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Emergency Medicine Curriculum: Complications of Pregnancy Small Group Module

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ABSTRACT:

Audience: This curriculum, created and implemented at Kaweah Delta HCD emergency medicine program, was designed to educate our emergency medicine (EM) residents, PGY-1 to PGY-3, as well as medical students and attending physicians.

Introduction: Obstetrical (OB) emergencies pose a unique challenge to the EM physician. Given the relative rarity of these presentations within the emergency department (ED), it is important that residents are educated in a comprehensive manner to ensure understanding and retention.¹ The exact prevalence of emergency department (ED) visits that are associated with complications of pregnancy is unknown, but they are likely a sizeable portion of the patient population of the ED. Also, many hospitals in rural areas have closed their labor and delivery units due to higher operating costs and lack of available medical personnel.² New models of high-quality teaching that ensure retention of clinically rare, but critical presentations are required. There is a body of research that suggests a small-group discussion model rather than traditional lecture-based content may improve learner engagement and retention. This model encourages active learning, which requires simultaneous instructor and learner engagement.^{3, 4, 5, 6, 7} Studies have revealed that the application of knowledge through case studies, personal interaction with content experts, and integrated questions are effective learning strategies for emergency medicine.³ The small group discussion classroom is facilitated by content experts with personal experience in the topic at hand.

Objectives: We aim to teach the presentation and management of pregnancy complications through interactive teaching during small group discussions concerning patient cases. This curriculum utilizes resources chosen by education faculty, study questions, actual experience, and small group discussions in place of a traditional lecture-based format. In doing so, a goal of the curriculum is to encourage self-directed learning, improve understanding and knowledge retention, improve the educational experience of our residents, and allow assessment by the faculty concerning the knowledge base and ability of the residents.

Methods: Core obstetric emergency medicine content will be delivered through small group modules and case-based content authored by faculty and content experts. Suggested resources for self-directed learning

CURRICULUM

are tied to each module. The Socratic method, as used during small group sessions, drives learner participation and critical evaluation of the core topics. Open-ended questions developed by the faculty and residents for each module stimulate further discussion and integration with real-life experience. Learners (as well as faculty) are encouraged to utilize free open access medical (FOAM) education resources both in the preparatory self-directed learning phase as well as afterwards to continue integration of core content with real-life experience. Suggested obstetric simulations are included and encouraged as well.

Topics: Emergency, pregnancy, pregnancy-related complications, obstetrics, abruptio placentae, ectopic pregnancy, gestational hypertension, preeclampsia & eclampsia, HELLP syndrome, hyperemesis gravidarum, molar pregnancy, placenta previa, preterm labor, postpartum hemorrhage, premature rupture of the membranes, resuscitative hysterotomy (perimortem c-section), Rh isoimmunization, sexually transmitted diseases, spontaneous and threatened spontaneous abortions.



USER GUIDE

List of Resources:

Abstract	103
User Guide	105
Didactics and Hands-On Curriculum Chart	109
Appendix A: Abruptio Placentae & Resuscitative Hysterotomy	121
Appendix B: Ectopic Pregnancy	125
Appendix C: Gestational Hypertensive Diseases of Pregnancy	130
Appendix D: HELLP syndrome and other Gestational Liver Disorders	134
Appendix E: Hyperemesis Gravidarum	138
Appendix F: Molar Pregnancy (Gestational Trophoblastic Disease)	142
Appendix G: Placenta Previa	146
Appendix H: Preterm Labor and Premature Rupture of the Membranes	150
Appendix I: Postpartum Hemorrhage	156
Appendix J: Rhesus Factor (Rh) Isoimmunization	160
Appendix K: Sexually Transmitted Diseases and other Genitourinary Infections	163
Appendix L: Spontaneous Abortion and Threatened Spontaneous Abortion	168

Learner Audience:

Medical students, interns, junior residents, senior residents

Length of Curriculum:

The Model of Emergency Medicine is repeated every 18 months. Each time a core topic is taught, different learning styles are attempted. Although the resident gets information on the complications of pregnancy twice, the small group discussion is used only once in 3 years; however, it can be used each time. The complications-of-pregnancy small group presentation consists of 12 patient cases that are designed to be discussed in 20 – 25 minutes for each case.

Topics:

Emergency, pregnancy, pregnancy-related complications, obstetrics, abruptio placentae, ectopic pregnancy, gestational hypertension, preeclampsia & eclampsia, HELLP syndrome, hyperemesis gravidarum, molar pregnancy, placenta previa, preterm labor, postpartum hemorrhage, premature rupture of the membranes, resuscitative hysterotomy (perimortem c-section), Rh isoimmunization, sexually transmitted diseases, spontaneous and threatened spontaneous abortions.

Objectives:

1. Resident learners will learn the content of the Model of the Clinical Practice of Emergency Medicine, specifically Section 13.3 Complications of Pregnancy, utilizing small group discussions based on the Socratic method.¹³
2. After completing the module, complications of pregnancy, resident learners will be able to discuss the pathophysiology, diagnosis, evaluation, and management of the complications of pregnancy and apply this medical knowledge to various pregnancy related emergencies including:
 - Abruptio placenta
 - Ectopic pregnancy
 - Gestational hypertension, Preeclampsia & Eclampsia
 - HELLP Syndrome
 - Hyperemesis Gravidarum
 - Molar Pregnancy
 - Placenta Previa
 - Preterm Labor
 - Postpartum Hemorrhage
 - Premature rupture of the membranes
 - Resuscitative Hysterotomy (Perimortem C-section)
 - Rh isoimmunization
 - Sexually Transmitted Diseases
 - Spontaneous Abortion and Threatened Spontaneous Abortion

Brief introduction:

Obstetrical (OB) emergencies pose a unique challenge to the EM physician. Given the relative rarity of these presentations within the emergency department (ED), it is important that residents are educated in a comprehensive manner to ensure understanding and retention.¹ These OB and gynecological (GYN) pathologies are part of a greater core curriculum that must be mastered by the time the resident is ready for independent practice. Thus, it is imperative that content is delivered in a high-yield, digestible, and retainable way.

Problem identification, general and targeted needs assessment:

Traditional lecture-based curricula focus on the delivery of content through passive means. Learners typically sit in larger groups and are presented with high-density slides of information while an experienced speaker highlights important points. Though this approach makes efficient use of faculty time and allows for a higher faculty-to-learner ratio, it has recently come under fire for a variety of reasons. Criticisms include passive learning being ineffective for clinical scenarios, inability to create dialogue among learners to solidify concepts, and lack



USER GUIDE

of learner attention span required to digest such a high volume of passively received material.^{9,10}

Problem-based learning, the “flipped classroom,” and case-based learning are all examples of small group discussions (SGD); these various implementations of SGDs have successfully been used to ameliorate the aforementioned criticisms of traditional lecture-based classrooms. Briefly, SGDs involve a far smaller group of learners paired with a content expert to engage in a Socratic method-based discussion of the content using open-ended questions, clinical cases, and case simulations. Evidence suggests the SGD methodology may enhance retention of critical concepts, as well as increase learner satisfaction and enjoyment.^{8,11,12} Studies also reveal that the application of knowledge through clinical case discussions, personal interaction with content experts, and integrated questions are effective learning strategies for emergency medicine residents and medical students.⁸ Additionally, inclusion of SGDs into an established curriculum may enhance a physician’s clinical performance and even patients’ health.^{11,12}

When paired with a traditional lecture-based curriculum, SGDs may offer the comprehensive learning environment needed to engage learners in an effective way. However, due to the contemporary nature of these new educational strategies, there is a paucity of emergency medicine core curricula designed for SGDs. In particular, there exists few comprehensive obstetric/gynecologic (OB/GYN)-based SGD curricula. The need for a complete EM OB/GYN syllabus is apparent, particularly one that can be rapidly adapted by busy educators and content experts.

Goals of the curriculum:

We aim to teach the presentation and management of pregnancy complications through interactive teaching during small group discussions concerning patient cases. This curriculum utilizes resources chosen by education faculty, study questions, actual experience, and small group discussions in place of a traditional lecture-based format. In doing so, a goal of the curriculum is to encourage self-directed learning, improve understanding and knowledge retention, improve the educational experience of our residents, and allow assessment by the faculty concerning the knowledge base and ability of the residents.

Objectives of the curriculum:

1. Resident learners will learn the content of the Model of the Clinical Practice of Emergency Medicine, specifically Section 13.3 Complications of Pregnancy, utilizing small group discussions based on the Socratic method.¹³
2. After completing the module, Complications of Pregnancy, resident learners will be able to discuss the pathophysiology, diagnosis, evaluation, and management of the complications of pregnancy and apply this medical knowledge to various pregnancy related emergencies including:
 - Abruptio placenta
 - Ectopic pregnancy
 - Gestational hypertension, Preeclampsia & Eclampsia
 - HELLP Syndrome
 - Hyperemesis Gravidarum
 - Molar Pregnancy
 - Placenta Previa
 - Preterm Labor
 - Postpartum Hemorrhage
 - Premature rupture of the membranes
 - Resuscitative Hysterotomy (Perimortem C-section)
 - Rh isoimmunization
 - Sexually Transmitted Diseases
 - Spontaneous Abortion and Threatened Spontaneous Abortion

Educational Strategies: (See curriculum chart)

Please refer to the curriculum chart of linked objectives and educational strategies.

Associated Content: There is a single powerpoint that has various images to help teach the concepts in the appendices.

Evaluation and Feedback: This method of instruction has been present in this residency since it began. Each year, an annual program evaluation is performed asking about the rating of the different teaching methods including lectures, small group discussions, simulation, asynchronous learning, use of question banks, etc. This method is perceived as positive among the residents. They like the interaction with the faculty as well as the application of the medical knowledge to a patient case. We try to introduce small group discussion at least once in a 4-week block. During that time, the residents also participate in a simulation case.

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USER GUIDE

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DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Abruptio Placenta & Resuscitative Hysterotomy	<p>Pre-reading Material:</p> <p><u>Roe J, Hang BS, Lyon D, Sanford JM. Perimortem cesarean delivery. In: Karjane NW, ed. Medscape. WebMD LLC. http://emedicine.medscape.com/article/83059-overview#a2.htm.</u></p> <p>Rose CH, Faksh A, Traynor KD, Cabrera D, Arendt Kw, Brost BC. Challenging the 4- to 5-minute rule: from perimortem cesarean to resuscitative hysterotomy. <i>Am J Obstet Gynecol.</i> 2015;213(5):653-656. doi: 10.1016/j.ajog.2015.07.019</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>20 - 25 Minutes for Case and Content Discussion</p>	<p>Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with abruptio placenta,</p> <p>Appropriate management of a patient with abruptio placentae</p> <p>Video on performance of resuscitative hysterotomy</p>	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a patient case with abruptio placentae.</p> <p>Stress the emergent areas of the above sections such as immediate diagnosis and treatment with a large abruption and fetal distress</p> <p>Review pathophysiology, diagnosis, & tx of placental abruption</p> <p>List what circumstances indicate that a resuscitative hysterotomy should be performed.</p> <p>Describe how a resuscitative hysterotomy should be performed</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	PGY-1 PGY-2 PGY-3 Medical Students Faculty	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -</p> <p>Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Ectopic Pregnancy	<p>Pre-reading Material: American College of Emergency Physicians Clinical Policies Subcommittee (Writing Committee) on Early Pregnancy, Hahn SA, Promes SB, Brown MD. Clinical policy: critical issues in the initial evaluation and management of patients presenting to the emergency department in early pregnancy. <i>Ann Emerg Med.</i> 2017;69(2):241- 250.e20 doi: 10.1016/j.annemerg med.2016.11.002</p> <p>Case Discussions, and Discussion Questions Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>20 - 25 Minutes for Case and Content Discussion</p>	<p>Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with a possible ectopic pregnancy.</p>	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical & eval of a patient case with a possible ectopic pregnancy Review pathophysiology, diagnosis, and treatment of ectopic pregnancy</p> <p>Discuss the use of transvaginal versus transabdominal ultrasound in the evaluation of suspected ectopic pregnancy</p> <p>Discuss the importance and limitations of using the Beta-HCG & the Us together to diagnose ectopic pregnancy</p> <p>List the indications for the treatment of ectopic pregnancy – methotrexate, surgery, etc.</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p>	<p>PGY-1 PGY-2 PGY-3 Medical Students Faculty</p>	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Hypertensive Disorders of Pregnancy Including Gestational Hypertension, Preeclampsia, Eclampsia	<p>Pre-reading Material: None</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>-20 - 25 Minutes for Case and Content Discussion</p>	Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with elevated blood pressure during pregnancy.	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a pregnant patient with elevated blood pressure</p> <p>Review pathophysiology, diagnosis, and treatment of hypertensive disorders of pregnancy</p> <p>Diagnose a case of preeclampsia and eclampsia</p> <p>Choose the appropriate medications for the treatment of hypertension in pregnancy</p> <p>List the antihypertensives that should not be used in pregnancy</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	PGY-1 PGY-2 PGY-3 Medical Students Faculty	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



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Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
HELLP Syndrome And other gestational liver diseases	<p>Pre-reading Material: Weinstein L. It has been a great ride: the history of HELLP syndrome. <i>Am J Obstet Gynecol.</i> 2005;193(3 Pt1):860-863. doi: 10.1016/j.ajog.2005.06.058</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>-20 - 25 Minutes for Case and Content Discussion</p>	<p>Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with HELLP syndrome after 20 weeks gestation and other gestational liver diseases.</p>	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a pregnant patient with possible gestational liver disease</p> <p>Review pathophysiology, diagnosis, and treatment of HELLP and liver disorders</p> <p>Discuss the controversy concerning whether HELLP should be included with hypertensive diseases of pregnancy or a separate entity</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	<p>PGY-1 PGY-2 PGY-3 Medical Students Faculty</p>	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Hyperemesis Gravidarum	<p>Pre-reading Material: None</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>-20 - 25 Minutes for Case and Content Discussion</p>	Pathophysiology, Evaluation, Diagnosis, and Management of a patient who hyperemesis	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a pregnant patient with the complaint of nausea and vomiting</p> <p>Differentiate the difference between nausea and vomiting of pregnancy and hyperemesis gravidarum</p> <p>Review pathophysiology, diagnosis, and treatment of hyperemesis gravidarum</p> <p>Choose the correct disposition of a patient with hyperemesis gravidarum</p> <p>Recognize when the differential should be expanded in a pregnant patient with nausea/vomiting</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	PGY-1 PGY-2 PGY-3 Medical Students Faculty	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Molar Pregnancy	<p>Pre-reading Material: None</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>20 - 25 Minutes for Case and Content Discussion</p>	<p>Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with a molar pregnancy</p>	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a patient case with a molar pregnancy</p> <p>Recognize when a molar pregnancy is suspected</p> <p>Review pathophysiology, diagnosis, and treatment of molar pregnancies</p> <p>Choose the correct disposition of a patient with a molar pregnancy</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	<p>PGY-1 PGY-2 PGY-3 Medical Students Faculty</p>	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Placenta Previa	<p>Pre-reading Material: Houry DE, Salhi BA. Acute complications of pregnancy In: Marx JA, Hockberger RA, Walls RM, et al. eds. <i>Rosen's Emergency Medicine Concepts and Clinical Practice</i>. 8th ed. Philadelphia, PA: Elsevier Saunders; 2013: 2282-2299.</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>20 - 25 Minutes for Case and Content Discussion</p>	Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with placenta previa	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a patient case with vaginal bleeding in pregnancy</p> <p>Recognize when placenta previa is suspected</p> <p>Review pathophysiology, diagnosis, and treatment of placenta previa</p> <p>Choose the correct disposition of a patient with placenta previa</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	PGY-1 PGY-2 PGY-3 Medical Students Faculty	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Postpartum Hemorrhage	<p>Pre-reading Material: Desai S, Henderson SO. Labor and delivery and their complications. In: Marx JA, Hockberger RA, Walls RM, et al. eds. <i>Rosen's Emergency Medicine Concepts and Clinical Practice</i>. 8th ed. Philadelphia, PA: Elsevier Saunders; 2013: 2331-2350.</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>20 - 25 Minutes for Case and Content Discussion</p>	Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with postpartum hemorrhage	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a patient case with postpartum hemorrhage</p> <p>Recognize when postpartum hemorrhage is suspected</p> <p>Review pathophysiology, diagnosis, and treatment of postpartum hemorrhage</p> <p>Diagnose the emergent nature of the condition and begin management immediately in an organized manner to determine and stop the hemorrhage</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	PGY-1 PGY-2 PGY-3 Medical Students Faculty	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Preterm Labor and Premature Rupture of Membranes	<p>Pre-reading Material: Houry DE, Salhi BA. Acute complications of pregnancy In: Marx JA, Hockberger RA, Walls RM, et al. eds. <i>Rosen's Emergency Medicine Concepts and Clinical Practice</i>. 8th ed. Philadelphia, PA: Elsevier Saunders; 2013: 2282-2299.</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>20 - 25 Minutes for Case and Content Discussion</p>	Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with preterm labor or premature rupture of membranes	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a patient case with suspected preterm labor and premature rupture of membranes</p> <p>Diagnose preterm labor and know when to attempt to stop progression of labor</p> <p>Diagnose premature rupture of membranes</p> <p>Choose the correct disposition of a patient with premature labor and/or premature rupture of membranes</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	PGY-1 PGY-2 PGY-3 Medical Students Faculty	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Rh Isoimmunization	<p>Pre-reading Material: None</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>20 - 25 Minutes for Case and Content Discussion</p>	Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with potential and actual Rh Isoimmunization	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a patient with bleeding of pregnancy that has Rh negative status</p> <p>Determine the evaluation and treatment of patient with Rh negative status</p> <p>State when immune globulin (Rhogam/Rhophylate) is required in pregnant females with Rh negative status</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	PGY-1 PGY-2 PGY-3 Medical Students Faculty	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Sexually Transmitted Diseases and other Genitourinary Infections	<p>Pre-reading Material: None</p> <p>Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>20 - 25 Minutes for Case and Content Discussion</p>	Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with symptoms or possible sexually transmitted diseases and other genitourinary infections in pregnancy	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a pregnant patient with a sexually transmitted disease</p> <p>Determine the treatment for the pregnant patient with a sexually transmitted disease</p> <p>Discuss the significance of UTI and asymptomatic bacteriuria</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	PGY-1 PGY-2 PGY-3 Medical Students Faculty	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Spontaneous Abortion and Threatened Abortion (Miscarriage)	<p>Pre-reading Material Houry DE, Salhi BA. Acute complications of pregnancy In: Marx JA, Hockberger RA, Walls RM, et al. eds. <i>Rosen's Emergency Medicine Concepts and Clinical Practice</i>. 8th ed. Philadelphia, PA: Elsevier Saunders; 2013: 2282-2299.</p> <p>Case Discussions, and Discussion Questions</p> <p>-Encourage Participants to Share Clinical Experiences to Enhance Discussion</p> <p>20 - 25 Minutes for Case and Content Discussion</p>	<p>Pathophysiology, Evaluation, Diagnosis, and Management of a patient who presents with symptoms suggestive of spontaneous or threatened abortion (miscarriage)</p>	<p>By the end of this session, learners will:</p> <p>Obtain the history, physical and evaluation of a patient with vaginal bleeding during first 20 weeks of pregnancy</p> <p>Determine the evaluation and treatment of patient with spontaneous abortion or threatened spontaneous Abortion</p> <p>Choose the correct disposition of those patients</p> <p>Discuss the answers to the questions designed to stress the teaching points of the case</p> <p>Summarize key learning points of the case</p>	<p>PGY-1 PGY-2 PGY-3 Medical Students Faculty</p>	<p>Equipment: Laptop so instructor can show images that are provided</p> <p>Tables and Space Promoting Small Group Discussion.</p> <p>Instructors: 1 Faculty Members Or Content Expert</p> <p>Timing: Small Group Discussions Involve No More than 6 – 8 Learners and Last 20-25 Minutes</p>	<p>Milestone: MK</p> <p>Assessment: -Learner Preparation and Participation</p> <p>Evaluation: CORD Post-test</p>



Appendix A:

Abruptio Placentae & Resuscitative Hysterotomy

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical examination, and evaluation of a patient case with abruptio placentae.
2. Stress the emergent areas of the above sections such as immediate diagnosis and treatment with a large abruption and fetal distress.
3. Review pathophysiology, diagnosis, and treatment of placental abruption.
4. List what circumstances indicate a resuscitative hysterotomy should be performed.
5. Discuss how to perform a resuscitative hysterotomy.
6. Discuss the answers to the questions designed to stress the teaching points of the case.
7. Summarize key learning points of the case.

Case Study - present complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 25-year-old female, G2P0010, with 32-week gestation, presents with complaints of severe suprapubic pain. She is accompanied to the ED by a male friend and is screaming in pain. She does not know her blood type. When pressed for answers, she does admit that she was at a party and she was drinking and snorting cocaine. She has not had any prenatal care.

Past Medical History:

Surgery: Dilation and curettage (D&C) after last pregnancy, 1 year ago

Medical Illnesses: none

Social: Tobacco – denies, alcohol – positive, Drugs of Abuse – marijuana, cocaine

Physical:

Vital signs: 68/40 – 148 – 20 – 98.6

General –well-developed female, screaming and moaning, holding her gravid abdomen

All normal except

Pelvic – external normal, vaginal vault empty, cervix closed, thick and high, uterus halfway between umbilicus and xiphoid process and it is very firm to palpation, fetal heart tones (FHT) 92



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient Management

1. Recognition that this is abruption immediately and that patient is in shock.
2. Starts 2 Large Bore intravenous (IV) lines, gives fluid bolus, places patient on cardiac monitor, applies 15 L mask of oxygen, calls OB and surgical team immediately.
3. Orders complete blood count (CBC), complete metabolic panel (CMP), prothrombin time (PT), partial thromboplastin time (PTT), urine toxicology, serum toxicology, Type and Cross 4 units.
4. Shortly after patient is attached to monitor, heart rate becomes bradycardic and she is unresponsive.
5. Starts Advanced Cardiac Life Support (ACLS) – cardiopulmonary resuscitation (CPR), intubates, gives fluid and epi, no response.
6. Recognizes only has minutes to save fetus and the caesarean section (C-section) will make it possible to control bleeding. Performs perimortem C-section.
7. Removes detached placenta, wipes out uterus and provides direct pressure.
8. Continues ACLS and fluids, maternal heart rate increases, and blood pressure returns.

Question Prompts:

1. What factors are associated with placental abruption?
Maternal hypertension preeclampsia
Increased maternal age increased parity
Smoking thrombophilia
Prior miscarriage prior abruption
Cocaine use
2. What is the number one clinical evidence of abruption? (See slide #2 for visual explanation about why bleeding may not be apparent.)
Uterine tenderness and pain – about 66%
3. What are the complications of abruption?
Depends on the size of the abruption but the complications are:
Uterine irritability
Dropping fibrinogen levels producing disseminated intravascular coagulation (DIC)
Fetal distress and demise
Shock and maternal death
4. What is the sensitivity of US to detect abruption?
About 60%, not a perfect test.
5. How long after an arrest should a perimortem C-section be performed?
a. As soon as possible after maternal cardiac arrest



DIDACTICS AND HANDS-ON CURRICULUM

- b. Viability decreases after 4 minutes of maternal arrest*
 - c. In certain cases, such as abruption placentae, resuscitative hysterotomy may benefit the mother*
6. Indications for perimortem C-section
 - a. Unstable mother such as a trauma victim - the purpose of the perimortem C-section is to stabilize the mother*
 - b. Maternal cardiac arrest with no return of spontaneous circulation in 5 minutes – the purpose is to save the infant*
7. How is a perimortem C-section performed?
 - a. Prep the skin quickly with Betadine or other antiseptic.*
 - b. Vertical Midline incision with a #10 blade from fundal height to symphysis pubis – attempt to cut through all layers of the abdominal wall.*
 - c. Retract the abdominal wall.*
 - d. Avoid bowel and bladder, make vertical incision into the uterine fundus.*
 - e. Insert fingers into the incision, lift the uterine wall from the infant and cut with scissors. Take care not to cut the infant.*
 - f. Deliver the infant, suction mouth and nose, clamp, and cut umbilical cord.*
 - g. Hand infant to other members of the healthcare team.*
 - h. Remove detached placenta and apply direct pressure.*
 - i. Continue resuscitation of the mother.*
 - j. If resuscitation is successful, give broad spectrum antibiotic and close the uterus.*
8. What about checking with an ultrasound or Doppler before beginning the hysterotomy?
Could lose valuable time in having a successful outcome for the infant if the mother is arrested. If the mother is in cardiac arrest and measurement of the fundus is above the umbilicus, don't check and just perform the hysterotomy.

Video of Simulated Procedure: See slide #3 for video address (<https://vimeo.com/77314218>)

References:

- Bioomer R, Reid C, Wheatley R. Prehospital resuscitative hysterotomy. *Eur J Emerg Med.* 2011;18(4):241-242.
- Young JS. Maternal emergencies after 20 Weeks of pregnancy and in the postpartum period. In: Tintinalli. JE Stapczynski J, Ma O, Yealy DM, Meckler GD, Cline DM, eds. *Tintinalli's Emergency Medicine: A Comprehensive Study Guide.* 8th ed. New York, NY: McGraw-Hill; 2016:644-651.
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DIDACTICS AND HANDS-ON CURRICULUM

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Rose CH, Faksh A, Traynor KD, Cabrera D, Arendt Kw, Brost BC. Challenging the 4- to 5-minute rule: from perimortem cesarean to resuscitative hysterotomy. *Am J Obstet Gynecol.* 2015;213(5):653-656. doi: 10.1016/j.ajog.2015.07.019



Appendix B: Ectopic Pregnancy

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a patient case with a possible ectopic pregnancy.
2. Review pathophysiology, diagnosis, and treatment of ectopic pregnancy.
3. Discuss the use of transvaginal versus transabdominal ultrasound in the evaluation of suspected ectopic pregnancy.
4. Discuss the importance and limitations of using the Beta-hCG and the ultrasound together to diagnose ectopic pregnancy.
5. List the indications for the treatment of ectopic pregnancy – methotrexate, surgery, etc.
6. Discuss the answers to the questions designed to stress the teaching points of the case.
7. Summarize key learning points of the case.

Case Study - present complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 26-year-old female, G0P0, presents with complaints of vaginal bleeding with mild left lower quadrant pain. She had some abdominal pain intermittently for last two days but it always resolved and it was not this severe. Today the abdominal pain started two hours prior to admission, sudden onset, constant, left lower quadrant, does not radiate.

Past Medical History:

Last menstrual period (LMP) 8 weeks ago,

Surgery: Tonsillectomy and adenoidectomy

Medical Illnesses: none

Social: Tobacco – denies, alcohol – occasionally, Drugs of Abuse – denies

Physical:

Vital signs: blood pressure 104/76, heart rate 96, respiratory rate, 16, temperature 98.6

PE: normal except mild left lower quadrant tenderness and mild tenderness left adnexa



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient management

1. Do bedside urine hCG to check for pregnancy. Ask what would do if states cannot urinate – can catheterize, can send serum but do not delay. Once pregnancy is confirmed, ectopic pregnancy should immediately be number one in differential. You can also use blood on a urine point-of-care pregnancy test, although this is an off-label use.
2. Start at least one intravenous (IV) line.
3. Can do a complete blood count (CBC) or a point-of-care hemoglobin although she has had minimal bleeding at this point.
4. Need to ask blood type. If does not know, need to do type and Rh.
5. There will be questions later with certain results that will be used to discuss management and disposition.
6. Consider a bedside ultrasound.

Question Prompts:

1. What are the risk factors for ectopic pregnancy? Remember to remind them that half the women with *ectopic pregnancy do not have risk factors.*
Intrauterine device (IUD)
Tubal sterilization
Pelvic inflammatory disease (PID) or sexually transmitted diseases (STDs)
Previous ectopic pregnancy
Older age
Race – more common in African-Americans and other minorities
Infertility treatment
Cigarette smoking
Recent elective abortion (probably a missed ectopic pregnancy at the time of procedure)
2. What are the classical historical factors of ectopic pregnancy?
Delayed menses
Abdominal pain
Vaginal bleeding – about 80% of the time
3. Can a woman have an ectopic pregnancy if she has not missed a period or have vaginal bleeding?
Yes – there will be patients that have never missed a menstrual period nor have vaginal bleeding on presentation.
4. What does radiation of pain to the shoulder imply?
Free fluid in the peritoneal cavity, irritating the diaphragm.
5. Where can ectopic pregnancies occur? (See slide #4 for areas of implantation.)



DIDACTICS AND HANDS-ON CURRICULUM

Implantation occurs in a site other than the endometrial lining of the uterine cavity—in the fallopian tube, uterine cornua, cervix, ovary, or abdominal or pelvic cavity.

6. Describe the pathophysiology of this diagnosis.
The implantation outside the uterus leads to a pregnancy that can grow into the or on the surface of the area that it has implanted. The ectopic pregnancy ruptures the area such as the fallopian tube causing hemorrhage in the area which can be fatal.
7. How often are adnexal masses felt in ectopic pregnancy on bimanual exam?
Only 10% of the time.
8. What tests should the emergency physician use to diagnose ectopic pregnancy?
Ultrasound and hormonal assays.
9. Need to interpret the US correctly. What confirms intrauterine pregnancy (IUP)?
*Double gestational sac
Intrauterine (IU) fetal pole or yolk sac
IU fetal heart activity*
10. What confirms an ectopic pregnancy?
*Ectopic fetal heart activity or
Ectopic fetal pole*
11. What other findings are suggestive of ectopic pregnancy?
*Moderate or large cul-de-sac fluid without intrauterine pregnancy
Adnexal mass without evidence of intrauterine pregnancy*
12. Are these finding significant of ectopic pregnancy?
*Small amount of free pelvic fluid – there is a 52% risk of ectopic pregnancy
Echogenic adnexal mass – 70% risk of ectopic pregnancy
Moderate/large amount of free pelvic fluid – 86% risk of ectopic pregnancy
Any mass plus free fluid – 97% risk of ectopic pregnancy*
13. How do we use the B-hCG hormonal level?
B-hCG levels are used in conjunction with ultrasound findings
14. What is the discriminatory zone for transabdominal ultrasound (US)?
6000 units
15. What is the discriminatory zone for transvaginal ultrasound (TV US)?
1500 units



DIDACTICS AND HANDS-ON CURRICULUM

16. What do these evaluation results determine about diagnosis, management, and disposition?
- If the beta-hCG level is above 1500 units, vital signs are normal, and the uterus is empty, is it very suggestive of an ectopic pregnancy? What should be the disposition?
Ectopic pregnancy versus recent spontaneous abortion.
Follow up in two days for a repeat Beta-hCG to see if it is increasing appropriately. Close follow-up.*
 - Beta-hCG is 3233 units and the TV US demonstrates fetal heart tones (FHT) in the left tube – to OR.*
 - Beta-hCG is 3233 units and the TV US demonstrates IUP – home.*
 - Beta-hCG is 3233 units and the TV US demonstrates IUP of twins but the patient had in vitro fertilization with implantation – discussion of heterotopic pregnancy (1/100) with her doctor and probably close follow-up.*
 - Beta-hCG is 879 units and TV US demonstrates no IUP and small amount of free fluid and vital signs become unstable – to OR.*
 - Beta-hCG is 879 units and TV US demonstrates no IUP and small amount of free fluid and VS are stable. Consult with obstetrics and gynecology, have serial beta-HCG.*
 - Beta-hCG is 1879 units and the TV US demonstrates no IUP and echogenic mass left adnexa and VS become unstable – to the operating room.*
 - Beta-hCG is 1879 units and the TV US demonstrates no IUP and echogenic mass left adnexa and vital signs are stable – consult obstetrics and gynecology. This is a controversial one – most would agree that this is an ectopic pregnancy – admit and do surgery or treat with methotrexate.*

17. What are the indications that methotrexate can be used?

Hemodynamically stable

Unruptured tubal or other ectopic pregnancy

Persistent trophoblast after salpingectomy

Serum quantitative beta-hCG < 5000 IU/L

Size of ectopic mass < 3.5cm

Normal liver function tests (LFTs)

Patient compliance for regular follow ups (average follow up 35 days)

18. What are the exclusion criteria for the use of methotrexate?

Clinically unstable

Severe or persistent abdominal pain or evidence of significant hemoperitoneum on ultrasound scan (>300mL)

The presence of cardiac activity in an ectopic pregnancy

Coexistent viable intrauterine pregnancy (heterotopic pregnancy)

Ectopic mass >3.5 cm (Not an independent predictor of treatment success)

Non-compliant patient / patient living far away from the hospital

Clinically significant renal, hepatic, or hematological impairment

Known hypersensitivity to methotrexate



DIDACTICS AND HANDS-ON CURRICULUM

Immunodeficiency / concurrent use of corticosteroids

19. When does a ruptured corpus luteum cyst occur? What are the symptoms?

Occurs about 7 -8 weeks gestations. Symptoms are vaginal bleeding with peritoneal pain or irritation.

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Appendix C:

Gestational Hypertensive Diseases of Pregnancy

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a pregnant patient with elevated blood pressure.
2. Review pathophysiology, diagnosis, and treatment of hypertensive disorders of pregnancy.
3. Diagnose a case of preeclampsia and eclampsia.
4. Choose the appropriate medications for the treatment of hypertension in pregnancy.
5. List the antihypertensives that should not be used in pregnancy.
6. Discuss the answers to the questions designed to stress the teaching points of the case.
7. Summarize key learning points of the case.

Case Study - present complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 19-year-old female, G1P00, with 34-week gestation, presents with complaints of headache that began gradually, approximately 8 hours ago. She reports the headache is all over her head and throbbing in nature. She took Tylenol with some relief. She has nausea but no vomiting. Of note, she has not seen her obstetrician (OB) since her 21 weeks gestational appointment.

Past Medical History:

Surgery: none

Medical Illnesses: none

Social: Tobacco – positive, alcohol – denies, Drugs of Abuse – denies

Physical:

Vital signs 176/110, heart rate 98, respiratory rate 16, temperature 98.6

General – very uncomfortable with headache.

Extremities – edema of lower extremities below the knee bilaterally and to the hands.

Neurologic – increased reflexes, positive clonus.

Shortly after arrival, she has a seizure.



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient Management

1. Gives valium or other benzo to stop seizure.
2. Check bedside glucose level.
3. Loads with Magnesium 6 gram over 15 minutes, then 2 grams/hour. Monitor reflexes to make sure not toxic.
4. Consider another medication to lower blood pressure if remains elevated after magnesium.
5. Labs – Complete blood count (CBC), liver function tests (LFTs), blood urea nitrogen (BUN), creatinine, check urine toxicology to make sure not due to ingestion.
6. Consider differential to include eclampsia, intracranial hemorrhage, hypoglycemia.
7. Place Foley & monitor urine output – want at 25cc/hr.
8. Perform computed tomography (CT) brain if continues to be altered mentally or neurologic symptoms persist when BP decreases.
9. Contact OB to deliver infant. (don't forget to give intramuscular steroids).

Question Prompts:

1. What is the definition of:
 - a. Pregnancy-induced hypertension (PIH) – *occurs during pregnancy and resolves post-partum.*
 - b. Preeclampsia – *Brand new definition from the American College of Obstetricians and Gynecologists (ACOG) since 12/2013: Preeclampsia is now to be diagnosed by persistent high blood pressure that develops during pregnancy or during the postpartum period that is associated with protein in the urine (there is no set amount of protein) or the new development of decreased blood platelets, abnormalities with the kidney or liver, fluid in the lungs, or signs of symptoms of neurological dysfunction such as seizures and/or visual disturbances.*
 - i. *Mild to moderate high blood pressure (140-159 mm Hg systolic or 90-159 mm Hg diastolic measured on two occasions at least four hours apart) warrants close evaluation and monitoring.*
 - ii. *Severe preeclampsia – High blood pressure greater than or equal to 160 mm Hg systolic or greater than or equal to 110 mm Hg diastolic is a feature of severe preeclampsia. Of course, with symptoms above.*
 - c. Eclampsia – *symptoms above with seizure.*
2. What are the risk factors for pregnancy-induced hypertension (PIH)?

<i>< 20 years of age</i>	<i>Primigravidas</i>
<i>Twin or molar pregnancies</i>	<i>Hypercholesterolemia</i>
<i>Smoking</i>	<i>Family history of PIH</i>
3. What is the pathophysiology of preeclampsia and eclampsia? (See slide #5 for pictorial explanation of the pathophysiology.)



DIDACTICS AND HANDS-ON CURRICULUM

The cause of preeclampsia and eclampsia is unknown but it is believed to be a vasospastic disease in which there is higher than usual cardiac output and developing higher peripheral resistance. Theoretically, possible endothelial dysfunction which responds to the increase in cardiac output by releasing vasoactive mediators that cause vasoconstriction which affects the placenta and other organs. (See slide to show the decreased blood supply to the placenta.)

4. What are complications of eclampsia?
*Injury to maternal organs.
Placental infarction/abruption.
Fetal death from hypoxia or prematurity.*
5. What are the main toxic effects of magnesium?
*Decreased neuro reflexes and hypotonia.
Depressed respirations and respiratory arrest – level > 12mg/dL.*
6. What should be done if hypermagnesemia occurs?
Stop the infusion. Provide ventilatory support if needed.
7. What is the antidote for hypermagnesemia?
Calcium gluconate, 1 gram intravenous push.
8. When a patient has a seizure, what is the first test that should be performed?
*Bedside glucose.
Pulse Oximetry.*
9. What medications can be used for a blood pressure that remains over 105 mmHg diastolic after magnesium has been loaded?
*Hydralazine – 5 mg intravenously and can be repeated every 20 minutes in doses of 5 mg – 10 mg to achieve a blood pressure of less than 105 mm Hg diastolic.
And either labetalol – 20 mg administered intravenously over 2 minutes, can be doubled every 10 minutes until an appropriate blood pressure is obtained or a total of 300 mg is given.
Or nifedipine, 30 – 60 mg by mouth. Since it is by mouth, nifedipine does not have a rapid onset as do the intravenous medications.*
10. What medications can be used to control blood pressure of pregnant females with persistent hypertension and no signs of preeclampsia? This is for women who persistently remain with a blood pressure > 160/110 mmHg.
 - a. First line
 - i. *Methyldopa: Initial dose is 250 mg orally 2-3 times a day. Maintenance dose is 500 mg to 2 g orally divided in 2 to 4 doses, up to a maximum of 3 g/day.*
 - ii. *Labetalol: Initial dose is 100 mg orally 2 times a day.*



DIDACTICS AND HANDS-ON CURRICULUM

b. *Second line – calcium channel blockers. The most frequently used calcium channel blocker is nifedipine used in the dosages above.*

11. What medications should not be used in pregnancy and why?

a. *Angiotensin converting enzyme inhibitors (ACE Inhibitors).*

b. *Angiotensin Receptor Blockers.*

Use of these drugs in the first trimester are associated with an increase in the fetal abnormalities that are higher than in women not taking these medications. Most common abnormalities are cardiac and nervous system. Use of the drugs in the second or third trimester have been associated with renal failure, oligohydramnios, pulmonary hypoplasia, calvarial abnormalities, and fetal growth retardation.

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Appendix D:

HELLP syndrome and other Gestational Liver Disorders

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a pregnant patient with possible gestational liver disease.
2. Review pathophysiology, diagnosis, and treatment of HELLP and liver disorders.
3. Discuss the controversy concerning whether HELLP should be included with hypertensive diseases of pregnancy or a separate entity.
4. Discuss the answers to the questions designed to stress the teaching points of the case.
5. Summarize key learning points of the case.

Case Study - present complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 25-year-old F, G3P1102, with a 28-week gestation, who presents with complaints of abdominal pain. The patient has a past medical history of gestational hypertension, which is being treated with methyldopa. Her abdominal pain began two days ago, started mildly and then progressively became worse. The pain is located in the epigastric area and right upper quadrant (RUQ) and does not radiate. She vomited once undigested food but there was no blood in the emesis. She denies having fever.

Past Medical History:

Surgery: Tonsillectomy & adenoidectomy, Caesarean section (C- section) to deliver infant during last pregnancy at 34 weeks for severe preeclampsia.

Medical Illnesses: Hypertension (HTN), as above.

Social: Tobacco – denies, alcohol – denies, Drugs of Abuse – denies.

Physical:

Vital signs: Blood pressure 160/96, heart rate 76, respiratory rate 16, temperature 98.6.

General –well-developed female, mildly uncomfortable, does not look particularly ill.

All normal except:

Abdomen – tender RUQ and epigastric area, equivocal Murphy’s, active bowel sounds.

Pelvic – external normal, vaginal vault empty, cervix closed, thick and high, uterus height is just above the umbilicus and nontender, adnexa are normal, fetal heart tones (FHT) 164 bpm.



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient Management

1. Starts intravenous (IV) line, send labs of complete blood count (CBC), complete metabolic panel (CMP), liver function tests (LFTs) including bilirubin and lactate dehydrogenase (LDH), urinalysis, lipase.
2. Considers differential of appendicitis, gastritis, peptic ulcer disease, cholecystitis, biliary colic, HELLP.
3. Performs ultrasound given differential of possible biliary disease.
4. Gives pain medications – can start with acetaminophen, may use morphine (no nonsteroidal anti-inflammatory drugs (NSAIDs)). May give Maalox to see if pain changes.
5. Recognizes HELLP when hemoglobin (Hgb) is 8.2, LDH is 962 U/L, aspartate aminotransferase (AST) is 143, platelet count is 48,000. Complete Metabolic Panel (CMP) is normal.
6. Consults obstetrician (OB).
7. Admits patient to the hospital.

Question Prompts:

1. What is HELLP?

Hemolysis

Elevated Liver enzymes

Low Platelet count

The definition is not agreed upon and there are 2 classifications. This is the University of Tennessee definition:

- i. Complete Syndrome includes:
hemolytic anemia present on the peripheral smear and an
LDH>600U/L
elevated liver enzymes (AST >70)
thrombocytopenia (platelet count <100K)*
- ii. Partial HELLP – severe preeclampsia with one or two features but not all three.*

2. When should HELLP be considered?

In any pregnant female with abdominal pain, especially pain in the right upper quadrant.

3. What is the pathophysiology of HELLP?

HELLP is grouped in the diseases of hypertension along with preeclampsia and eclampsia. The cause of preeclampsia and eclampsia is unknown but is believed to be due to endothelial dysfunction and release of vasoactive substances causing vasoconstriction. The classification of HELLP is controversial and some believe that HELLP is an entity that is separate from gestational hypertensive diseases such as preeclampsia and eclampsia. The above hypothesis about the pathophysiology of preeclampsia, eclampsia, and HELLP is one of many due to this controversy.



DIDACTICS AND HANDS-ON CURRICULUM

4. What are the risk factors for HELLP?
34 years of age.
Multiparity.
White race or European descent.
History of poor pregnancy outcome.

5. What are the symptoms of HELLP?
Nausea/vomiting.
Epigastric and/or right upper quadrant pain.
Headache.
Visual changes.
Jaundice.

6. What is the most frequent drug mistakenly given to a patient with HELLP?
Maalox or other antacid due to the epigastric and/or right upper quadrant pain.

7. What labs abnormalities are seen with HELLP?
CBC – anemia and schistocytes
Platelets – thrombocytopenia.
AST & alanine aminotransferase (ALT) – elevated, AST >70 IU/L.
Normal or elevated blood urea nitrogen (BUN) or creatinine.
Coagulation profile – normal or abnormal.
LDH - >600 IU/L.
Uric acid - > 6.0.
Bilirubin – increase in indirect.

8. What is the treatment for HELLP?
Admit.
Observe, follow the blood pressure and laboratory values.
Deliver the patient at 34 weeks if the patient is able to continue the pregnancy without serious complications. Once the female with HELLP progresses to 34 weeks, the disease usually rapidly progresses after that date and delivery becomes a problem because of the tendency to have hemorrhage during delivery due to thrombocytopenia. Thrombocytopenia makes a C-section difficult to perform because of the possibility of hemorrhage. Having the mother labor and plan for a vaginal delivery also places the mother at risk for hemorrhage.

9. What does hypoglycemia mean if the patient has HELLP?
Severe liver failure.

10. What are the other liver diseases of pregnancy?



DIDACTICS AND HANDS-ON CURRICULUM

Acute Fatty Liver of Pregnancy – this is a rare disease which occurs in the third trimester. It is caused by deficiency of liver enzyme causing increased levels of long-chain fatty acids. The disease has similar symptoms as HELLP. The symptoms are nausea, vomiting, headache, anorexia, fatigue. On physical exam, the liver is tender. The disease can progress to coagulopathy, jaundice, seizures, and hepatic coma. The patients can become hypoglycemic and demonstrate hepatic encephalopathy. Two-thirds of the patients with this disease develop renal failure. The disease can be fatal. The treatment is always delivery.

Intrahepatic cholestasis of pregnancy which is rare. The etiology of the disease is unknown. The pathophysiology demonstrates failure in the uptake of bile acid by hepatocytes. The patient with this disease complains of itching long before any other symptom. The itching usually starts on palms and soles and then spreads to the rest of the body. Other symptoms are rare. The patient then becomes jaundiced with elevated bilirubin levels (rarely above 5 mg/dL), elevated alkaline phosphatase (7-10 fold) but has normal transaminases. The disease is not fatal but associated with preterm labor, meconium staining, and fetal demise. The condition usually resolves after delivery.

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Appendix E:

Hyperemesis Gravidarum

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a pregnant patient with complaints of nausea and vomiting.
2. Differentiate the difference between nausea and vomiting of pregnancy and hyperemesis gravidarum.
3. Review pathophysiology, diagnosis, and treatment of hyperemesis gravidarum.
4. Choose the correct disposition of a patient with hyperemesis gravidarum.
5. Recognize when the differential should be expanded in a pregnant patient with nausea/vomiting.
6. Discuss the answers to the questions designed to stress the teaching points of the case.
7. Summarize key learning points of the case.

Case Study - present the complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 22-year-old female, G1P0, with 9-week gestation, without known chronic medical illnesses who presents with complaints of vomiting. She vomits every day, multiple times, undigested food. It has become worse in the last week. She denies diarrhea. Complains of crampy abdominal pain. She did not take her temperature at home. She has lost 3 pounds since her last visit to the OB.

Past Medical History:

Last menstrual period (LMP): 11 - 12 weeks ago,

Surgery: Lipoma removal

Medical Illnesses: none

Social: Tobacco – denies, alcohol – denies, Drugs of Abuse – denies

Physical:

Vital signs: Blood pressure 104/76, heart rate 112, respiratory rate 16, temperature 98.6

Normal. Pelvic and Abdominal exam are normal



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient Management

1. Must recognize hyperemesis by history (intermittent vomiting becoming more persistent), loss of weight and lab values (slightly increased blood urea nitrogen (BUN) and positive ketones in the urine with specific gravity of 1.030 which demonstrates volume loss and dehydration).
2. Order labs. Electrolytes to check for abnormalities especially low sodium and potassium, increased BUN. Urinalysis to check for urinary tract infection (UTI), specific gravity and presence of ketones, complete blood count (CBC) to check for anemia if undernourished. If the patient had abdominal pain can do lipase for pancreatitis and liver function tests (LFTs) for hepatitis. LFTs can be a little elevated in hyperemesis. Abdominal pain is unusual in hyperemesis and other diagnoses should be considered.
3. Order ultrasound (US) to check for multiple births or molar pregnancy if has not had US confirming intrauterine pregnancy (IUP).
4. Treat correctly with fluid with dextrose and antiemetics.

Question Prompts:

1. When is the peak incidence of hyperemesis? When does it resolve?
Vomiting in pregnancy begins usually about 6 weeks but every pregnancy is different. This patient has been vomiting since the pregnancy began. Hyperemesis usually becomes worse at approximately 8 – 12 weeks and resolves by 20 weeks.
2. What is the definition of hyperemesis gravidarum?
Severe nausea and vomiting associated with weight loss, fluid depletion, and/or laboratory abnormalities such as hypokalemia, ketonemia, etc.
3. What is the differential?

<i>Appendicitis</i>	<i>Ovarian torsion</i>
<i>Cholecystitis & Biliary colic</i>	<i>Pancreatitis</i>
<i>Diabetic Ketoacidosis (DKA)</i>	<i>Pregnancy, preeclampsia</i>
<i>Gastritis & peptic ulcer disease</i>	<i>Urinary Tract Infection</i>
<i>Gastroenteritis</i>	<i>Hepatitis</i>
<i>Small bowel obstruction</i>	<i>Hyperemesis</i>
4. What is the pathophysiology of hyperemesis gravidarum?
The pathophysiology of hyperemesis is unknown at this time.
5. What conditions are associated with hyperemesis gravidarum?
Molar pregnancy.
Multiple gestations.



DIDACTICS AND HANDS-ON CURRICULUM

6. What fluids should be used with hyperemesis?

Saline or Lactated Ringer's solution (LR) are standard but added dextrose prevents fat breakdown and helps clear ketones from the serum.

7. When should the fluids be stopped?

When ketones are largely reduced from the urine and the patient can take food or fluids orally.

8. What antiemetics are safe?

Most antiemetics are Class C drug and considered safe.

American College of Obstetricians and Gynecologists (ACOG) recommend pyridoxine (Vitamin B6) and doxylamine as the first choice of medication for treatment. This combination is offered as an oral tablet called Diclegis. The antihistamine, doxylamine, can also be found in over-the-counter sleep medications.

Selective Serotonin (5-HT) antagonists – generally safe. There are no adequate studies to determine the ultimate fetal safety of these drugs. They work as effectively as other antiemetics.

- *Ondansetron (Zofran)*
- *Dolasetron (Anzemet)*
- *Granisetron (Sancuso, Granisol)*

Dopamine antagonists – again there is no conclusive study demonstrating safety of these products but are generally considered safe.

- *Promethazine (Phenergan)*
- *Prochlorperazine (Compazine)*
- *Metoclopramide (Reglan)*

Ginger capsules have been used and are effective.

Steroids are the final drug but should not be given without consultation of obstetrician.

9. What are the complications of hyperemesis?

Wernicke encephalopathy from vitamin B-1 deficiency.

Mallory-Weiss tears.

Esophageal rupture.

Pneumothorax.

Acute tubular necrosis.

10. Who gets admitted? IF the patient has:

Persistently abnormal vital signs.

Severe dehydration and inability to tolerate oral fluids.

Severe electrolyte abnormality.

Acidosis.

Infection.

Malnutrition.

Any of the complications.



DIDACTICS AND HANDS-ON CURRICULUM

11. If the patient is discharged, what medications can be prescribed for treatment?

Antiemetics and pyridoxine.

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Appendix F:

Molar Pregnancy (Gestational Trophoblastic Disease)

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a pregnant patient with the complaint of vaginal bleeding.
2. Recognize when a molar pregnancy is suspected.
3. Review pathophysiology, diagnosis, and treatment of a molar pregnancy.
4. Choose the correct disposition of a patient with a molar pregnancy.
5. Discuss the answers to the questions designed to stress the teaching points of the case.
6. Summarize key learning points of the case.

Case Study – present the complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 39-year-old female, G3P2002, with a 12-week gestation, without known chronic medical illnesses who presents with complaints of vaginal bleeding. The bleeding began the day prior to admission but she has only used pantliners. She is complaining of severe suprapubic cramping. The only other complaint is multiple visits to the obstetrician for persistent vomiting. Denies fever, urinary tract infection symptoms, etc.

Past Medical History:

Surgery: Denies

Medical Illnesses: none

Social: Tobacco – denies, alcohol – socially, Drugs of Abuse – denies

Physical:

Vital signs: blood pressure 104/76, heart rate 112, respiratory rate 16, temperature 98.6.

Constitutional – Slightly obese female, looks stated age, very uncomfortable.

Normal except:

Abdominal: active bowel sounds, gravid uterus with uterine size almost to level of umbilicus, tender over the uterus.

Pelvic: round-like structures seen in the vaginal vault, small amount of blood in the vaginal vault, cervix open approximately 2 cm, uterus size is larger than dates, no adnexal masses or structures noted.



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient Management

1. Perform history and physical including pelvic examination.
2. Must recognize possibility of molar pregnancy by the physical findings of enlarged uterus for dates and the cystic structures in the vaginal vault.
3. Order labs. Complete blood count (CBC) and quantitative Beta-hCG.
4. Ask about blood type and if does not know, order type and Rh factor.
5. Order intravenous line, give fluids, pain medication.
6. Order ultrasound (US).
7. Consult obstetrics and gynecology for dilation and curettage (D&C).

Question Prompts:

1. What is the pathophysiology of molar pregnancy?
The pathophysiology of a molar pregnancy is disordered proliferation of chorionic villi. There is a spectrum of gestational trophoblastic disease with the minor presentation being a molar pregnancy without invasion of the uterine tissue or the molar pregnancy can be invasive. The invasive type is known as choriocarcinoma.
2. Define complete mole. (See slide # 6 for spectrum of trophoblastic diseases)
A complete molar pregnancy is the complete absence of fetal tissue.
3. Define incomplete mole.
An incomplete molar pregnancy shows that fetal tissue is present but it has a focal distribution.
4. What is the risk factor for molar pregnancy?
The risk factor is extremes of age.
5. What are the symptoms of molar pregnancy?
The symptoms are:
Abdominal pain
Nausea/vomiting – hyperemesis gravidarum
Vaginal bleeding (can have a red currant consistency)
6. What is the physical sign of a molar pregnancy?
The patient will have an enlarged uterus for dates.
7. Which of the characteristics of a molar pregnancy does the case study patient have?
The characteristics of the patient in this case are:
Persistent nausea and vomiting
Vaginal Bleeding



DIDACTICS AND HANDS-ON CURRICULUM

Uterus larger than dates

8. How is gestational trophoblastic disease diagnosed?

More frequently by US by identifying cystic structures in the uterus (See slide #7 for picture of US image).

Sometimes not diagnosed until products are sent to pathology (See slide for appearance of molar tissue).

9. What are the complications of molar pregnancy?

The complications are:

Preeclampsia

Eclampsia

Pulmonary embolization of trophoblastic tissue

Hyperemesis gravidarum

Significant uterine bleeding

10. What is the appearance of a molar pregnancy on ultrasound?

On ultrasound, a molar pregnancy has the appearance of cystic structures. The ultrasound is only approximately 58% sensitive for detection of this condition.

11. If bilateral large ovarian cysts are seen on ultrasound, what is the significance of that?

Bilateral large ovarian cysts noted on ultrasound are known as theca lutein cysts. The definition of theca lutein cysts are large ovarian cysts with straw-colored fluid caused by elevated levels of Beta-hCG.

12. Here's a mnemonic to help remember the characteristics of molar pregnancy. The mnemonic is, "HYDATIDIFORMS" ¹:

hCG increased

Hypertension (And features of pre-eclampsia seen in 50%)

Yuck! Vomiting (Due to excess chorionic gonadotropin)

Dyspnea (Pulmonary embolism of trophoblastic cells)

Abdominal pain (Due to overstretching, hemorrhage, infection, perforation, or contractions)

Thyrototoxic features like tremors and tachycardia (Because chorionic thyrotropin is increased)

Increased size of uterus

Doughy, elastic feel of uterus (Due to absence of amniotic fluid sac)

Internal ballottement cannot be elicited

Fetal heart sounds absent, fetal parts not felt

Ovaries enlarged (Due to theca lutein cysts)

Red currant jelly discharge (Commonest presentation is vaginal bleeding, described as "White currant in red currant juice")

Molar tissue expulsion (Grape-like vesicles per vagina)

Methotrexate for metastatic mole



DIDACTICS AND HANDS-ON CURRICULUM

Snow storm appearance on ultrasound (But you must remember that definitive diagnosis is made by histological examination of products of conception)

Suction evacuation, surgical curettage is treatment

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Appendix G: Placenta Previa

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a pregnant patient with the complaint of vaginal bleeding.
2. Recognize when a placenta previa is suspected.
3. Review pathophysiology, diagnosis, and treatment of placenta previa.
4. Choose the correct disposition of a patient with placenta previa.
5. Discuss the answers to the questions designed to stress the teaching points of the case.
6. Summarize key learning points of the case.

Case Study - present the complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 27-year-old female G2P1001, with 30-week gestation, without known chronic medical illnesses who presents with complaints of vaginal bleeding which began one hour prior to admission.

History: The patient has had episodes of prior bleeding which all have been self-limited. She had an ultrasound (US) which demonstrated a low-lying placenta at 26 weeks. She has been on bed rest for the last 3 weeks at home.

Past Medical History:

Surgery: Caesarean section (C-section) last child for failure to progress

Medical Illnesses: none

Social: Tobacco – denies, alcohol – socially before pregnancy, Drugs of Abuse – denies

Physical:

Vital signs: Blood pressure 104/76, heart rate 110, respiratory rate 16, temperature 98.

Physical exam: normal except bright red blood dripping slowly from vaginal vault, uterus between umbilicus and xyphoid process.

Fetus: 152 beats per minute (BPM).



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient Management

1. Identify possible placenta previa and do not perform a bimanual exam.
2. Start two intravenous (IV) lines and give fluid bolus since the patient is tachycardic.
3. Perform baseline complete blood count (CBC), prothrombin time (PT), partial thromboplastin time (PTT), type & screen, fibrinogen level and fibrin split products (FSP).
 - a. Normal fibrinogen in pregnancy is 400-450 mg/dL; anything below 300 demonstrates a defect in coagulation.
4. Check fetal heart tones immediately.
5. Place on tocometer.
6. Consult obstetrician emergently.

Question Prompts:

1. What are the risk factors for placenta previa?

The risk factors are:

Multiparity

Prior C-section

Maternal age

Preterm Labor

2. What is the pathophysiology of placenta previa?

The pathophysiology is an implantation of the placenta over the cervical os. The vessels in the placenta can bleed when lower uterine wall elongates or with cervical dilatation.

3. What types of placenta previa are there?

There are 3 types of placenta previa:

Low-lying placenta

partial previa

complete previa (see slide # 8 for picture)

4. Do patients with placenta previa develop preterm labor?

Yes, about 20% of patients with placenta previa develop preterm labor.

5. What is the most common symptom of placenta previa?

The most common symptoms of placenta previa is painless vaginal bleeding.

6. Why do we not do a speculum or digital probing of the cervix? When should such an exam be done?

Performing a speculum or digital exam of the cervix can exacerbate bleeding and the patient will develop a severe hemorrhage. The vaginal exam should be performed when there is a double set-up in an operating suite. The double set up means that there is equipment to perform a vaginal delivery as



DIDACTICS AND HANDS-ON CURRICULUM

well as a cesarean section (C-section). If the patient begins to hemorrhage due to the exam, a crash C-section can be performed if this develops.

7. What test is the method of choice for diagnosing placenta previa?
*The method of choice to diagnose placenta previa is ultrasound. A transvaginal ultrasound can be used to diagnose this condition although the textbook does not say at what stage of pregnancy that this can be done. Remember, after 20 weeks of gestation and a placenta previa is suspected, objects should not be placed in the vaginal vault.
Ultrasounds can be performed to monitor the type of placenta previa present and if there is any accumulation of blood.
Also, the bladder should be emptied before the ultrasound is performed for placenta previa which is unlike performing an ultrasound checking for ectopic pregnancy in which a full bladder is desired for accuracy of that ultrasound.*
8. What is used to treat coagulopathy if a placenta previa is found?
Intravenous fresh frozen plasma (FFP)
9. What treatment should be given if the mother is Rh-negative?
Rho (D) Immunoglobulin (Rhogam or Rhophylate) is given to prevent Rh Sensitization of the mother.
10. What is the disposition of this patient?
If the previa is partial and mild and the fetus is not in distress, the patient can be admitted to labor and delivery and the patient is continuously monitored.
11. What if the fetus is in distress or the hemorrhage is significant?
Emergent consultation with an obstetrician and possible emergent C-section is the treatment.
12. What if fetus is doing well and hemorrhage is not significant but the mother is found to be having preterm labor?
The treatment is consultation with obstetrician, give intramuscular steroids (for maturation of the fetal lungs in case delivery will occur), and administer tocolytics to attempt to stop labor. If the gestation is 36 weeks or greater than consideration can be given to delivering the fetus depending on the size of the previa.

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Appendix H: Preterm Labor and Premature Rupture of the Membranes

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a pregnant patient with symptoms of suspected preterm labor and premature rupture of the membranes.
2. Diagnose preterm labor and know when to attempt to stop progression of the labor.
3. Diagnose premature rupture of the membranes.
4. Choose the correct disposition of a patient with premature labor and/or premature rupture of the membranes.
5. Discuss the answers to the questions designed to stress the teaching points of the case.
6. Summarize key learning points of the case.

Case study - present the complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 41-year-old female, G1P0, 28-week twin gestation, presents to the emergency department with complaints of abdominal pain and back pain that began 40 minutes prior to admission. The patient had one similar episode two weeks ago and was hospitalized for two days and treated for urinary tract infection and discharged. When asked, she denies rupture of the membranes and vaginal bleeding, but endorses contractions that occur every four minutes.

Past Medical History

Surgery: in vitro fertilization

Medical Illnesses: none

Social: Tobacco – denies, alcohol – denies, Drugs of Abuse – denies

Physical:

Vital signs: Blood pressure 104/76, heart rate 76, respiratory rate 16, temperature 98.6.

Normal except tender over the uterus on exam, uterus is palpated between umbilicus and xyphoid process, external genitalia normal, vaginal vault empty, no fluid in the vaginal vault, cervix is open 1 cm.



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points

Patient Management

1. Obtain history of contractions and prenatal care of this pregnancy and possible previous complications.
2. Perform physical.
3. Determine the timing of the contractions, perform pelvic using sterile gloves, checking for amniotic fluid and dilatation, effacement, and station.
4. Place on tocometer.
5. Recognize preterm labor, consult with obstetrics, and start tocolytics (they are listed below).
6. Give single dose of intramuscular steroid for fetal lung maturity.
7. Transfer to Labor and Delivery following Emergency Medical Treatment and Labor Act (EMTALA) regulations.

Question Prompts:

1. Define preterm labor

Preterm labor is uterine contractions before 37 weeks.

2. What are the factors linked to preterm labor?

Demographic & Psychosocial factors for preterm labor are:

*Extremes of age (>40, teens)
Lower socioeconomic status
Tobacco and/or cocaine use
Prolonged standing
Psychosocial stressor*

Reproductive & gynecologic factors for preterm labor are:

*Prior preterm labor
Diethylstilbestrol (DES) exposure
Multiple gestations
Anatomic endometrial cavity anomalies (bicornuate uterus)
Cervical incompetence
Low pregnancy weight gain
First-trimester vaginal bleeding
Placental abruption or previa*

Surgical factors for preterm labor are:

*Prior reproductive organ surgery
Prior paraendometrial surgery other than genitourinary surgery (appendectomy)*

Infections that can cause preterm labor are:

*Urinary Tract Infection
Nonuterine infections
Genital tract infections (bacterial vaginosis)*



DIDACTICS AND HANDS-ON CURRICULUM

3. How do you tell Braxton-Hicks from preterm labor?

Distinguishing between Braxton-Hicks from preterm labor is best done with a tocometer. An ultrasound study can be used and if fetus is making fetal breathing movements, it is unlikely that preterm labor is present.

4. What are the normal characteristics of fetal heart tones?

Fetal heart tone rate is approximately 100 – 160 beats per minute (BPM) and should have a variable pattern.

5. What pattern of fetal heart tones are normal and which ones are concerning? See slides for pictures of the fetal heart tones.

Slide #9 (On the left): This slide demonstrates a tracing of early deceleration in a patient with an unremarkable course of labor. Notice that the onset and the return of the deceleration coincide with the start and the end of the contraction, giving the characteristic mirror image.

Slide #9 (On the right): This slide demonstrates a non-reassuring pattern of late decelerations with preserved beat-to-beat variability. Note the onset at the peak of the uterine contractions and the return to baseline after the contraction has ended. The second uterine contraction is associated with a shallow and subtle late deceleration.

Slide #10: This slide demonstrates variable decelerations that are shown by an acute fall in the fetal heart rate with a rapid downslope and a variable recovery phase. They are characteristically variable in duration, intensity, and timing. They resemble the letter "U," "V" or "W" and may not bear a constant relationship to uterine contractions. They are the most commonly encountered patterns during labor and occur frequently in patients who have experienced premature rupture of membranes and decreased amniotic fluid volume. Variable decelerations are caused by compression of the umbilical cord. Pressure on the cord initially occludes the umbilical vein, which results in an acceleration (the shoulder of the deceleration) and indicates a healthy response. This is followed by occlusion of the umbilical artery, which results in the sharp downslope. Finally, the recovery phase is due to the relief of the compression and the sharp return to the baseline, which may be followed by another healthy brief acceleration or shoulder.

6. When should preterm labor not be stopped?

Preterm labor should not be stopped if:

The mother is critically ill OR

Fetal compromise is present OR

Major congenital anomalies are present OR

Intrauterine infection is present OR

Placental abruption is occurring OR

The mother has eclampsia OR

Significant cervical dilation signifying active labor is present OR



DIDACTICS AND HANDS-ON CURRICULUM

*Premature Rupture of the membranes has occurred OR
Fetal demise is present.*

7. What treatment is available to stop preterm labor?

The treatment includes

- a. *Give intravenous fluids first.*
- b. *Consult an obstetrician.*
- c. *Administer tocolytic medications. The following medications are all tocolytics and can be used to terminate labor.*
 - i. *Magnesium sulfate 4 -6 g bolus over 30 min then 2-4g/hour*
 - ii. *Terbutaline 5 - 10 mg orally (PO) every 4-6 hours
0.25 mg Subcutaneous every 20 minutes
0.010-0.080 mg/min intravenous (IV)*
 - iii. *Ritodrine 10 mg PO q 2-4h
0.050-0.350 mg/min IV*
 - iv. *Isoxsuprine 20 mg PO q 6h
0.2-0.5 mg/min IV*

8. What are the major adverse reactions of magnesium?

The major adverse reactions of magnesium are respiratory and neurologic depression.

9. What are the major adverse reactions of Beta-mimetics such as terbutaline?

The major adverse reactions of Beta-mimetics are:

Maternal Tachycardia & Pulmonary edema due to high output failure.

Fetal tachycardia.

Maternal hyperglycemia if the mother is diabetic.

10. What should you consider if there is clear fluid in the vaginal vault? How is that tested?

PROM (premature rupture of the membranes) is defined as when the rupture of the chorionic and amniotic membranes occurs before labor begins (but after 37 weeks gestation).

PPROM (premature premature rupture of the membranes) is defined as premature rupture of the membranes that occurs before 37 weeks gestation.

Several tests can be done to check for premature rupture of the membranes.

- a. *Slide # 11 - A strip of nitrazine can be placed in the vaginal vault. If the strip turns blue (alkalotic) then it is positive for amniotic fluid. (See Slide #10 for picture of nitrazine and description of procedure.)*
- b. *There is a swab that can be used and if it turns blue, that is considered to be positive for amniotic fluid. (See Slide #12 for picture of the swab.)*
- c. *A specimen of the vaginal fluid can be examined with a microscope and if ferning is present, then it is considered to be positive for amniotic fluid. (See slide #13.)*



DIDACTICS AND HANDS-ON CURRICULUM

- d. *Collect some of the amniotic fluid on a slide, apply a flame to the fluid, and if the fluid turns white and crystallizes, it is amniotic fluid. If the vaginal vault fluid caramelizes and turn brown, it signifies that it is normal vaginal secretions.*

11. How does premature rupture of the membranes (PROM) change management?

The clinician needs to:

- a. *Decrease number of vaginal exams to decrease incidence of infection.*
- b. *Collect B-strep cultures, gonorrhea, & Chlamydia.*
- c. *Order antibiotics; although controversial, it does appear to have positive effect on delaying labor and decreasing morbidity and mortality.*
- d. *Can consider giving tocolytics to delay delivery so that lungs have chance to mature after steroids are given.*

12. How do the Emergency Medical Treatment and Labor Act (EMTALA) regulations affect those in preterm labor?

EMTALA does not allow women to be transferred who are in active labor. Active labor is occurring when the cervix is dilated beyond 3 cm. Most patients with preterm labor have a closed cervix and can be transferred by ambulance to the hospital at which their obstetrician is on staff or to a hospital that has a labor and delivery.

If an emergency medicine (EM) physician is working in an emergency department (ED) in a hospital that does not have a labor and delivery (L&D), the hospital should have an agreement with a tertiary center with a L&D to which they can transfer the patient.

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Appendix I: Postpartum Hemorrhage

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a patient with postpartum hemorrhage.
2. Diagnose the emergent nature of the condition and begin management immediately in an organized manner to determine and stop the hemorrhage.
3. Discuss the answers to the questions designed to stress the teaching points of the case.
4. Summarize key learning points of the case.

Case Study - present the complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 42-year-old F, G7P6006, with 40-week gestation, presents with complaints that she is delivering and could not make it to the hospital where her obstetrician (OB) is on staff. She was brought by husband in a car. She has a precipitous delivery just after arrival. The emergency medicine physician had no difficulty delivering the infant vaginally. The infant was examined and no abnormalities were found and remains stable. The obstetrician and neonatologist are on the way to the emergency department (ED). The placenta is delivered by the emergency medicine physician. Pitocin is begun (20 Units in 1 liter of saline at 150 milliliters per hour). The nurse comes to get the physician because patient is feeling weak and when the nurse checked there was a lot of blood on the stretcher.

Past Medical History

Surgery: none

Medical Illnesses: none

Social: Tobacco – denies, alcohol – denies, Drugs of Abuse – denies

Physical:

Vital signs: blood pressure 88/42, heart rate 116, respiratory rate 16, temperature 98.6.

General –well-developed, pale female, slightly lethargic

Skin – pale, diaphoretic

Lungs - clear

Cardiovascular – tachycardic, normal heart tones, capillary refill greater than 4 seconds, weak pulses

Abdomen – soft, large uterus, tender to palpation



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient Management

1. Treat the tone. Increase the rate of the Pitocin. Pitocin is begun after the delivery of an infant and placenta and the rate can be increased if bleeding occurs.
2. Give Prostaglandins (Dinoprostone, Misoprostol).
3. Have nurse massage the uterus.
4. Start a second line, place the patient on the monitor, apply oxygen.
5. Send blood to the lab for Complete blood count (CBC), prothrombin time (PT), partial thromboplastin time (PTT), type and cross, fibrin split products, fibrinogen.
6. Call for assistance from obstetrician.
7. Search for a trauma cause to bleeding such as tears of the perineum, rectum, cervix, vagina, vulva, urethra.
8. If continues to bleed, the physician should search manually with a sterile glove to make sure that all parts of the placenta have been removed.
9. Uterine Packing – This is not used very often anymore. The procedure is to place 15 – 20 yards of 4-inch gauze with a ring forceps into the uterine cavity, in a layering technique. Can use a special balloon to provide tamponade. (Slide #17)
10. Another method is to press on the aorta to decrease flow to pelvis.
11. When everything else fails, pelvic vessel embolization can be performed by interventional radiology or a hysterectomy can be performed by an obstetrician.

Question Prompts:

1. What is the definition of postpartum hemorrhage?
The definition of postpartum hemorrhage is hemorrhage after delivery in excess of 500 ml.
2. How are postpartum hemorrhages classified?
The classifications are immediate and delayed.
3. What is the difference between immediate and delayed?
*An Immediate postpartum hemorrhage is defined as blood loss in the first 24 hours.
A delayed postpartum hemorrhage is defined as blood loss that occurs between 24 hours and 6 weeks.*
4. What are the predisposing factors for postpartum hemorrhage? (4 T's and other)
 - a. *Thrombin – Short name to remember that Disseminated Intravascular coagulation (DIC) can be caused by the following 4 conditions:*
 - i. *Pre-eclampsia*
 - ii. *Placental abruption*
 - iii. *Pyrexia in labor*
 - iv. *Bleeding disorders: hemophilia, anticoagulation, von Willebrand disease*



DIDACTICS AND HANDS-ON CURRICULUM

- b. *Tissue – this is to remind the physician that retained tissue can be a source of bleeding. (See Slide #16 for examples of abnormal attachment of the placenta.)*
 - i. *Retained placenta*
 - ii. *Placenta accreta – placenta adheres without the intervening decidua basalis*
 - iii. *placenta percreta – villi extend into the myometrium*
 - iv. *placenta increta – villi extend full thickness through the myometrium*
 - v. *Retained products of conception (RPOC)*
- c. *Tone (laxity of the uterus after delivery) – this is responsible for approximately 75 - 90% of postpartum hemorrhage. Risk factors for developing decreased tone of the uterus are:*
 - i. *Placenta previa*
 - ii. *Over-distention of the uterus, multiple pregnancies, polyhydramnios*
 - iii. *Uterine relaxants*
 - iv. *Previous postpartum hemorrhage*
- d. *Trauma – accounts for 20% of cases of postpartum hemorrhage. The woman is bleeding from trauma that occurred during delivery.*
 - i. *Caesarean section (C-section) – there may be bleeding of organs or vessels that are lacerated during the procedure.*
 - ii. *Episiotomy – can bleed from the area of the episiotomy.*
 - iii. *Macrosomia (>4 kg) – can result in tearing or bruising of any part of the birth canal.*
- e. *Other factors placing women at risk for postpartum bleedings.*
 - i. *Asian ethnicity*
 - ii. *Anemia*
 - iii. *Induction*
 - iv. *Body mass index >35*
 - v. *Prolonged labor*
 - vi. *Age*

5. What are the predisposing factors for vaginal trauma?

The predisposing factors for vaginal trauma are:

Uncontrolled delivery

Macrosomia

Malpresentation

6. What is the organized method of stopping postpartum hemorrhage?

a. *First treat the tone.*

b. *Then search for and treat the trauma (see Slide # 14 for perineal laceration description).*

c. *Then search for and treat the tissue (see slide #15 for link to removal of retained placenta).*

d. *Then search for and treat the thrombin (coagulopathies). Check for disseminated intravascular coagulation, coagulopathies, give transfusion of appropriate blood products.*

7. What should be considered if there is ongoing evidence of blood loss such as hypotension but no actual bleeding noted and a firm uterus but no lacerations are found?



DIDACTICS AND HANDS-ON CURRICULUM

The patient most likely has a pelvic hematoma in the vaginal area. Difficult to visualize so the best diagnostic test to locate such a hematoma is probably a computed tomography (CT) of the pelvis.

8. What should be considered if there is ongoing evidence of blood loss (hypotension) and significant abdominal pain and tenderness?
Uterine Rupture should be considered in the setting of hypotension and continuous abdominal pain.
9. What is the classification of vulvar tears? (Slide #14)
1st degree – perineal skin & vaginal mucous membranes
2nd degree – extend through the skin into fascia & muscles of the perineal body
3rd degree – skin, mucous membranes, perineal body & anal sphincter
4th degree – skin, mucous membranes, perineal body, anal sphincter, rectal mucosa
10. How do retained products cause continued bleeding?
Retained products prevent myometrial constriction leading to continued bleeding.
11. What are the risk factors for developing abnormal placental attachment such as placenta accreta?
The risk factors for abnormal placental attachment are:
Multigravidity
Prior C-section
Placenta previa
Previous curettage
Uterine infections
12. How would you know if someone has a condition such as placenta accreta without an Ultrasound?
Placenta accrete should be suspected when the manual exploration of the uterus is performed and the placenta does not separate easily from the uterus. The placenta should separate easily when this procedure is performed. If the placenta does not separate easily then it is abnormally attached.

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Appendix J:

Rhesus Factor (Rh) Isoimmunization

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a patient with bleeding of pregnancy that has Rh negative status.
2. Determine the evaluation and treatment of patient with Rh negative status.
3. State when immune globulin (Rhogam/Rhophylate) is required in pregnant females with Rh negative status.
4. Discuss the answers to the questions designed to stress the teaching points of the case.
5. Summarize key learning points of the case.

Case Study: present the complaint and then have the group work through the history, physical, differential, and evaluation.

Patient: 25-year-old female, G1P0, with 16-week gestation, presents to the emergency department with complaints of falling down approximately seven stairs. She complains of pain in the left elbow and left knee. She denies loss of consciousness, vomiting, neck pain, neurological deficits, abdominal pain, vaginal bleeding, etc.

Past Medical History:

Surgery: none

Medical Illnesses: none

Social: Tobacco – denies, alcohol – denies, Drugs of Abuse – marijuana occasionally

Physical:

Vital signs: Blood pressure 104/76, heart rate 92, respiratory rate 16, temperature 98.6.

Normal except:

Musculoskeletal: Left upper extremity – tenderness over the elbow with palpation, no deformities or edema noted on exam, radial pulse is palpable and strong, sensation intact to light touch, full range of motion of all joints but with pain at the elbow.

Left lower extremity – non-tender over the knee, able to bear weight on that extremity, no deformities noted, no edema noted, full range of motion all joints, pedal pulses are palpable and strong, sensation to light touch is intact distally.



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient Management:

1. Obtain history of pregnancy and events of fall.
2. Perform a complete exam looking for trauma.
3. Ask about blood type or do Type and Rh to make sure that the patient does not need either Rhogam/Rhophylate. Patient tells you that she is AB negative.
4. Must order type and Rh so can give immune globulin, Rhogam or Rhophylate.
5. Orders 300 mcg Rhogam intramuscularly (IM). (Even minor trauma can cause exposure to Rh-positive fetal blood.)
For women with a gestation under 12 weeks, only 50 micrograms of immune globulin (Rhogam/Rhophylate) are needed.
6. Check fetal heart tones – 164 beats per minute (BMP).
7. Ultrasound to check the status of the pregnancy. A bedside ultrasound is appropriate.
8. Radiograph of the left elbow is ordered, shield the patient. No radiograph is needed of the left knee because the examination of the patient meets Ottawa knee rules for no imaging.

Question Prompts:

1. When is Rhogam given routinely to Rh-negative women?
Rhogam is administered at 28 weeks gestation if the father is Rh-positive or his status is unknown.
2. When can transplacental hemorrhage occur that exposes the mother to Rh-positive fetal blood?
Transplacental hemorrhage can occur during:
 - a. Uterine manipulation
 - b. Surgery for ectopic pregnancy
 - c. Amniocentesis
 - d. Trauma – even minor
3. What should be done if the emergency department does not carry the smaller dose of Rhogam/Rhophylate (50 versus 300 micrograms)?
No problem, give the larger dose. There is no added benefit to receiving the larger dose but there is no added risk from receiving the larger dose.
4. If the institution does not have either Rhogam or Rhophylate, what should be done to provide it?
There is a 72-hour window in which the immune globulin can be given. The pharmacy should order it and the patient should return within 72 hours to receive a dose.
5. What is the purpose of a Kleihauer-Betke test? How much fetal blood is needed to get a positive Kleihauer-Betke test?
The Kleihauer-Betke test can detect fetal cells in the maternal circulation. There must be at least 5 milliliters of fetal cells for the test to be positive.



DIDACTICS AND HANDS-ON CURRICULUM

6. Should the Kleihauer-Betke test be used to determine whether the mother gets immune globulin?
No, because it only takes 0.1 milliliters of fetal cells to sensitize a Rh-negative mother and the test needs at least 5 milliliters to be positive.

7. Should immune globulin (Rhogam/Rhophylate) be given if the mother has bleeding at 32 weeks?
If the mother received an injection of immune globulin at 28 weeks, no further immune globulin is needed.
The mother should receive an injection of Rhogam if the mother did not receive an injection of immune globulin at 28 weeks.

8. What is the Kleihauer-Betke test used for then?
In cases of major trauma, the Kleihauer-Betke is used to detect how much fetal blood the mother has been exposed to during a trauma or bleeding episode.
300 micrograms of immune globulin effectively prevents sensitization for exposures up to 15 milliliters of packed red blood cells or 30 milliliters of whole blood. If the mother has been exposed to more than 30 milliliters of whole blood, then more immune globulin should be administered.

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Appendix K:

Sexually Transmitted Diseases and other Genitourinary Infections

Author: Linda L Herman, MD and Kunal Sukhija, MD

Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a pregnant patient with a sexually transmitted disease.
2. Determine the treatment for the pregnant patient with a sexually transmitted disease.
3. Discuss the significance of urinary tract infection (UTI) and asymptomatic bacteriuria.
4. Discuss the answers to the questions designed to stress the teaching points of the case.
5. Summarize key learning points of the case.

Case Study - present the complaint and then have the group work through the history, physical, differential, and evaluation.

Patient – 25-year-old F, G1P0, with an 8-week gestation, presents with complaints vaginal bleeding. She reports she did a pregnancy test last week and it was positive. The patient is accompanied to the emergency department (ED) by a friend. She states that she is only spotting, and denies abdominal pain. She endorses intermittent vomiting. The patient is worried that she is having a miscarriage. She does not know her blood type. The bleeding has only been spotting and she has used only one pad today and it has not been soaked.

Past Medical History:

Surgery: none

Medical Illnesses: none

Social: Tobacco – denies, alcohol – denies, Drugs of Abuse – marijuana

Physical:

Vital signs: Blood pressure 98/56, heart rate 76, respiratory rate 16, temperature 98.6

General –well-developed female, comfortable

Physical exam normal except:

Pelvic – external genitalia normal, vaginal vault with small amount of dark red blood, cervix closed, no cervical motion tenderness, uterus is small (about the size of an orange) and nontender to palpation, no masses palpated in the adnexa and there is no adnexal tenderness.



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points

Patient Management

1. Perform full exam
2. Order type and Rh (A Positive), beta-HCG (8432 units), and ultrasound (demonstrates a live intrauterine pregnancy with fetal heart tones (FHT) 148 bpm otherwise normal), does Gonorrhea (GC), Chlamydia, and wet prep to check for sexually transmitted diseases.
3. Can be discharged with follow-up.
4. Next day receives report concerning the patient whose test is positive for chlamydia and Gardnerella – must call patient and provide Rx for azithromycin 1 gram orally (PO) and metronidazole (500 mg by mouth, twice a day for seven days) or clindamycin (300 mg by mouth, twice a day for seven days) for the Gardnerella.

Question Prompts:

1. What complications are associated with bacterial vaginosis?
The complications are:
Amnionitis
Premature rupture of membranes (PROM)
Fetal prematurity
Postpartum infection
2. What is the treatment for bacterial vaginosis?
Metronidazole – 500 mg twice a day by mouth for 7 days OR
Clindamycin 300 mg twice a day by mouth for 7 days.
Intravaginal treatment is not recommended in pregnant females.
3. Why is there a higher incidence of Candida albicans vaginitis in pregnancy?
The high levels of estrogen & other steroids change the vaginal environment leading to a higher incidence of Candida albicans vaginitis. There is no association with low birth weight or preterm delivery with a Candida albicans infection.
4. What is the treatment for candida vaginitis?
7 days of vaginal azoles.
5. Can a pregnant patient take oral azoles for candida vaginitis?
No because they are associated with poor fetal outcomes.
6. Does candida vaginitis cause similar complications as that of bacterial vaginosis?
No, it is just uncomfortable for the patient due to itching and irritation in the perineal and vaginal area.
7. What if the patient was positive for Trichomoniasis? Do we treat and with what?



DIDACTICS AND HANDS-ON CURRICULUM

Yes, Trichomoniasis is treated because it is associated with prematurity but treatment does not affect that outcome. The treatment is metronidazole 2 grams by mouth times one only. There should be shared decision making between the healthcare provider and the patient because treatment is usually delayed until after 37 weeks of gestation in asymptomatic women. Since there is no change in outcome and the patient is not having any symptoms, the treatment is usually delayed until the patient reaches term gestation.

8. What are the treatment options for Chlamydia in pregnancy?
Azithromycin 1 gram PO
Alternate treatment - amoxicillin, 500 mg three times a day by mouth for 7 days
9. What complications are associated with Chlamydia infections in pregnancy?
Preterm labor
Postpartum endometritis
Neonatal conjunctivitis
Neonatal pneumonia
10. Is Gonorrhea common in pregnancy?
No, only about 1% of pregnant females contract gonorrhea.
11. Can you get salpingitis with gonorrhea in pregnancy?
Yes, but salpingitis is rare and usually only occurs during the first trimester.
12. Since salpingitis and pelvic inflammatory disease (PID) are rare in pregnancy, what else should be considered when pregnant patients present with abdominal pain and symptoms and a physical exam that is consistent with PID?
Appendicitis, ruptured appendix, other gastrointestinal etiologies.
13. What is the treatment for gonorrhea?
Cephalosporins- First line is ceftriaxone, 250 mg intramuscularly for one dose only.
This should be combined with Azithromycin, 1 gram by mouth for one dose only.
Other cephalosporins that can be used are:
Ceftizoxime, 500 mg intramuscularly for one dose.
Cefoxitin, 2 g intramuscularly with probenecid 1 g orally (probenecid is Category B) for one dose.
Cefotaxime, 500 mg intramuscularly for one dose.
Second line treatment is spectinomycin, 2 grams intramuscularly. This is also combined with the above dose of azithromycin.
If the patient is allergic to cephalosporins and spectinomycin is not available, then an infectious disease consult should be obtained.
14. What are the complications of gonorrhea in the neonate?



DIDACTICS AND HANDS-ON CURRICULUM

Neonatal gonococcal ophthalmia & sepsis.

15. What do you do if you think that the patient has a herpes lesion?
Send off a culture of the lesion; consult obstetrics (OB) whether or not they want patient to start taking acyclovir.
16. What is the problem with herpes and delivery of the infant?
An active herpes infection in the mother can cause disseminated infection or herpes meningitis in the infant.
17. When is the risk the greatest for transmission of herpes to the fetus?
The risk is the greatest during the third trimester.
18. What condition should be considered in the differential if a woman comes in after the 16th week of pregnancy with fever and tender uterus? What are risk factors for developing this disease?
Chorioamnionitis should be considered in a woman with complaints of fever and a tender uterus with a gestational age of at least 16 weeks or longer. Preterm labor and premature rupture of the membranes are risk factors for developing chorioamnionitis.
19. How is chorioamnionitis confirmed?
Amniocentesis is the test to confirm chorioamnionitis. (emergency physicians don't do that – all the patients with suspected chorioamnionitis get admitted & get intravenous (IV) antibiotics). Blood cultures and vaginal cultures for Group B Streptococcus, E. coli, chlamydia and gonorrhea should be obtained.
20. How is chorioaminionitis treated?
As above - Admission, intravenous antibiotics, consult with an obstetrician.
21. What are the physiological changes during pregnancy that are associated with an increase in urinary tract infections?
The physiological changes during pregnancy are:
 - a. *Uterine pressure*
 - b. *Poor emptying of the bladder with voiding*
 - c. *Progesterone-induced smooth muscle relaxation which inhibits ureteral peristalsis*
22. Should asymptomatic bacteria be treated? With what?
*Yes, literature shows that 30% of those with asymptomatic bacteria get pyelonephritis
There is new literature out that shows that asymptomatic bacteriuria may not be as significant as once thought though.*
23. What medications are indicated to treat UTI and asymptomatic bacteriuria?
Cephalosporin



DIDACTICS AND HANDS-ON CURRICULUM

Nitrofurantoin

Sulfonamide (not in the third trimester)

24. Should all pregnant women with pyelonephritis be admitted to the hospital?

Not necessarily; a select number of patients can be treated on an outpatient basis. In the past, all pregnant patients were admitted to the hospital with pyelonephritis because of the increased incidence of maternal sepsis, renal injury and preterm labor. Now it is recognized that patients who look well such as no tachycardia and adequate blood pressures that have good follow-up and are responsible can be discharged. Before this is done though, a consultation with an obstetrician should be performed. Also, it is good practice to give an intravenous dose of antibiotics before the patient is discharged. A urine culture should be sent to make sure that the patient was discharged with the correct choice for an antibiotic. Patients that appear ill and have signs of sepsis, are fluid depleted, cannot take antibiotics by mouth, have poor follow up, have questionable or poor social situations, and/or have significant co-morbidities should be admitted to the hospital for intravenous antibiotics.

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Appendix L:

Spontaneous Abortion and Threatened Spontaneous Abortion

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Objectives for Small Group Discussion

The learner should be able to:

1. Obtain the history, physical and evaluation of a patient with vaginal bleeding during first 20 weeks of pregnancy.
2. Determine the evaluation and treatment of patient with spontaneous abortion or threatened spontaneous abortion.
3. Choose the correct disposition of those patients.
4. Discuss the answers to the questions designed to stress the teaching points of the case.
5. Summarize key learning points of the case.

Case Study: present the complaint and then have the group work through the history, physical, differential, and evaluation.

Patient – 25-year-old female, G2P1010, with a 7-week gestation, presents to the emergency department with complaints of suprapubic cramping and vaginal bleeding that began 2 hours prior to admission. Has used one pad only. Denies gastrointestinal symptoms.

Past Medical History:

LMP: 9 weeks ago,

Surgery: none

Medical Illnesses: none

Social: Tobacco – denies, ETOH – denies, Drugs of Abuse – marijuana occasionally

Physical:

Vital signs: 104/76 – 112 – 16 – 98.6

Normal except slightly tender over the uterus on exam, cervix is closed, few quarter size clots in the vaginal vault, and uterus is approximately an 8-week size (size of an orange), no adnexal masses or tenderness on examination.



DIDACTICS AND HANDS-ON CURRICULUM

Main Teaching Points:

Patient Management

1. Obtain history of pregnancy, degree of bleeding, duration of bleeding, presence of cramping or pain, whether has had fever.
2. Ask about blood type or do Type and Rh to make sure does not need immune globulin (Rhogam/Rhophylate).
3. May or may not order CBC depending on the amount of bleeding.
4. Order B-hCG to assist in interpreting the ultrasound and disposition of the patient.
5. Perform pelvic examination to determine the status of the cervix (open or closed) and amount of active bleeding.
6. Order or perform ultrasound to check the status of the pregnancy and assist in ruling out ectopic pregnancy.

Question Prompts:

1. Define the following:
 - a. *Threatened miscarriage – patient has vaginal bleeding and cervical os is closed but the pregnancy continues.*
 - b. *Inevitable miscarriage – patient has vaginal bleeding and cervical os is open but the products of conception are still in the uterus and have not yet been expelled.*
 - c. *Incomplete miscarriage – patient has vaginal bleeding and/or pain, cervix is dilated and some of products of conception found at os or in the vaginal vault while some products are retained in the uterus.*
 - d. *Complete miscarriage – products of conception have been expelled and the os is closed again. This can only be diagnosed if the complete products of conception are seen or a dilatation and curettage is performed or the patient is being followed closely and her Beta-hCG becomes negative. It takes about 4 weeks for the Beta-hCG to become negative.*
 - e. *Anembryonic gestation – pregnancy is diagnosed but no fetal development takes place.*
 - f. *First or second trimester fetal death – failure to detect fetal heart tones when the fetus has at least 15-mm in crown-rump length (old term was missed abortion).*
2. When can bleeding occur during pregnancy and be a normal variant?
Bleeding during implantation of the blastocyst and at the time of the normal menstruation can be normal.
3. What should be done if the Beta-hCG is 780 Units and nothing is seen on the US?
Serial Beta-hCG should be performed to see if the pregnancy is progressing normally and a repeat ultrasound can be performed when the Beta-hCG enters the discriminatory zone.
4. This patient's Beta-hCG is 3159 and her ultrasound demonstrates a 7-week gestation with fetal heart tones. What is her disposition? What instructions should she be given?



DIDACTICS AND HANDS-ON CURRICULUM

Reassure the patient that nothing she did caused the bleeding.

Discharge the patient home after speaking with the obstetrician.

She should be told to rest but can perform activities of daily living. She should not have sexual intercourse until released by her obstetrician.

She should return if there is an increase in vaginal bleeding, if she faints, has severe pain, develops a fever, she notes passing of fetal tissue, or any other concerns.

5. The patient's Beta-hCG is 3159 and the ultrasound just shows thickened endometrium and some blood clots and the patient has brought to the emergency department what appears to be products of conception. How should this be managed?

The products of conception are sent to the lab to evaluate for completeness. The products of conception can always be returned to the patient after evaluation. Consult with an obstetrician by phone and patient can probably go home and have follow-up. When the pregnancy is 8 weeks or less gestation and there is mild bleeding, a dilatation and curettage is not usually required.

Don't forget to enter the order in the computer for examination of surgical pathology specimens.

6. What if this patient comes back and is still bleeding? Does she need an ultrasound each time?
She probably does not need an ultrasound each time. She may need a Beta-hCG though to see how she is progressing with her miscarriage and a pelvic exam to check the status of her cervix (open versus closed) and the amount of bleeding.

7. What are the risk factors for miscarriage?

- a. *> 40 years of age*
- b. *Increasing paternal age*
- c. *Alcohol use*
- d. *Increased parity*
- e. *History of prior miscarriage*
- f. *Poorly controlled diabetes*
- g. *Thyroid disease*
- h. *Low pre-pregnancy body mass index*
- i. *Maternal stress*
- j. *History of vaginal bleeding*

8. If the patient presents at less than 12 weeks and tissue is found at the os, should it be removed?
Yes, the tissue should be removed from the os as long as it only requires insertion of the ring forceps about 2 -3 centimeters and the products of conception remove with gentle pulling only. These products are also sent to the lab for analysis and completeness.

9. Is a Complete Blood Count (CBC) needed every time a pregnant female presents?



DIDACTICS AND HANDS-ON CURRICULUM

A baseline blood count is always a good value to have, but if the patient is not bleeding heavily (spotting) and the patient is not known to be anemic, then a complete blood count is probably not indicated.

10. Is there any treatment that can prevent a spontaneous abortion?

There are no treatments to prevent a spontaneous abortion.

11. When is a dilatation and curettage (D&C) indicated?

Dilatation and curettage is indicated when there are retained products in the endometrial cavity and the patient condition is unstable (abnormal vital signs or significant anemia) and/or there is a large amount of hemorrhage from the uterus.

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