**Chapter 44
Childbirth emergencies**

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**General considerations and resource management**

Out-of-hospital deliveries not attended by physicians or midwives are a rare occurrence, comprising less than 2% of all births in the US [1]. The majority of out-of-hospital deliveries encountered by EMS personnel are uncomplicated vertex presentations and require only routine supportive care of both mother and neonate [1–3]. Maternal risk factors for unattended out-of hospital delivery include younger maternal age, multiparity, and poor prenatal care [3]. These same risk factors are associated with not only prematurity but higher incidence of fetal morbidity and mortality [3]. Literature over the last two decades shows a trend towards increasing numbers of unattended out-of-hospital deliveries and an increasing medicolegal burden of such cases [1]. It is imperative that medical directors provide robust training, protocol, and direct medical oversight support to crews managing out-of-hospital births.

Due to the low frequency and high-risk nature of unattended out-of-hospital births, along with the significant emotional component of these situations for both patient and provider, catastrophic outcomes are possible and do occur. It is important for EMS personnel to realize that the same risk factors that contribute to unattended out-of-hospital birth also contribute to prematurity (often extreme) and neonatal morbidity. Some complications are not amenable to successful resolution within the scope of practice of prehospital providers and will necessitate temporizing measures and rapid transport. The most practical approach is to focus training on the methodical application of interventions within the scope of care and whenever possible to expedite transport to an appropriate receiving facility.

Resource management at the scene of an unattended out-of-hospital childbirth also presents challenges as there will be at minimum two patients for the prehospital personnel to manage. As the proportion of overall pregnancies involving multiple gestations continues to rise, it is reasonable to expect EMS personnel to encounter increasing numbers of multiple birth situations, further complicating resource management. The request for additional resources, if available, should be made as soon as a multiple gestation birth, an abnormal presentation, or other childbirth emergency is identified. In some systems mother and neonate may also require transport to separate receiving facilities. Finally, given the emotionally charged nature of an out-of-hospital childbirth, attention must be paid to caring for other family members or loved ones on scene to ensure not only their support but also that they do not interfere with the provision of appropriate care.

**Management of abnormal presentations**

**Umbilical cord prolapse**

Umbilical cord prolapse is a rare complication characterized by an umbilical cord descending through the cervix prior to the presenting fetal part, and may lead to fetal distress if the fetus compresses the cord as it subsequently traverses the birth canal. Incidence of prolapsed unbiblical cord has been variously reported but is generally felt to occur in approximately 0.5–1% of all deliveries [4–6]. Although no specific data have been offered on the incidence of prolapsed umbilical cords encountered in the prehospital environment, it is reasonable to expect a rate generally similar to overall incidence.

Risk factors for prolapsed cord include abnormal presentation of the fetus (particularly breech), lack of prenatal care, twinning (particularly the second-born twin), and gestational diabetes/macrosomia [4,5]. The presence of a prolapsed cord is associated with lower Apgar scores and increased perinatal mortality, and it is imperative that the prehospital provider assesses for this potentially disastrous condition by visualizing the perineum. For crews with advanced fetal monitoring capability, unexplained fetal distress should prompt sterile vaginal exam to assess for the presence of this complication [5,7,8].

Emergency treatment of umbilical cord prolapse centers on the temporizing decompression of cord by elevation of the presenting fetal part followed by rapid delivery to remove the neonatal dependence on umbilical cord blood flow for oxygenation. Using a gloved hand, the provider gently elevates the presenting part. The exposed cord may be covered in a moist sterile towel. If Doppler is not available to assess cord blood flow, an attempt may be made detect pulsation in the cord; however, this may be faint and care must be taken to avoid further manual compression of the cord during palpation [7,8]. Because prolapsed cord is associated with abnormal presentations, rapid completion of delivery, particularly in the prehospital setting, may be less likely. Providers should expedite transport if at all possible in these situations while attempting to preserve cord blood flow via manual elevation of the presenting part as described above and positioning of the mother in the knee-to-chest position or steep Trendelenburg to aid in reducing pressure on the cord [8]. Most often, cesarean section is undertaken to expedite delivery once at the hospital [4,5,8].

**Breech**

Breech presentations are encountered in 3–4% of deliveries overall [9]. In the prehospital environment, one series showed a breech incidence of 2.5% (2/81). Both were feet-first breeches and neither was completely delivered in the field [2]. Breech presentations may be of three types: complete, with flexion at both hips and knees; incomplete or footling, where one or both hips are not flexed, resulting in a foot as the presenting part; and frank, where both hips are flexed and both knees are extended so that the legs lie along the abdomen of the fetus.

Complications during breech presentation are related to incomplete dilation of the cervix by a small presenting part, entrapment of the after-coming head, prolapsed cord (particularly with footling presentation), and injury due to excessive traction by the attendant [8,9]. There is general agreement that once a breech presentation is recognized, every effort should be made to obtain obstetric expertise and rapid availability of c-section. EMS clinicians should therefore initiate transport as soon as possible. If delivery is already in progress, the presenting body part should be wrapped in a towel and supported but not elevated. Providers should be alert for a prolapsed cord as this is a known complication of breech presentation. Traction should be avoided. If only an after-coming head remains undelivered, crews may be instructed to place fingers on the maxilla to gently flex the neck to facilitate passage of the head.

**Shoulder dystocia**

Shoulder dystocia is defined as failure of the fetal shoulders to deliver following delivery of the fetal head and occurs in between 0.2–3% of deliveries [7–11]. Some authors have proposed a more concrete definition based on a time interval of >60 seconds between delivery of the fetal head and shoulders and the necessity for maneuvers beyond simple gentle downward traction to facilitate delivery of the anterior shoulder, but there is not consensus [8,10]. Physiologically, shoulder dystocia results from the impaction of the fetal shoulders against the maternal pelvic inlet. Most commonly, the anterior fetal shoulder is impacted against the pubic symphysis, but the posterior fetal shoulder may also impact against the sacral promontory. The most common cause is fetal macrosomia. Dystocia may also be precipitated by very rapid delivery of the fetal head without time for the shoulders to appropriately rotate and possibly by overzealous external rotation of the fetal head by an inexperienced attendant [8]. There are no reliable prediction criteria for dystocia.

Shoulder dystocia is classically heralded by the “turtle sign” which involves the retrograde movement of the fetal head back into the introitus following its initial delivery. Shoulder dystocia should be suspected whenever delivery does not complete with gentle downward movement of the fetal head. It constitutes a true emergency and is associated with significant fetal morbidity and mortality resulting from mechanical injury to the brachial plexus and neck of the neonate and frank suffocation [7,8]. Fortunately, if the dystocia is relieved within a few minutes, the incidence of permanent injury and perinatal death is very low, having been reported to be between 0–1.6% and 0–2.9% respectively [10].

Disagreement exists over the optimal combination and sequence of maneuvers designed to relieve shoulder dystocia [11]. Interventions in the prehospital environment will likely be limited by the scope of practice of personnel unless an EMS physician is on scene. The primary focus should be on positioning and gentle suprapubic pressure to attempt to reduce the anterior shoulder impaction and facilitate completion of delivery.

The most commonly applied maneuver is McRoberts, which consists of hyperflexion of the maternal hips which results in increased sacral–pubic distance. This maneuver is easy to perform and is in fact used routinely by many obstetricians to prevent development of dystocia. McRoberts should be accompanied by application of suprapubic – *not fundal* – pressure. Application of the McRoberts maneuver alone has been reported to relieve approximately 40% of dystocias, and when suprapubic pressure was added, success climbed to nearly 60% [10]. If the combination of McRoberts and suprapubic pressure fails to relive the dystocia, a trial of rolling the patient to the “all fours” position (Gaskin maneuver) should be undertaken [11,12]. If the dystocia cannot be relieved with this sequence of maneuvers, focus should shift to immediate emergency transport for more invasive maneuvers.

Emergency medical services physicians may elect to attempt fetal rotation maneuvers (Woods corkscrew and Rubin) to complete delivery, or direct their crews to perform these maneuvers via on-line consult; however, providing adequate and effective guidance via radio or cell phone in these situations will likely be difficult [11,13–15]. If on scene, an EMS physician may also attempt replacement of the fetus into the uterus (Zavenelli maneuver) as a temporizing measure until cesarean section can be completed [14,15]. While episiotomy may be useful in facilitating such maneuvers, it is unlikely itself to relieve the bone-on-bone impaction of a shoulder dystocia [10]. Deliberate fracture of the fetal clavicle has also widely been described, but is not universally accepted as an appropriate practice [10].

**Vaginal hemorrhage**

Postpartum hemorrhage is the leading cause of maternal death worldwide and may be classified into primary and secondary hemorrhage. Primary occurs in the first 24 hours following delivery, and secondary occurs after 24 hours until weeks following delivery. Primary postpartum hemorrhage complicates 4–6% of pregnancies, although the incidence has recently been shown to be on the rise [16,17]. Most (80%) primary hemorrhage is due to uterine atony. Other causes include inherited coagulopathies (i.e. von Willebrand), retained placenta, placenta accreta, uterine inversion, and pelvic/vaginal trauma [16]. Secondary postpartum hemorrhage is most often due to retained products of conception with or without infection, and coagulopathies both inherited and acquired [16].

Prehospital management of postpartum hemorrhage centers on treatment of uterine atony, as this represents the majority of cases encountered. Fundal massage using a circular motion over the uterine fundus should be the first maneuver attempted by clinicians of all levels. Specialty or critical care transport units may also have the capacity to administer pharmacological agents to assist with uterine contraction such as oxytocin, misoprostol (Cytotec), methylergonovine (Methergine), and prostoglandins (Hemabate and Dinoprostone) [8,9,16]. Crews should establish large-bore IV access if not already done, and initiate fluid resuscitation per protocol for hemorrhagic shock.

Prehospital efforts to complete delivery of the placenta if it does not spontaneously deliver (i.e. traction on the umbilical cord) have the potential to exacerbate hemorrhage and may precipitate uterine inversion. They should be attempted under the direction of medical oversight, if at all. Bleeding from lacerations to the perineum and vagina should be controlled using standard hemorrhage control techniques, including direct pressure and vaginal packing if necessary [16]. If an inverted uterus is identified, direct medical oversight may consider having crews attempt manual reduction to facilitate hemorrhage control in remote locations with prolonged transport times.

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