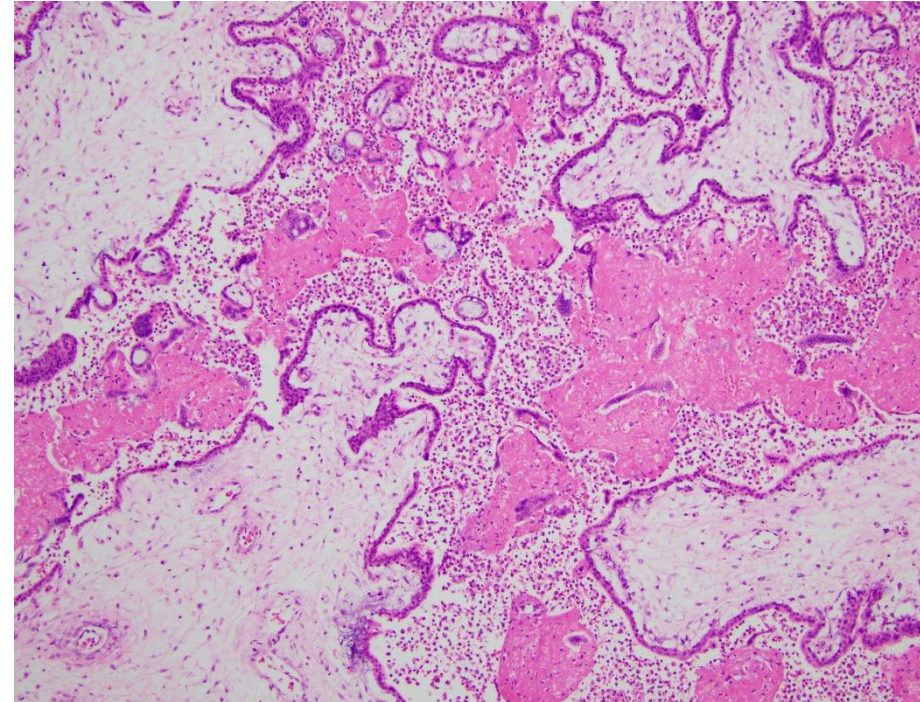
High recurrence risk



Inflammatory and Immune Mediated Disorders



Maternal floor infarction (ref 13)

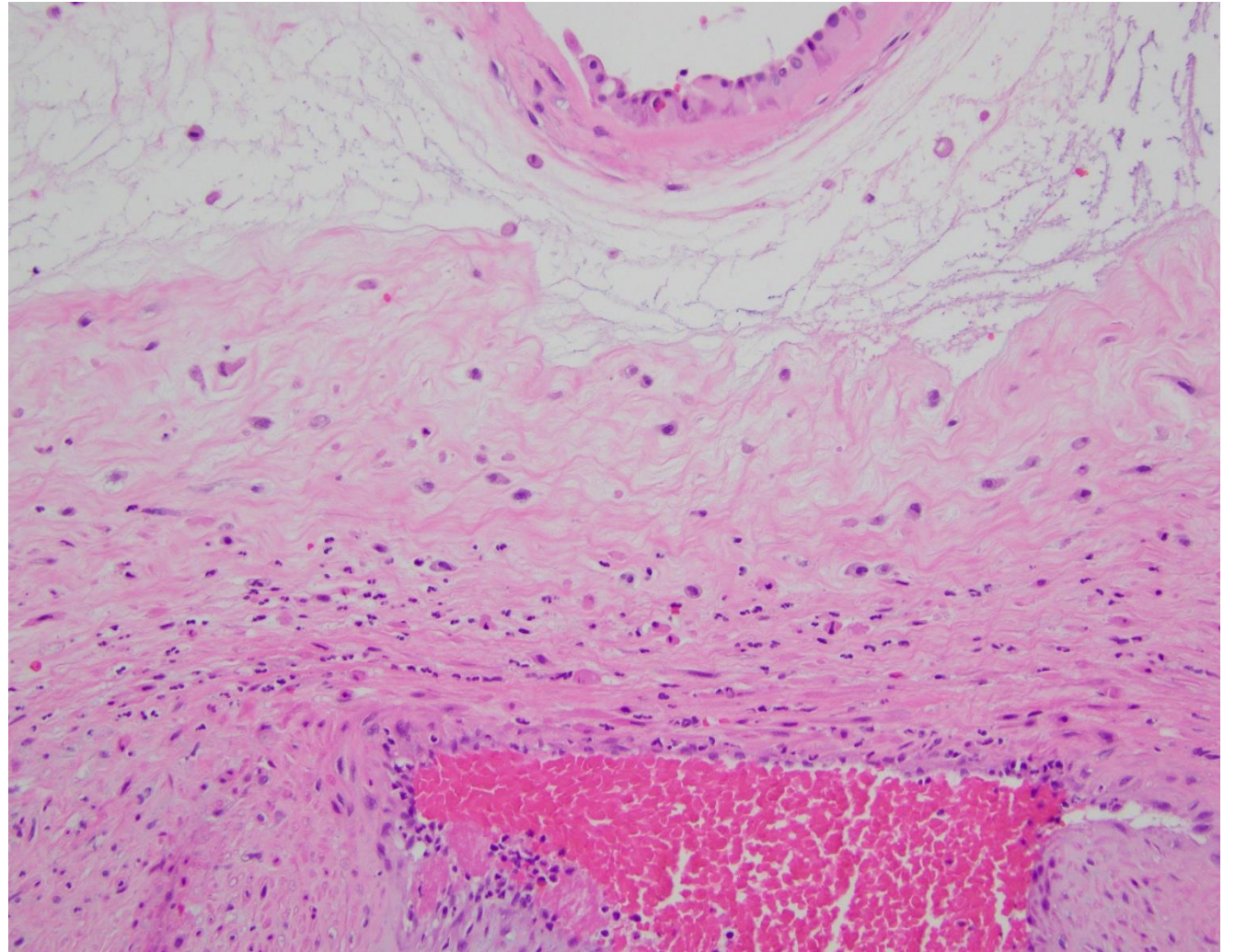


Massive histiocytic intervillitis

Membranes

Membranes

- Meconium
- Hemosiderin
- Amnion Nodosum
- Bacteria



Meconium staining with myonecrosis

Abnormalities of implantation

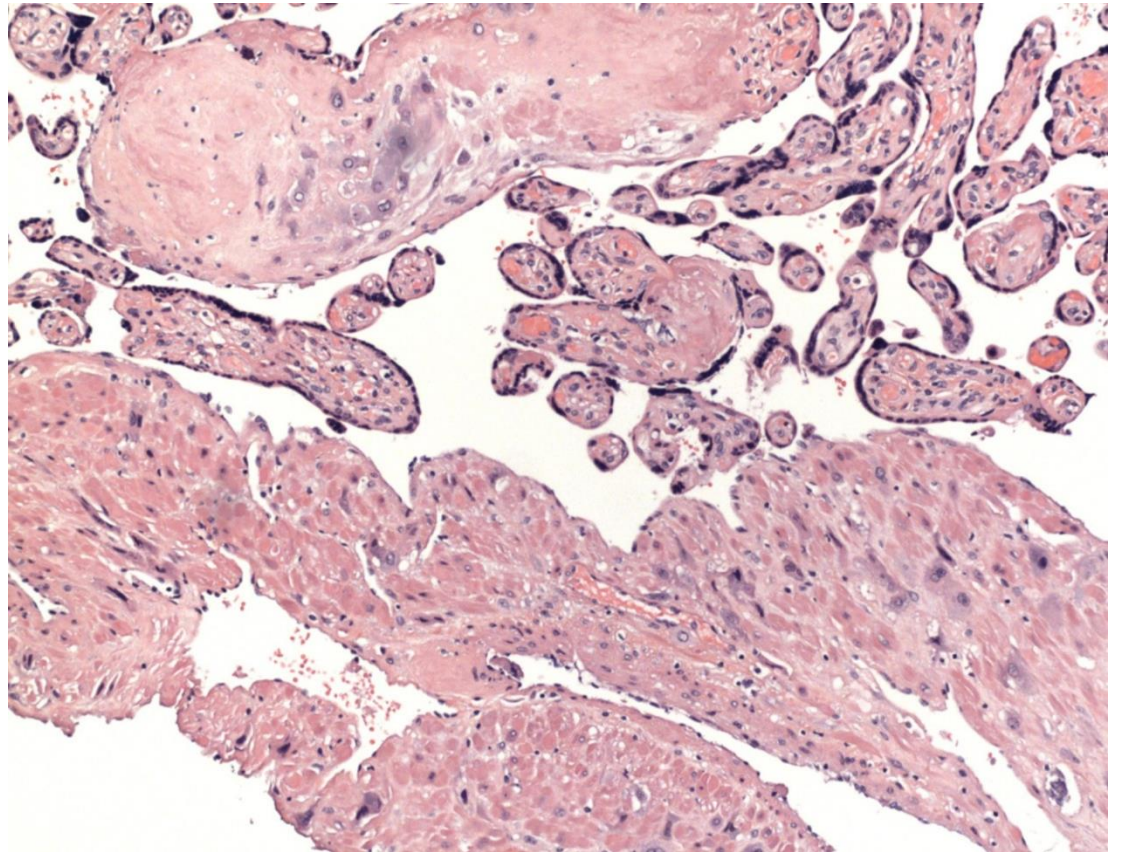
- Placenta previa
- Vasa previa
- Placenta accreta spectrum

Clinical Importance

Information re current pregnancy

Explain findings at delivery

Recurrence risk



Masses & neoplasm

Hematoma

Trophoblastic cyst

Chorangioma

Metastatic neoplasm

- Melanoma
- Breast

Primary placental choriocarcinoma

Clinical Importance

Information re current pregnancy

Immediate care of newborn

Maternal follow up



Takeaways

How to incorporate placental pathology

Triage

- Institutional policy for placenta submission

- Clinical history

- Exam

Interpretation

- Framework

- What compartments involved

- Was more than one process involved

Application

- Immediate action

- Informative re pregnancy

- Long term consequences

Communication

- Ask questions

- Further study?



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