



Just the facts: precipitous deliveries in the emergency department

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Clinical scenario

You receive an EMS patch about a 30-year-old female at 39 weeks gestational age in active labor. The baby is beginning to crown and will be brought straight into your ED. How will you deliver this baby, and what are the associated complications to be prepared for?

Key clinical questions

What are the risks of an ED delivery compared to routine L&D deliveries?

While ED deliveries are an infrequent event, they are associated with higher rates of maternal and fetal complications. This includes shoulder dystocia (0.6%), prolapsed cord (0.6%), infant resuscitation (1.2%), infant mortality (2.7%), and post-partum hemorrhage (6.5%) [1]. Pregnant women who deliver in the ED have been shown to have suboptimal antepartum care [1]. This lack of access to medical care, in combination with other psychosocial factors such as substance abuse and intimate partner violence, may contribute to these higher complication rates.

What are the steps in performing a vaginal delivery?

In preparation for the delivery, gather sterile gloves, towels, a gown, umbilical clamps, scissors, suture materials, and an uterotonic agent. A neonatal warmer, cardiorespiratory monitor, suction, warm blankets, and airway equipment should be prepared for a neonatal resuscitation. Call for help early if available, including obstetrics, pediatrics/neonatology, and a respiratory therapist.

If time allows, a brief history should include the estimated due date, any pregnancy complications, the frequency of contractions, and any loss of fluid or bleeding. To establish if delivery is imminent, a sterile vaginal exam should be performed to assess for crowning, perineal distension, or labial separation with contractions.

With the patient in dorsal lithotomy position, use a sterile towel with your dominant hand to support the perineum. Place your non-dominant hand over the baby's occiput to provide gentle pressure and neck flexion. It is important to control the rate of delivery to minimize the risk of perineal and vaginal tearing. Once the head is delivered and restitutes to face the maternal thigh, check for a nuchal cord by running your finger along the baby's neck. Next, place your hands on the baby's cheeks and apply gentle downward traction to deliver the anterior shoulder, followed by upward traction to deliver the posterior shoulder. The rest of the body usually delivers spontaneously. Use two clamps 4–5 cm apart and cut the umbilical cord at 30–60 s. Following delivery, an uterotonic agent such as oxytocin 10 units IM or 5 units IV is administered. Placental separation usually occurs within 5 min of delivery but can take up to 30 min, recognized as a gush of blood, uterus firming, and cord lengthening. You can aid in the delivery once separation has occurred by keeping the cord taut while applying suprapubic pressure to prevent uterine inversion.

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Table 1 Proposed sequence of maneuvers in patients with shoulder dystocia

1. McRobert's maneuver	Hyperflexion of maternal hips and knees against the abdomen, best performed using two assistants on either side of patient To improve the success of this maneuver, an assistant can simultaneously apply oblique suprapubic pressure to internally rotate the anterior fetal shoulder. Constant pressure or CPR-like movements are both acceptable
2. Rotational maneuvers	Rubin II: place two fingers on the back of the anterior shoulder to rotate the shoulder 30 degrees toward the fetal chest Wood's corkscrew: augments the Rubin II maneuver by additionally placing two fingers on the front of the posterior shoulder and rotating the fetus 180 degrees Reverse Wood's corkscrew: place two fingers on the back of the posterior shoulder and rotate in the opposite direction
3. Delivery of the posterior shoulder	Insert one hand along the infant's posterior arm, placing pressure in the antecubital fossa to flex the elbow. Grasp the forearm or hand and sweep across the chest to deliver the posterior arm
4. Gaskin maneuver	Place the patient in an all-fours position, which increases the pelvic outlet by up to 2 cm to allow more space to disimpact the posterior shoulder
5. Catastrophic maneuvers (performed by an obstetrician)	Clavicle fracture: apply pressure anteriorly and superiorly away from fetal lung Zavanelli maneuver: cephalic replacement with immediate cesarean delivery Symphysiotomy: sharp midline dissection of the symphysis pubis

What is shoulder dystocia and how do we manage it?

Shoulder dystocia refers to the mechanical, bone-on-bone impaction of the anterior fetal shoulder against the pelvic outlet. It requires prompt recognition and management to decrease the risk of fetal hypoxic encephalopathy. Other fetal complications include brachial plexus injuries, and fractures of the clavicle and humerus. Maternal complications include post-partum hemorrhage, and more severe perineal lacerations and sphincter tears. Several maneuvers exist to relieve shoulder dystocia, but no one sequence of maneuvers has proven to be the most effective (Table 1). The McRoberts maneuver is recommended as the initial technique of choice, as this is non-invasive and the easiest to perform [2] (Fig. 1).

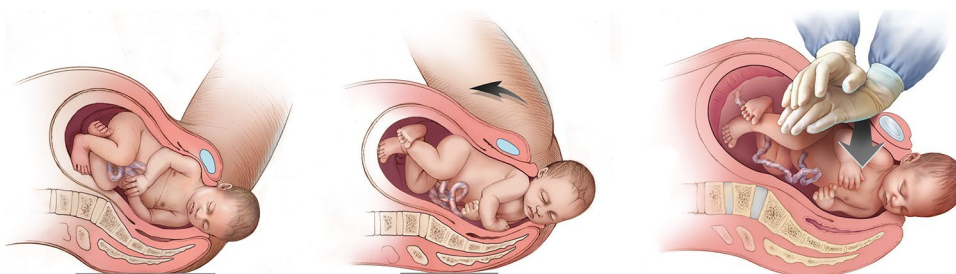
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What cord emergencies may arise and how do we manage them?

Nuchal cords around the neck are common, present in up to 20% of deliveries [3]. The cord is usually loosely wrapped and can be gently pulled over the fetal head, or alternatively can be moved caudally over the shoulders. If the cord is tight, it will likely not impede the delivery, but rarely may need to be clamped and cut prior to delivery. This should be considered as a last resort given the associated fetal complications of hypovolemia, anemia, and hypoxic-ischemic encephalopathy if delivery is not achieved in a timely manner.

Cord prolapse is less common, however can result in serious complications, carrying a 6–10% mortality rate [4]. The mainstay of treatment is urgent cesarean delivery. Manual transvaginal elevation of the presenting part can be performed immediately to reduce cord compression. This can then be taken over by other maneuvers, including placing the mother in Trendelenburg and knee-chest positioning and filling the maternal bladder. A warm, moist wrapping should be used to protect the cord from trauma and to

Fig. 1 McRoberts maneuver and suprapubic pressure.
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reduce vasospasm from the cold external environment [4]. If an emergency cesarean delivery is not available, a vaginal delivery should be performed as rapidly as possible.

How do we manage post-partum hemorrhage (PPH)?

Uterine atony accounts for the vast majority of PPH. Uterotonic agents must be started with concurrent bimanual uterine massage, and foley should be inserted to decompress the bladder. Oxytocin is the uterotonic agent of choice. A 20 unit/L bag is rapidly infused until tone is achieved, followed by 7–15 units/hour [5]. If bleeding continues, a second-line agent should be added. Options include misoprostol 200–400 µg SL, ergotamine 250 µg IM/IV or carboprost 250 µg IM. If a second-line agent is to be used, 1 g of tranexamic acid IV should also be administered [5]. If there are any retained placental fragments, they can be gently extracted using blunt dissection with a bimanual uterine exploration. Search for any traumatic hematomas or lacerations, which can initially be managed with direct pressure. Finally, if there are any suspected coagulopathies, consider replacement of clotting factors. If these initial attempts at hemostasis fail, other strategies may include uterine tamponade with tranexamic-soaked gauze or insertion of an intra-uterine balloon tamponade device. Possible surgical interventions include uterine compression sutures, uterine artery embolization, and hysterectomy.

Case resolution

The patient is brought into your resuscitation bay. You have prepared a room for the mother and a room for the baby, including a neonatal warmer and neonatal resuscitation equipment given the higher rates of complications. Your examination reveals an actively crowning baby. After delivery of the head, you feel a loose nuchal cord around the neck, which you slip over the baby's head and deliver successfully.

Key points

1. While ED deliveries are an infrequent event, they are associated with higher rates of maternal and fetal complications.
2. Delivery begins with a controlled descent of the head, followed by delivery of the anterior shoulder, posterior shoulder, cord clamping, and placental delivery.
3. In managing shoulder dystocia, a structured and methodical approach is helpful in this high-risk situation, with the McRoberts as the initial maneuver of choice.
4. Nuchal cords are common and often not harmful. Pro-lapsed cords are more rare and more life threatening, usually requiring urgent operative delivery.
5. Uterine atony is the most common cause of PPH, with treatment including bimanual uterine massage and administration of an uterotonic agent.

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Declarations

Conflict of interest The authors declare they have no conflict of interest or financial support.

References

1. McLelland G, McKenna L, Morgans A, Smith K. Epidemiology of unplanned out-of-hospital births attended by paramedics. *BMC Pregnancy Childbirth*. 2018;18(1):15. <https://doi.org/10.1186/s12884-017-1638-4>.
2. ACOG Committee on Practice Bulletins-Gynecology, The American College of Obstetrician and Gynecologists. 2002 ACOG practice bulletin clinical management guidelines for obstetrician-gynecologists. Number 40. *Obstet Gynecol*. 100(5 Pt 1):1045–50.
3. Hayes D, Warland J, Parast M, Bendon R, Hasegawa J, Banks J, et al. Umbilical cord characteristics and their association with adverse pregnancy outcomes: a systematic review and meta-analysis. *PLoS ONE*. 2020;15:9 e0239630. <https://doi.org/10.1371/journal.pone.0239630>.
4. Wong L, Kwan A, Lau S, Sin W, Leung T. Umbilical cord prolapse: revisiting its definition and management. *Am J Obstet Gynecol*. 2021;225(4):357–66. <https://doi.org/10.1016/j.ajog.2021.06.077>.
5. Robinson D, Basso M, Chan C, Duckitt K, Lett R. Guideline No. 431: postpartum hemorrhage and hemorrhagic shock. *J Obstet Gynaecol Can*. 2022;44(12):1293–310. <https://doi.org/10.1016/j.jogc.2022.10.002>.