Anesthesia Toolbox

Sample SIM Script

Trauma Sim 6: The Pregnant Trauma Patient

Section 1: Demographics

Case Title: The Pregnant Trauma Patient

Patient Name: Baby Boy Jones

Scenario Name: Pediatric Traumatic Brain Injury

Simulation Developer: Ben Lancaman MD

Dates of Development: 1/29/18

Appropriate for the following learning groups (circle all that apply). This scenario is most appropriate for early to mid level trainees in anesthesia/ED/Surgery or community physicians.

- Faculty/community physicians CME
- Residents (PGY) 1 2 **3 4 5 6 7**
- Specialties Pediatric Anesthesiology
- Pediatric Emergency Medicine
- Pediatric Critical Care
- Pediatric Surgery
- Medical Students (yr) 1 2 3 4
- Nurse anesthesia Faculty
- Nurse anesthesia Students (yr)

- Anesthesia Assistants
- Other

Section 2: Curricular Information

Educational Rationale

This scenario will provide learners with the opportunity to practice caring for a pregnant trauma patient. Pregnancy in trauma provides unique challenges that require a modification to the standard clinical approach. Despite this the focus should be on maternal resuscitation, optimizing the A-B-C-D-E approach to the primary survey before addressing fetal or obstetric issues. It will provide an opportunity to consider some of specific issues of caring for both a mother and fetus. The desired outcome is to improve participant understanding of the unique features of caring for a pregnant trauma patient and the fetus including modifications of routine trauma care, mobilizing OB resources, and assessment of both maternal and fetal status.

Learning Objectives: ACGME Core Competencies: Medical knowledge (mk), Patient care (pc), Practice-based learning and improvement (pbli), Interpersonal and communication skills (cs), Professionalism (pr), Systems-based practice (sbp)).

Upon completion of this activity, participants will be able to:

- Demonstrate a systematic approach to the trauma patient (sbp)
- Modify routine trauma management as appropriate for the pregnant patient (mk, pc)
- Appropriately use and interpret obstetric resources to assess the mother and baby (sbp, cs, pr)
- Activate appropriate referral pathways for care of mother with threatened labor (sbp, mk, pc)

Suggested Reading

- Miller's Basics of Anesthesia 7e – Trauma in Anesthesia (pregnancy section)
- Jain V, et al. Guidelines for the management of a pregnant trauma patient. J Obstet Gynaecol Can. 2015;37(6):553-571.
- Mendez-Figueroa H, et al. Trauma in pregnancy: an updated systematic review. AJOG. 2013;209(1);1-10.
- Barraco R, et al. Practice management guidelines for the diagnosis and management of injury in the pregnant patient: the EAST Practice Management Guidelines Work Group. J Trauma Acute Care Surgery. 2010;69(1):211-214.

- https://www.acep.org/Clinical---Practice-Management/Trauma-in-the-Obstetric-Patient--A-Bedside-Tool/#sm.000102ul0o9uueg6vn12ekxch0zsv (accessed 1/29/18)
- http://www.trauma.org/archive/resus/pregnancytrauma.html (accessed 01/29/18)

- bedside tool (http://www.acep.org/Clinical---Practice-Management/Trauma-in-the-Obstetric-Patient--A-Bedside-Tool/)
- SOGC Clinical Practice Guideline – Guidelines for the management of a pregnant trauma patient (http://sogc.org/wp-content/uploads/2015/06/gui325CPG1505E.pdf)
- ANTS teamwork assessment tool/MiniCEX

Assessment Instruments

- Modified ANTS. Modification includes evaluation of prioritization and performance of critical tasks by the anesthesia trainee. Modification is a supplemental checklist.

Section 3: Preparation

Monitors Required:

	Non-Invasive BP Cuff				
	Pulse Oximeter				
	Arterial Line				
	EKG				
	Temperature Probe				
	Pulse Oximeter				
	Capnograph				
	CTG (cardiotocoraphy) or fetal doppler				
	Central line				

Other equipment required:

	Anesthesia Machine		ETT of various sizes/cuffed and uncuffed		Nerve stimulator
	Pumps		LMA/supraglottic device		Blood gas equipment
	Video laryngoscope		Laryngoscope		Iv equipment
	Orogastric tube		Hard cervical collar		Bag mask
	Hotline		Foley catheter bag		iv pole
	oral airways		OR bed		
	nasal airways		Manikin with obstetric modification		
	Cricothyroidotomy kit		c- collar		
			Moulage for fracture/bruising		

Available Medications:

	Normal saline		Ketamine		Succinylcholine 20 mg/ml
	Lactated ringers		Propofol 10 mg/ml		Rocuronium 10 mg/ml)
	D5		Ketamine 50 mg/ml		Atropine 1 mg/10 ml
	Colloid		Midazolam 1 mg/ml		Epinephrine 1 mg/10 ml
	PRBC 4 units		Etomidate 2 mg/ml		Phenylephrin 100 mcg/ml
	FFP 4 units				Ephedrine 50 mg/10 ml
	Fentanyl 50 mcg/ml		Methylergonovine (0.2ml/ml)		Calcium Chloride 1 gm/10 ml
	Morphine 10 mg/ml		Carboprost (PGF2 alpha)		Vasopressin 20 units/ml
			Anti D immunoglobulin		Tranexamic acid 1 gm
			Tetanus toxoid		

Time Duration

Set-up	15 minutes
Preparation	5 minutes
Simulation	20 minutes
Debrief	30 minutes

Personnel - This is a multidisciplinary trauma scenario. Depending on the number and skill mix of the learners, the faculty should complete the team as necessary. Team composition:

- Anesthesia Doctor
- ASSESSMENT (Primary/Secondary) Doctor
- Procedures Doctor
- Procedures Nurse
- Team Leader Doctor
- Team Leader Nurse (optional)
- Scribe/Circulating Nurse
- Paramedic for handover at start – can also act as radiographer later in SIM
- Potential phone consults
    - Obstetrics – could be an in person consult as well depending on staffing resources
    - Neonatologists
    - ICU
    - Blood bank
    - Administration/Request for transfer
    - ICU

Mannequin Set-up

- Pregnant
- R tib/fib fx
- C-collar

Room Set-up

- Room setup as ED trauma bay
    - Gurney for patient/mannequin
    - Patient Monitor
    - IV poles
    - Rapid infuser
    - Ultrasound machine
    - Standard IV/Drug cart

- Xray light box or equivalent
- Computer for accessing pathology/radiology

Information for students

- Location
- Provide ANTS assessment tool to learners
- Provide Additional Learning Materials

Information for faculty

- Provide SIM to faculty
- Provide ANTS assessment tool
- Provide training on ANTS
- Provide Additional Learning Materials

Case Stem

Background:
In this scenario the participant will be presented with a mid 20yr old pregnant patient who fell down a flight of stairs. The patient will have sustained a fracture from a non-accidental injury. The scenario will focus on the initial workup of this patient.

Initial Presentation:
The learner is paged to the ED trauma bay to evaluate a patient arriving via paramedics. The patient is a mid 20 yr old pregnant patient who fell down a single flight of stairs onto a tile floor.

The patient is obviously pregnant (approximately 30weeks). Learners arrive into ED/Trauma Bay as the patient is being transferred onto ED bed.

Patient History (via paramedic hand-off)
24yo female fell down a single flight of stairs. Approximately 30 weeks pregnant. She denies any LOC. Open fracture of R lower extremity. Paramedics gave 10 mg morphine IV and 5 mg metoclopramide IV. I8 G IV right AC placed in the field. 500 ml given from first bag of NS.

Review of Systems

- CNS: awake and alert. Crying
- Cardiovascular: tachycardia
- Pulmonary: tachypnea
- Renal/Endocrine/Heme/Coag – no history of problems
- OB History: first pregnancy, 30 weeks, uncomplicated

Current Medications and Allergies

- NKDA
- Prenatal vitamins are only medication

Physical Exam

- General: pale, obviously pregnant, open right tib/fib fracture
- Weight: 89 kg, Height: 5'7" (170 cm)
- VSS: HR 110, BP 100/70, RR 24, SaO2 96% on O2 facemask
- Airway: patent
- Lungs: bilat, equal, pain to palpation right chest wall, bruising right chest
- Renal/Endocrine/Heme/Coag – no history of problems
- OB History: first pregnancy, 30 weeks, uncomplicated

Review of Systems

- CNS: awake and alert. Crying
- Cardiovascular: tachycardia
- Pulmonary: tachypnea
- Renal/Endocrine/Heme/Coag – no history of problems
- OB History: first pregnancy, 30 weeks, uncomplicated

Initial Vital signs

- HR 115
- BP 95/70
- RR 26
- Ox Sat 96%

Case Progression

- Patient status: Patient is lying on ED bed. C-collar/spine board insitu, Oxygen via NRBMask. 18g PIVC in right Antecubital fossa. Padded gauze/combine over Right Tib/Fib #. Bruising over R chest wall. VSS Patient is complaining of significant pain from R lower extremity.
- Participant action with resultant events
    1. Participant to conduct a primary survey
        a. Should complete a primary survey in a systematic fashion
        b. Identify patient is pregnant and apply lateral tilt while maintaining spinal precautions. If participant does not apply uterine tilt, blood pressure will fall slightly, if still does not provide tilt, nurse will suggest application of tilt
        c. Lateral tilt – improves BP (110/70) but tachycardia persists due to pain (110)
        d. Identify altered hemodynamics and consider hypovolemic shock as a differential

    e. If judged as hemodynamically compromised should provide fluid challenge with either crystalloid or blood. Based on physiological response should be identified as responder, transient responder, or non-responder. Identify that a pregnant patient is able to mask significant blood loss due to physiological hypervolemia.
2. Conduct early VBG/ABG to assess for biochemical markers of shock to help differentiate normal compensation of later pregnancy from pathological hemodynamic states. If participant does not order tests, nursing can draw blood and ask what labs should be ordered.
3. Participant conduct a detailed secondary survey
    a. Participant should call for OB consultation. They are busy with two simultaneous c/sections. OB nurse arrives with doppler and cardiotocograph. If participant does not apply, nursing asks if they want to apply the monitor. Fetal HR 120-140. If continuous monitoring is applied, then fetal HR should remain stable at ~120
    b. PV examination should reveal small amount of blood loss
    c. Comment on need for AnitD immunoglobulin if patient is Rhesus negative

Next Frame

- Able to obtain chart in electronic medical record. Nursing confirms patient is 30 weeks pregnant, no significant medical history except anemia of pregnancy (HGB 10.9 1 month ago), uncomplicated OB history patient is Rh negative.
- VSS: BP 92/68, HR 115, RR 20, SaO2 95%. Only significant findings on primary survey were decreased breath sounds on right, small amount of vaginal bleeding.
- Patient is complaining of pain with deep inspiration.
- Participant action with resultant events
    1. Participant considers ordering CXR for reduced breath sounds, pain, and bruising on right chest.
        a. Patient is very concerned about x-ray and its effects on baby. Participant should be reassuring.
        b. CXR will be read as normal
    2. Participants considers ordering C-spine film
        a. Film will be read as negative. Participant should not take c- collar off even though patient is complaining it is tight. Patient has a distracting injury and c-spine film will not rule out injury. If participant begins to take off collar, ED physician or nursing will discourage it.
    3. Participants considers ordering Anti D immunoglobulin for patients RH negative status. If participant does not order it, OB nurse will suggest.
    4. Participant may give small amount of pain medication for patient complaints of pain

    a. If participant gives a large dose, patient will become groggy and blood pressure will decrease
    b. With appropriate dossing, BP will fall slightly.
5. Participant initiates some volume resuscitation
    a. BP will increase and HR decrease with volume administration
    b. BP will decrease if volume resuscitation is not initiated
6. Labs VBG
    a. pH 7.44
    b. pO2 39
    c. pCO2 44
    d. HCO3 21
    e. BE -0.3
    f. Lactate 2.2
    g. Hgb 9.8
    h. Glu 122mg/dL

Next Frame Modification for advanced learners

1. Pulseless Right foot that requires reduction in ED
    a. Issues to consider include agents for sedation
    b. GA vs sedation in pregnant patient (risk of aspiration)
    c. Location for reduction
2. Onset of labor/contractions
    a. Patient complains of abdominal pain with palpable contractions
    b. Cardiotocograph evidence of contractions vs palpable contractions
    c. Obtain OB advice regarding early labor management
    d. Drugs to halt labor – e.g. albuterol
    e. Preparations for fetus – steroids
    f. Transfer to appropriate location – is labor ward appropriate with open fracture? ICU?
3. Suspicion of non-accidental injury
    a. When asked for history of what happened the patient will avoid the question
    b. On pressing will disclose that her partner may have 'bumped' her at the top of the stairs. But it was 'definitely an accident'
    c. Learners should identify this as a potential non-accidental injury and escalate through appropriate local channels (i.e. social work, consider police involvement, ensure patient is safe from partner – not left alone)

<u>Background and briefing information for facilitator/coordinator's eyes only</u>

Debriefing

- What went well?
- What was difficult?

- What would you do differently
- Was any information unclear?

Teaching Points/Medical Knowledge/Patient Care

1. General Management of Case General Trauma Management
    a. Efficiency of Primary/Secondary surveys
    b. Major differentials considered (Pneumothorax,
    c. Spinal immobilization
    d. Pregnancy Modification
        i. Lateral tilt – when should this be applied (ASAP)
        ii. Discuss some of the physiological changes in pregnancy and how that impacts trauma (increased blood volume, physiological anemia, difficult airway, increased aspiration risk, hypercoaguable, conditions of pregnancy – preeclampsia, cholestasis, altered placental attachments, risk of amniotic fluid embolus and its consequences)
        iii. Consults – to whom and when?
        iv. Monitoring fetus, when (secondary survey), who can interpret? Fetal wellbeing as early sign of maternal issues
        v. Radiological imaging in pregnancy – is it ok? (yes but should minimize to essential imaging only. Need to weigh the risk of missed diagnosis with increased radiation exposure – mother is a trauma patient first, parturient second)

2. Team Dynamics/Communication Skills/Professionalism
    a. Task Management
        i. Prioritizing
        ii. Identifying and utilizing resources
    b. Teamwork and communication
        i. Team leadership – effective or not
        ii. Team followership – did all team member support the leader
        iii. Group situational awareness
        iv. Activation of external support – OB/Transfers
    c. Situation Awareness
        i. Gathering information
        ii. Recognizing and understanding
        iii. Anticipating
    d. Decision making
        i. Identifying options
        ii. Balancing risks and selecting options
        iii. Re-evaluating