

Simulation Patient Design (January, 2020) Case of Cord Prolapse in the L&D Suite

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Introduction

Umbilical cord prolapse is the presence of the umbilical cord between the fetal presenting part and the cervix. It can be overt (passed the presenting part) or occult (alongside the presenting part). The incidence of umbilical cord prolapse ranges from 1.4 to 6.2 per 1000.⁽¹⁾ It is not a common emergency, however it can result in severe maternal and neonatal morbidity and mortality. The incidence is trending down with the use of diagnostic ultrasound as well as the increased use of cesarean delivery for fetal malpresentation.^(2, 3) Decreasing rates of grand multiparity worldwide are also contributing to a reduced incidence.⁽³⁾

When it occurs, the need to proceed with an emergent delivery necessitates that providers be aware of this presentation and know how to respond in a timely manner for optimal maternal and neonatal outcomes. The incidence of fetal mortality due to cord prolapse is estimated to be less than 10%; a decrease from earlier estimates of 35-47% is related to increased availability of cesarean delivery and advanced neonatal resuscitation methods.⁽⁴⁾

Pathogenesis may be related to:

- (1) Rupture of membranes resulting in outward flow of amniotic fluid with the umbilical cord
- (2) Disengagement of the fetal presenting part during obstetric procedures resulting in cord prolapse

Risk factors (obstetric)⁽⁵⁾:

1. Malpresentation: Transverse lie (9.6%), breech (3.5%), vertex (0.24%)
2. Prematurity (<37 weeks)
3. Pelvic deformity
4. Low birth weight
5. Second twin
6. Uterine malformation or tumor
7. Multiparity
8. Polyhydramnios: Associated with unstable lie or unengaged presenting part
9. Unengaged presenting part
10. Prolonged labor
11. Fetal anomalies (external)

Risk factors (iatrogenic): Obstetric interventions: 50% of cases of cord prolapse⁽⁶⁾

- a. Artificial rupture of membranes (AROM)
- b. Cervical ripening with balloon catheter
- c. Induction of labor
- d. External cephalic version
- e. Internal podalic version
- f. Use of forceps or vacuum
- g. Application of scalp electrode
- h. Insertion of intrauterine pressure catheter

Clinical Presentation:

1. Overt: Incidental finding – vaginal exam to assess labor progress
2. Intrapartum finding:
 - Acute onset of fetal bradycardia – severe/prolonged
 - Moderate or severe decelerations
 - Associated risk factors present

Differential for:

1. Mass in vagina: face, caput succedaneum, fetal limb
2. Fetal bradycardia: epidural bolus, maternal hypotension, uterine rupture, placental abruption

Management:

Acute obstetrical emergency:

Call for help

- Alert teams and OR
- Continuous fetal monitoring
- 100% oxygen via facemask

Immediate delivery

- Cesarean delivery in OR with general anesthesia, or spinal anesthesia placed in the lateral position, or in-situ epidural catheter
- Can consider vaginal delivery, if delivery is imminent and instrumental delivery is possible

Funic decompression (measures to relieve cord compression in the interim):

- 2 fingers in vagina with manual elevation of fetal presenting part
- Steep Trendelenburg, or knee-chest, or exaggerated Sim's position
- Foley: Fill bladder with 500-700 mL saline
- Avoid cord manipulation: May result in umbilical artery vasospasm
- Keep cord warm and moist (if cord in vagina and delivery not imminent)

Educational Rationale:

- To teach team skills in managing an emergency and a stat move to the OR in the event of a cord prolapse
- In addition, being aware of the need to educate and explain to the patient at the end of an emergent event

Target Audiences: Nursing, OB, Anesthesiology, OR personnel

Learning Objectives: As per Accreditation Council for Graduate Medical Education (ACGME) Core Competencies

Upon completion of this simulation (including the debrief) learners will be able to:

- *Medical knowledge:* Describe risk factors, clinical symptoms, diagnosis and management of cord prolapse
- *Patient care:* Describe risk factors for patients who may be at risk for the event
- *Practice-based learning and improvement:* Identify management steps for cord prolapse; identify measures for relieving cord pressure while awaiting delivery

- *Interpersonal and communication skills*: Develop a protocol for rapid assessment of an obstetric emergency; designate roles for smooth transfer to the OR for a stat delivery; maintain communication with patient and family
- *Professionalism*: Demonstrate mutual respect for all team members and family members
- *Systems-based practice*: Identify steps in activating an emergency team response; identify roles for smooth transfer to the OR in an emergency; demonstrate effective communication with team members.

Questions to ask after the scenario:

1. How effective was the emergency activation response?
2. Did each member know his/her role in the crisis?
3. Did the team members know the steps to relieve cord compression while transitioning to the OR?
4. How was the anesthesia emergency response: how would you manage a difficult airway in this scenario?
5. Were there any deficiencies identified in the team response?
6. Was there effective communication with the patient and her family?

Assessment Instruments:

1. Grading Sheet if applicable for formative learning assessment (Appendix 1)
2. Simulation Activity Evaluation form (Appendix 2)

Equipment needed and set up:

In-situ OR setup

- Mannequin in Triage room – supine with legs frog legged
- Monitor in OR – not set up

Simulation Scenario set up:

The case

Mrs. Victoria Sim is a 38 year old, G4P3 at 38 weeks gestational age presenting to the labor and delivery floor with painful contractions. She has a history of poor prenatal care and has not been regular with her prenatal appointments, however the plan is for a vaginal delivery. She has been comfortably managed with a labor epidural that was placed on arrival. Last check was 2 hours ago and the patient was 6 cm dilated.

Simulation pre-brief

- Read the scenario and instruct team members on their role during the simulation
- The learners take their places in the labor room
- Patient (embedded participant)
- Husband (embedded participant – learner who has been briefed)

Cord Prolapse Scenario:

Trigger	Patient Condition	Action	Done	Time	Comments
Labor room: Patient laying supine	Supine on bed	<ol style="list-style-type: none"> 1. Nurse is monitoring fetal tracing 			
Nurse notices FHR drop and tracing changes	Patient asks her husband to call her sister back in the room	<ol style="list-style-type: none"> 1. Nurse checks the FHR monitor 2. Talks to patient and reassess situation 3. Nurse places a wedge or provides left lateral tilt 4. Places oxygen facemask 			
OB resident comes into room		<ol style="list-style-type: none"> 1. Resident reassures patient 2. Takes report from nurse 3. Assesses the patient and makes differential diagnosis 4. Asks patient if she is hurting or feeling contractions 5. Performs vaginal exam 6. If she does not perform vaginal exam, then patient reports feeling wet – this should alert the OB resident to perform a vaginal exam 			
OB resident feels mass in vagina FHR 100 Anesthesiologist enters room	<p>Husband asks what is going on</p> <p>Patient reports it hurts around her belly area</p> <p>Patient asks what is going on</p>	<ol style="list-style-type: none"> 1. Differential diagnosis 2. Assess FHR 3. Call for help and activate emergency response for stat cesarean section 4. Alert anesthesia and Peds teams 5. Reassure patient and husband 6. Keep 2 fingers in vagina 7. Position of bed: Trendelenburg 8. Discussion between OB and the anesthesiologist regarding GA vs. converting labor epidural analgesia to surgical anesthesia. Consideration of maternal factors and whether FHR is normal 			

Move to the OR	Move patient to OR table	<ol style="list-style-type: none"> 1. Place oxygen 2. Place monitors 3. FHR monitor 			
<p>On arrival in the OR FHR 120</p> <p>Prep the patient</p>	<p>Patient asking for husband; reassure and inform status of husband's presence in the room depends on mode of anesthesia for the delivery</p>	<ol style="list-style-type: none"> 1. Reassure patient and FHR 2. Preoxygenate 3. Discussion of administering the epidural bolus 4. If epidural bolus has been administered, then patient will report continuing to feel pain when checked 5. Re-evaluate level and decision to proceed with general anesthesia 6. Induction of anesthesia 7. Intubate 8. Start surgery 9. Check for antibiotic status 10. Surgeon confirms status and scenario ends with surgical incision 			

Appendix 1

Obstetrics Interdisciplinary Team Simulation

Name of simulation: _____

Date: _____

OB Nursing Anes

Each item has two components. The “Before the simulation” column (left side) examines your perspective at the beginning of the simulation. The “End of Simulation” column (right side) is to evaluate your perspective at the completion of the simulation.

1. How would you rate your knowledge of the risk factors of cord prolapse?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/none				Knowledgeable			Little/none				Knowledgeable		

2. How would you rate your knowledge of differential diagnosis for fetal heart rate abnormalities?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/none				Knowledgeable			Little/none				Knowledgeable		

3. How would you rate your knowledge of the steps in funic decompression in cord prolapse?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/none				Knowledgeable			Little/none				Knowledgeable		

4. How would you rate your knowledge of, and management for cord prolapse?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/none				Knowledgeable			Little/none				Knowledgeable		

5. How would you rate your knowledge of the institutional protocol for facilitating the anesthesiologist in a stat cesarean delivery in the OR?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/none				Knowledgeable			Little/none				Knowledgeable		

Appendix 2

SIMULATION ACTIVITY EVALUATION FORM

DATE OF SIMULATION: _____

OCCUPATION: Consultant PG Yr 1 2 3 4 STUDENT NURSE MIDWIFE OTHER

SPECIALTY: _____ YEARS IN PRACTICE: _____

Please rate the following aspects of this training program using the scale listed below:

1 = poor 2 = suboptimal 3 = adequate 4 = good 5 = excellent

Use "N/A" if you did not experience or otherwise cannot rate an item

INTRODUCTORY MATERIALS

Orientation to the simulator	1	2	3	4	5	N/A
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PHYSICAL SPACE

Realism of the simulator space	1	2	3	4	5	N/A
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EQUIPMENT

Satisfaction with the mannequin	1	2	3	4	5	N/A
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SCENARIOS

Realism of the scenarios	1	2	3	4	5	N/A
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Ability of the scenarios to test technical skills	1	2	3	4	5	N/A
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Ability of the scenarios to test behavioral skills	1	2	3	4	5	N/A
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Overall quality of the debriefings	1	2	3	4	5	N/A
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DID YOU FIND THIS USEFUL?

To improve your clinical practice?	1	2	3	4	5	N/A
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To improve your teamwork skills?	1	2	3	4	5	N/A
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To improve your VERBAL communication?	1	2	3	4	5	N/A
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To improve your NONVERBAL communication?	1	2	3	4	5	N/A
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FACULTY

Quality of instructors	1	2	3	4	5	N/A
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Simulation as a teaching method	1	2	3	4	5	N/A
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COMMENTS

References:

1. Holbrook BD, Phelan ST. Umbilical cord prolapse. *Obstet Gynecol Clin North Am.* 2013;40:1-14
2. Lin MG. Umbilical cord prolapse. *Obstet Gynecol Surv.* 2006;61:269-77
3. Gibbons C, O'Herlihy C, Murphy JF. Umbilical cord prolapse--changing patterns and improved outcomes: a retrospective cohort study. *BJOG.* 2014;121:1705-8
4. Katz Z, Lancet M, Borenstein R. Management of labor with umbilical cord prolapse. *Am J Obstet Gynecol.* 1982;142:239-41
5. Ahmed WAS, Hmady MA. Optimal management of umbilical cord prolapse. *Int J Womens Health.* 2018;10:459-65.
6. Usta IM, Mercer BM, Sibai BM. Current obstetrical practice and umbilical cord prolapse. *Am J Perinatol.* 1999;16:479-84