Neonatal Complications: Recognition and Prompt Treatment of Shoulder Dystocia

ABSTRACT

The most common injuries associated with shoulder dystocia include fractures, brachial plexus nerve damage, and birth asphyxia. Between June 2004 and October 2008, the Pennsylvania Patient Safety Authority received 316 reports involving shoulder dystocia. Neonatal injuries were identified in 124 (39%) of these reports and included fractures, brachial plexus injuries, and death. There are several antepartum and intrapartum risk factors that contribute to shoulder dystocia, such as maternal gestational diabetes, fetal macrosomia, documented anencephaly, the use of forceps or vacuum extraction, and precipitous or prolonged second stage of labor. Shoulder dystocia risk management involves identification and communication of patients at risk for shoulder dystocia before delivery, the management of shoulder dystocia when it occurs to minimize potential injury to fetus and mother, thorough documentation and treatment upon discovery of the problem, and ongoing interdisciplinary simulation drills for all obstetric personnel that include the application of external and/or internal maneuvers. (Pa Patient Saf Advis 2009 Dec 16;6[Suppl 1]:18-25.)

The Problem

The American College of Obstetricians and Gynecologists (ACOG) practice guidelines describe shoulder dystocia as a delivery that requires additional obstetric maneuvers following the failure of the shoulders to deliver spontaneously with gentle downward traction on the fetal head.[1] The occurrence of shoulder dystocia is difficult to predict, although risk factors have been documented as gestational diabetes, fetal macrosomia, and previous occurrence of shoulder dystocia during birth, according to ACOG.[1] These complicated deliveries require prompt and systematic responses.[2] The competing major concern during shoulder dystocia is fetal hypoxia, which can result from compression of the neck and central venous congestion, compression of the umbilical cord, or reduction of the placental intervillous flow from prolonged increased intrauterine pressure, combined with secondary fetal bradycardia. While it is reasonable that prolonged head-to-shoulder interval thresholds may be associated with permanent central neurologic dysfunction, there is no clear consensus in the clinical literature on the amount of time allowed for the safe resolution of shoulder dystocia.[3]

The causes of shoulder dystocia are mechanical and are associated with impaction of the anterior fetal shoulder behind the maternal pubis symphysis or impaction of the posterior fetal shoulder on the sacral promontory, or impaction of both, which results in the fetal head being delivered while the shoulders are impacted.[1,2] Shoulder dystocia may result from the failure to deliver the fetal shoulder without using external or internal maneuvers. There is a subjective component of this diagnosis that requires internal and/or external maneuver determination by the delivery provider.[1] Shoulder dystocia is the fourth most common cause of medical litigation involving delivering providers and accounts for 11% of all obstetrics-related lawsuits.[2,4-7] The number of shoulder dystocia reports varies and ranges from 0.2% to 3% of all vaginal deliveries in the United States.[1,8] Between June 2004 and October 2008, the Pennsylvania Patient Safety Authority received 316 reports involving shoulder dystocia. In 124 (39%) of these reports, neonatal injuries, including fractures and brachial plexus injuries were identified, as well as deaths.

Risk Factors

Maternal Risk Factors

Maternal risk factors for shoulder dystocia include gestational diabetes, obesity, postterm pregnancy, advanced age, abnormal pelvic anatomy, and short stature. Intrapartum risk factors for shoulder dystocia include instrument-assisted vaginal delivery (forceps or vacuum), precipitous or protracted second-stage labor (one to three hours depending on parity and anesthesia), and delayed head-to-body delivery time. ACOG considers prolonged second stage of labor as the lack of continuing progress in a nulliparous woman for three hours with regional anesthesia or two hours without regional anesthesia, and the lack of continuing progress in a woman for two hours with regional anesthesia and one hour without regional anesthesia.[9]

Fetal Risk Factors

Fetal anthropometric variations and documented anencephaly are associated with increased risk of shoulder dystocia. Specific factors include fetal macrosomia, large chest or biparietal diameter, the absence of truncal rotation, and the fetal shoulders remaining in the anterior-posterior plane.[8] Most macrosomic neonates do not experience shoulder dystocia, but shoulder dystocia incidence increases from 5% to 9% among fetuses with nondiabetic mothers when weights increase from 4,000 to 4,500 g. Shoulder dystocia is a risk with fetal weight of 5,000 g or more but may also occur with fetuses of average weight.

Clinically Applied Forces

Fetal manipulation can be reasonably used during shoulder dystocia deliveries, but it is important for birthing providers to be aware of the natural tendency to increase applied traction when faced with a difficult delivery. Increasing clinically applied traction to the head during the birth process may produce

stretch injuries of the fetal brachial plexus.[7,10,11] Applying overly vigorous traction on the head or neck or excessively rotating the body may cause more serious damage to the neonate and severely stretch the brachial plexus nerve roots from the spinal column, potentially causing permanent loss of arm function.[5] Future function of affected fingers, hands, and arms will depend on which nerves are damaged.[5] The use of internal fetal maneuvers is associated with less clinically applied traction and less brachial plexus stretching, which are two critical determinants of mechanical birth injury in cases of shoulder dystocia.[12]

The extent of nerve injury depends on the magnitude and direction of the delivery force, as well as the rate at which it is applied.[7] Clinically applied forces may typically reach up to 10 lb of force traction during routine deliveries.[7] Obstetric brachial plexus injury is caused by the stretching of the nerves. If there is no mechanical disruption to the nerve or axons, the stretching results in temporary dysfunction known as neurapraxia. Ninety percent of obstetric brachial plexus palsy consists of neurapraxia, and complete recovery is expected.[7] Stretching beyond the brachial plexus elastic limit that results in the cutting or crushing of a nerve fiber, and in which part of the axon separates from the cell nucleus, results in Wallerian degeneration. There may be partial recovery in these cases, which often results in scarring and granuloma formation, known as neuroma. If the brachial plexus stretch is more severe, mechanical disruption produces a rupture in the nerve tract and sprouting neurons are typically unable to bridge the defect. These lesions can be grafted, which may result in restoring limited conduction. The most severe stretch injury is an avulsion in which the nerve roots become detached from the spinal cord.[7]

The direction of the clinically applied forces also determines the extent of the injury. If forces are applied axially with the cervical and thoracic vertebrae aligned, the brachial plexus is least stretched.[7] The greatest concentration of tension at Erb's point (formed by the union of the C5 and C6 nerve roots) occurs with lateral flexion of the neck, even with small amounts of traction.[7] Externally applied forces to the fetal head and neck increase the extent and degree of tension, which can misalign the head further from the opposite shoulder, producing a predictable and consistent injury.[7]

The rate at which forces are applied also affects the likelihood of injury. Rapidly applied forces are less tolerated by the brachial plexus than those applied in a smooth and slow manner. Allen et al. found two cases of fetal shoulder dystocia in neonates with similar birth weights and delivered with similar magnitude of force.[13] One neonate was delivered with clinically applied forces that were applied three times more rapidly than those experienced by the other neonate. While shoulder dystocia occurred in both cases, the neonate that was subjected to rapidly applied forces also sustained temporary brachial plexus injury.[13]

A randomized study by Crofts et al. found that 75 of 113 birthing providers applied much greater forces (two-thirds more) during simulated cases of shoulder dystocia than during simulated normal deliveries when the practitioners determined the level and applied the patterns of forces.[11]

Prolonged labor and the use of forceps or vacuum extraction are associated with increased risk for shoulder dystocia, although the risk is significantly greater with vacuum extraction. (For more information, see the article "Preventing Maternal and Neonatal Harm during Vacuum-Assisted Vaginal Delivery" in this issue.)

Uterine Forces

Sandmire and Demott indicate that one cause of brachial plexus injuries is the maternal uterine forces that occur during the mechanisms of labor.[14] The maximum uterine forces exerted in childbirth is around 35 lb.[7,10] This force occurs with the combination of McRoberts positioning (mother's thighs are abducted and hyperflexed onto the abdomen) and the valsalva maneuver. Although 35 lb may appear to be sufficient to cause injury, the forces are transmitted axially and do not typically cause lateral deviation of the head from the shoulders, which is needed to stretch the brachial plexus beyond its limit. The stretching of the brachial plexus to deviation is more likely to be caused by uterine malformation. Still, it is important, particularly in the case of shoulder dystocia, to note that the birthing clinician apply the least amount of traction to the fetal head.[7]

Pennsylvania Patient Safety Authority Reports

In the 316 shoulder dystocia Incidents and Serious Events reported to the Pennsylvania Patient Safety Authority from June 2004 to October 2008, 124 (39%) of the neonates experienced injuries associated with shoulder dystocia. (See Table 1.) Forty-one percent of these patients experienced skeletal fractures, 25% developed decreased limb movement, 12% resulted in Erb's palsy and brachial plexus injury, and 2% died. (See Table 2.) Examples follow of shoulder dystocia events that were reported through the Authority's reporting system.

Table 1. Shoulder Dystocia Events Reported to the Pennsylvania Patient Safety Authority, June 2004 through October 2008

INJURIES ASSOCIATED WITH SHOULDER DYSTOCIA	NUMBER OF REPORTS	PERCENTAGE
No reported injuries associated with shoulder dystocia	192	61%
Reported injuries associated with shoulder dystocia	124	39%
Total	316	100%

Table 2. Neonatal Injuries Associated with Shoulder Dystocia Reported to the Pennsylvania Patient Safety Authority, June 2004 through October 2008

NEONATAL INJURIES	NUMBER OF REPORTS	PERCENTAGE OF NEONATAL INJURIES (N = 124)	PERCENTAGE OF ALL SHOULDER DYSTOCIA REPORTS (N = 316)
Skeletal injuries (clavicular fracture, humeral fracture)	51	41%	16%
Decreased limb movement	31	25%	10%
Erb's palsy and brachial plexus injury	15	12%	5%
Crepitus	7	6%	2%
Cephalohematoma/subdural hemorrhage	4	3%	1%
Death	3	2%	1%
Other (audible pop or click, bruising, laceration)	63	51%	20%
Total (may have multiple, overlapping injuries)	174		

Fracture and Brachial Plexus Injury

A macrosomic infant was born to a diabetic mother. Shoulder dystocia [was identified and] resulted in an undisplaced clavicle fracture and brachial plexus injury. The need for full CPR [cardiopulmonary resuscitation] in the delivery room [occurred upon delivery of the infant]. The infant [was resuscitated].

Decreased Limb Movement

During a spontaneous [full-term] vaginal delivery of a viable [fetus], a shoulder dystocia occurred. The McRoberts maneuver was performed along with [the application of] suprapubic pressure. After the delivery, it was noted that the baby had decreased movement of the right arm. The diagnosis of brachial plexus palsy [was made].

Erb's Palsy

A forceps-assisted delivery for maternal exhaustion [was conducted]. Shoulder dystocia [was identified and] reduced with the McRoberts maneuver. Approximately 24 seconds elapsed from the delivery of [the baby's] head to delivery of the shoulders. On initial assessment, the baby was noted to have a flaccid arm and was diagnosed with shoulder dystocia and Erb's palsy. [The baby's] arm remained flaccid throughout the [hospital] stay.

Death

A [multiparous] mother with diabetes was admitted in active labor. [Fetal heart rate] began to show some decelerations with minimal variability. [Several hours later, the mother] was fully dilated and pushing when a shoulder dystocia was noted. [The application of] suprapubic pressure and McRoberts [maneuver] were unsuccessful. An emergency cesarean section was done. A [full-term neonate] was [delivered] with Apgars of 0/0/0.

Several of the facilities that reported shoulder dystocia events through the Authority's reporting system identified contributing risk factors that led to the injuries sustained during antepartum care, intrapartum care, and at delivery. Maternal gestational diabetes, fetal macrosomia, and documented anencephaly were listed as antepartum contributing risk factors. Use of

vaginal instrumentation by the delivering practitioner and delayed second stage of labor were among the intrapartum contributing risk factors. Injuries that were reported at delivery as the result of shoulder dystocia included fetal skeletal injuries, decreased limb movement, brachial plexus injuries, fetal lacerations, and fetal subdural hemorrhage. Fetal death was also reported.

A number of reports contained recommendations in response to the shoulder dystocia events. One hundred eighteen of the recommendations were identified as system improvements that facilities planned to implement to prevent recurrence of shoulder dystocia. Thirty-one percent of the reports that listed recommendations included peer review of the event through mortality and morbidity meetings, department meetings, or patient safety and quality assurance committees. (See Table 3.) Seven (6%) of the recommendations listed use of alternative maneuvers during the birthing process, including limiting the use of forceps, using the McRoberts maneuver, and considering earlier conversion to a cesarean section. In seventy-one (60%) of the recommendations, no system issues were reported and shoulder dystocia was listed as an unavoidable complication of childbirth. Two (2%) of the recommendations were for earlier documentation of shoulder dystocia diagnosis. In five (1.6%) of the events, facilities reported conducting a root-cause analysis (RCA) and listed staffing levels, physical assessment, use of alternative maternal or fetal maneuvers, the care planning process, and communication with patient and family as factors that contributed to these events. One hundred eighty (57%) of the reports stated that the facility did not conduct an RCA, and 131 (41%) of the reports did not indicate whether an RCA would be conducted.

Complications
Maternal Complications

Literature indicates maternal complications associated with shoulder dystocia include postpartum blood loss; hemorrhage; uterine atony; rectovaginal fistula; symphyseal separation or diathesis, with or without

transient femoral neuropathy; third- or fourth-degree episiotomy or tearing; and uterine rupture.[1,3,5]

Fetal Complications

Fetal complications resulting from shoulder dystocia include brachial plexus and palsy injuries (Erb's, Klumpke, and Erb-Duchenne-Klumpke palsy), fractures (clavicle or humerus), hypoxia (with or without neurologic damage), and death.[1,3,5] The most common fetal complication is brachial plexus injury, which occurs in 4% to 15% of neonates with shoulder dystocia.[3,5,15] (See Figure 1.) According to Gross et al., the external application of fundal pressure resulted in a 77% complication rate and is strongly associated with fetal orthopedic and neurologic damage.[4]

The examples below represent events reported to the Authority about shoulder dystocia complications that indicated use of external fundal pressure.

> [The mother] continued [to] push with no progress. [The decision was] made to use a vacuum. An episiotomy was performed and the vacuum was applied [several] times. The fetal head was delivered and mild shoulder dystocia [was discovered and] resolved after one minute with the McRoberts maneuver and fundal pressure. [A maternal] laceration was discovered after the baby was delivered.

> Infant was born by vaginal delivery and a shoulder dystocia occurred. At time of shoulder dystocia, the mother was placed in McRoberts position and fundal pressure was applied. Upon delivery, the infant was bagged and stimulated prior to spontaneous respirations. Apgar scores were 3 and 6. It was observed at that time that the infant had decreased movement of the right arm.

While most incidents of brachial plexus injuries are associated with shoulder dystocia, there is clinical literature indicating that permanent brachial plexus injuries have occurred that are not associated with shoulder dystocia or delivering provider traction. It is likely that there may be significant biological variability in the predisposition of brachial plexus injury in individual neonates.[6,15] This variation depends on the delivery difficulty and requires the subjective application of secondary maneuvers by the delivering provider.

Guidelines

There are no evidence-based guidelines for the prediction, prevention, or management of shoulder dystocia. The current practice guidelines are based on limited scientific evidence and the consensus opinions of experts.[2] ACOG developed these practice guidelines to aid obstetric practitioners in making decisions about appropriate obstetric care.[1] Most cases of shoulder dystocia cannot be predicted or prevented because there is no accurate method to identify fetuses that will develop this complication.[1] Ultrasound measurements to estimate macrosomia have limited accuracy. Planned cesarean delivery based on *suspected* macrosomia is not a reasonable strategy, but

| Table 3. Recommendations Listed by Facilities Associated with Shoulder Dystocia Reported to the Pennsylvania Patient Safety Authority, June 2004 through October 2008	
RECOMMENDATIONS	**REPORTS**
No system recommendations identified	71 (60%)
Peer review, department meeting, morbidity and mortality	37 (31%)
Consider cesarean section conversion earlier	4 (3%)
Limit forceps use and application of external maneuvers	3 (3%)
Better documentation	2 (2%)
Other	1 (1%)
Total (may have multiple, overlapping recommendations)	118 (100%)

a planned cesarean delivery may be reasonable for the nondiabetic mother with an estimated fetal weight exceeding 5,000 g or for the diabetic mother whose fetus is estimated to weigh more than 4,500 g.[1] Macrosomic neonates of diabetic mothers are characterized by larger shoulder and extremity circumferences, decreased head-to-shoulder ratio, higher body fat, and thicker upper-extremity skin folds compared with neonates of nondiabetic mothers of similar birth weight.[1] The intensive treatment of maternal diabetes during pregnancy may reduce the risk of neonatal macrosomia and fetal shoulder dystocia.[1]

Shoulder Dystocia Management

The appropriate management of shoulder dystocia is based on the recognition of risk factors. As part of antenatal care, a thorough patient history would include maternal age, parity, week of gestation, and birth history. Noting the birth weight of the mother's other infants in the case of multiparity is extremely important because subsequent births may result in shoulder dystocia.[2,5] Other important patient information to obtain includes whether forceps and/or vacuum extraction were used in previous deliveries. Any delivery in which the neonate experiences a fracture may suggest shoulder dystocia.[5] Prenatal laboratory and diagnostic studies including glucose screening or any history of maternal diabetes may also indicate propensity for shoulder dystocia. If available, fetal ultrasound reports may help rule out macrosomia and can be used to estimate fetal weight, although their accuracy may be limited.[3,5] Measurement of fundal height can assist in determining whether the uterine size is consistent with gestational age. Documentation of estimated fetal weight is very important, despite the controversy and margin of error because the failure to assess and document fetal weight during pregnancy or labor may constitute a deviation from the standards of practice.[8] Reporting any suspicion of fetal macrosomia to the delivering provider will help the team collaborate and

Figure 1. Brachial Plexus Injury
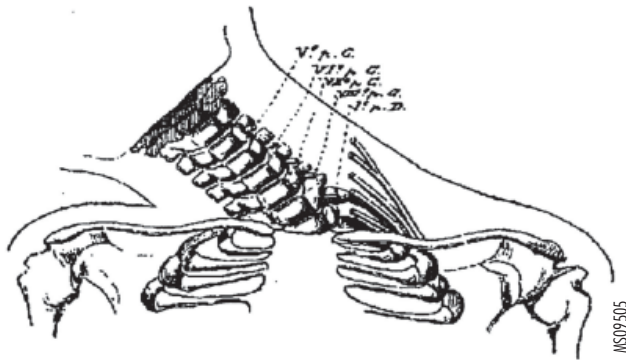
Source: Allen RH. On the mechanical aspects of shoulder dystocia and birth injury. *Clin Obstet Gynecol* 2007 Sep; 50(3):607-23.

implement an interdisciplinary plan for the management of a shoulder dystocia emergency.[2]

Maneuvers for Relieving Shoulder Dystocia

The objective for the relief of shoulder dystocia is to compensate for the incompatible fetal shoulder and maternal pelvic dimensions by changing the relative positions of the maternal pelvis and the fetal shoulders. This may be accomplished by shrinking the fetal shoulder width, and/or manually performing a forward-progressing rotational movement of the fetal shoulders within the birth canal.[10] The use of internal, rotational maneuvers takes better advantage of the maternal pelvic geometry.[10] The successful resolution of shoulder dystocia requires at least one of the following four components:[3]

1. Flatten the maternal sacrum and fetal cephalad rotation of the symphysis using the external McRoberts maneuver to reorient the maternal pelvis.

2. Collapse the fetal shoulder width by the external application of suprapubic pressure—*not* fundal pressure, which may impact the shoulder further.

3. Alter the orientation of the longitudinal axis of the fetus plane through internal rotation maneuvers.

4. Replace the bisacromial shoulder with the axiallary-sacromial width by delivering the posterior arm.

The order of these maneuvers is not as important as their effective and appropriate use. The persistent use of one ineffective maneuver may interfere with safe maternal and fetal outcomes.

- The McRoberts maneuver is the sharp flexion of the maternal thighs against the abdomen to achieve pelvic tilt and straightening of the lumbosacral joint. This maneuver is generally simple to perform.[12] The combination of the external McRoberts maneuver with suprapubic pressure relieves about 50% of shoulder dystocia cases. The mechanical effect of the McRoberts positioning—cephalad rotation of approximately 15°—lifts the pubis symphysis up approximately 1 cm and may

be sufficient to clear the obstructed anterior shoulder.[10] This action causes cephalad rotation of the pubis symphysis, reducing the inclination of the pelvic inlet and offering a greater anteroposterior diameter for the fetal shoulders. This also increases net expulsive forces by converting voluntary maternal pushing efforts into enhanced intrauterine pressure independently of contractions.[7,16] Typically, the use of suprapubic pressure results in downward force on the anterior fetal shoulder, facilitating its disimpaction above the pubis symphysis. (See Figure 2.) Failure of these maneuvers may indicate a more severe degree of shoulder dystocia and the need to use internal maneuvers.[16]

- The Rubin's maneuver is an internal rotation maneuver that adducts the fetus's shoulder girdle, thus reducing its diameter.[3] It consists of inserting the fingers of one hand into the vagina to the area behind the posterior aspect of the fetus's anterior or posterior shoulder and rotating the shoulder toward the fetal chest. Some healthcare providers perform this in concert with the external McRoberts maneuver to facilitate its success.[3] Lowering the bed may facilitate these maneuvers.[16]

- The Woods' corkscrew maneuver may be attempted if the Rubin's maneuver is unsuccessful. In this internal maneuver, the delivering provider places at least two fingers on the anterior aspect of the fetal posterior shoulder and applies gentle upward pressure around the circumference of the arc in the same direction as the Rubin's maneuver, creating a more effective rotation. These two maneuvers may be used together to increase torque forces by using two fingers behind the fetal anterior shoulder and two fingers in front of the fetal posterior shoulder. This may be difficult for the delivering provider due to limited space for the hand of the provider. The downward traction should be continued during these maneuvers, similar to the rotation of a screw being removed. It is important to note that the episiotomy has no direct effect in releasing shoulder dystocia, which is a primary issue of bony impaction. Episiotomy is a soft tissue procedure and will provide additional room for the healthcare providers' hand to perform internal maneuvers, if necessary.[3,16]

- The Reverse Woods' corkscrew maneuver may be necessary to adduct the fetal posterior shoulder out of the impacted position and into an oblique plane for delivery if the Woods' corkscrew maneuver is not successful.[3] The 30° rotation of the shoulders from their pathologic orientation of the Rubin's maneuver provides 2 cm more room for the passage of the fetal shoulders.[10] The delivery of the posterior arm before the shoulders reduces the bisacromial diameter, leaving only the axilloacromial diameter. The delivering provider locates the posterior shoulder and nudges it anteriorly. The fetal elbow is flexed and the forearm is delivered in a sweeping motion over the anterior fetal chest

wall. The posterior hand is followed by the arm and shoulder, thus facilitating the neonate's delivery. The fetus will likely spontaneously rotate in a corkscrew manner as the arm is removed, followed by the anterior shoulder falling under the symphysis, then delivery.[3,16] It is important to note that the delivery of the posterior arm maneuver has an increased rate of humeral fractures.[16]

- Delivery of the posterior arm combined with the Rubin's or McRoberts maneuver affords the potential for 4 cm of additional space.[10] Internal maneuvers also offer kinematic advantages over external maneuvers in resolving shoulder dystocia and take better advantage of maternal pelvic geometry. These maneuvers may be performed as early as possible in the management algorithm or in conjunction with the McRoberts maneuver.[10,12] These maneuvers are associated with reduced clinically applied traction and less brachial plexus stretching—two critical determinants of mechanical birth injury associated with shoulder dystocia.[12]

- The all-fours maneuver may also be used to facilitate delivery. For this maneuver, the mother is positioned on her hands and knees, and the effects of gravity and increased space in the hollow of the maternal sacrum facilitate delivery of the posterior shoulder and the arm.[3] Rapid delivery ensues within approximately two to three minutes in more than 80% of the deliveries when the all-fours maneuver is used, as described in one study.[16]

Several maneuvers of last resort for shoulder dystocia can be considered only in dire emergencies when external and internal maneuvers fail to achieve delivery. These procedures are associated with the highest rates of fetal injury and maternal trauma. These maneuvers include the deliberate fetal clavicle fracture, the cephalic replacement maneuver, hysterotomy (upper-segment uterine incision), and symphysiotomy.[3,16]

Maneuver Sequence

While there are no specific guidelines on the sequential use of shoulder dystocia maneuvers, facilities and birthing centers may consider using a set pattern of steps that providers can follow during births and interdisciplinary drills. When shoulder dystocia is diagnosed and the delivering provider encounters inadequate progression of dilatation and descent in labor, it is important to communicate signs and summon the obstetric rapid response team. The availability of emergency resuscitation equipment is also essential, in order to provide the safest and most effective care for the mother and fetus during the delivery. Having a set plan means that all involved birthing personnel will be familiar with the delineation of care and responsibilities. The delivering provider directs the obstetric team (obstetric assistants, anesthesia providers, neonatal support personnel), but each member has specific responsibilities. Facilities may consider developing protocols to designate

Figure. 2 Shoulder Dystocia and the Application of Suprapubic Pressure
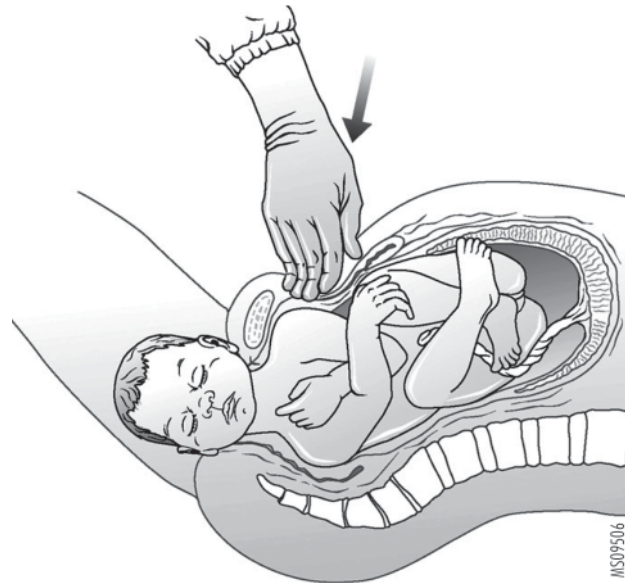
Reprinted from Gottlieb AG, Galan HL. Shoulder dystocia: an update. Obstet Gynecol Clin North Am 2007 Sep;34(3):501-31, with permission from Elsevier (http://www.sciencedirect.com/science/journal/08898545).

these responsibilities and regular shoulder dystocia drills may be helpful to rehearse such an emergency. Documentation is very important to provide a record of the timing of each maneuver so that if one is not successful after a reasonable amount of time, another can be attempted. The reasonable amount of time is determined by each facility.[3,16]

Interdisciplinary drills include a set of maneuvers performed sequentially by delivering providers as needed to complete vaginal deliveries. Conducting simulation drills may better prepare delivering providers and other obstetric personnel to perform an organized emergency management when an impacted fetal shoulder occurs.[15] Drills may provide the obstetric team with the skill set to respond adequately to these crisis scenarios. Consider the use of a mnemonics inventory that lists all possible external and internal maneuvers that may be used for the systematic resolution of shoulder dystocia. Refer to the two mnemonics (see "BE CALM" and "HELPERR") that document possible external and internal maneuvers, designed for the resolution of shoulder dystocia.

Documentation

It is also important to document in the postpartum record any physical abnormalities of the neonate such as bruising or lack of arm muscle tone. Provide factual information and consistently document any episode of shoulder dystocia encountered by all birthing personnel.[5]

BE CALM

The BE CALM mnemonic outlines the external and internal maneuvers that may be used when shoulder dystocia occurs.

*B*reathe; do not push

*E*levate legs to McRoberts position

*C*all for help

*A*pply suprapubic pressure (*not* fundal pressure)

En*L*arge vaginal opening

*M*aneuvers

Source: Camune B, Brucker MC. An overview of shoulder dystocia: the nurse's role. *Nurs Womens Health* 2007 Oct;11(5):488-97.

HELPERR

The HELPERR mnemonic outlines the external and internal maneuvers that may be used when shoulder dystocia occurs.

Call for *H*elp

*E*valuate for episiotomy

*L*egs (use the McRoberts maneuver)

Suprapubic *P*ressure

*E*nter maneuvers (internal rotation)

*R*emove the posterior arm

*R*oll the patient

Sources: Camune B, Brucker MC. An overview of shoulder dystocia: the nurse's role. *Nurs Womens Health* 2007 Oct;11(5):488-97; Baxley EG, Gobbo RW. Shoulder dystocia. *Am Fam Physician* 2004 Apr 1;69(7):1707-14.

During postpartum care and following all complicated deliveries, a discussion with the mother and family is conducted. It is important that the delivery events be documented. If shoulder dystocia has been diagnosed or a brachial plexus injury has been identified, speculation about its cause or incomplete documentation may be difficult to defend in a legal case. The following information is useful to document when encountering a delivery complicated by shoulder dystocia for retrospective review.[14]

- When and how the shoulder dystocia was diagnosed[14]
- Progress of labor (active phase and second stage)[14]
- Presence of the "turtle sign" (the tight retraction of the delivered fetal head against the maternal perineum)[1,2,4,5]
- Position and rotation of the fetus's head[14]
- Presence of an episiotomy[14]
- Whether anesthesia was required[14]

- Estimation of force and duration of traction applied[14]
- Order, duration, and results of maneuvers used[14]
- Duration of shoulder dystocia[14]
- Documentation of adequate pelvimetry before initiating labor induction or augmentation[14]
- Neonatal and obstetric providers impressions of the neonate after delivery[14]
- Information given to the mother that shoulder dystocia has occurred[14]
- Personnel involved in delivery[14]

Conclusion

While it is difficult to accurately predict or prevent shoulder dystocia, delivering healthcare providers can be prepared when this obstetric emergency occurs. Antepartum care includes the consideration of maternal and fetal risk factors. Intrapartum care includes the prompt identification, quick diagnosis, and management of shoulder dystocia. The delivering provider obtains assistance from the obstetric team, which provides emergency care for the mother and fetus throughout the delivery. Prompt application of various external and/or internal maneuvers as specified by each organization may provide quick resolution of the shoulder dystocia. Facilities may consider providing mandatory and ongoing interdisciplinary drills for all obstetric personnel that include the application of external and/or internal maneuvers. Above all, complete documentation will provide all healthcare personnel, patients, and their families with a clear understanding of the events that led to the discovery and resolution of the shoulder dystocia, brachial plexus injury, or any other obstetric emergency.

Notes

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Self-Assessment Questions

The following questions about this article may be useful for internal education and assessment. You may use the following examples or come up with your own.

1. All of the following clinical manifestations are useful when determining fetal risk factors for shoulder dystocia EXCEPT:
    a. Documented anencephaly
    b. Fetal anthropometric variations
    c. Fetal shoulders remaining in the anterior-posterior plane
    d. Ultrasound measurements for macrosomia

2. The strategies for the successful resolution of shoulder dystocia include all of the following EXCEPT:
    a. Collapse the fetal shoulder width by the external application of fundal pressure.
    b. Alter the orientation of the longitudinal axis of the fetus plane through internal rotation maneuvers.
    c. Replace the bisacromial shoulder with the axiallary-sacromial width by delivering the posterior arm.
    d. Flatten the maternal sacrum and fetal cephalad rotation of the symphysis using external maneuvers.

3. Which of the following interventions should not be implemented when shoulder dystocia is encountered?
    a. Apply McRoberts maneuver with suprapubic pressure.
    b. Increase traction on the fetal head and rotate the body.
    c. Position the mother in the all-fours maneuver.
    d. Perform Rubin's rotation maneuver with McRoberts maneuver.

4. A birthing provider encounters fetal shoulder dystocia during a delivery. The provider performs external maneuvers and applies suprapubic pressure without success. Internal rotation maneuvers are successful in releasing the fetal shoulder, but the neonate is noted to have a flaccid arm at delivery. Erb's palsy is diagnosed and communicated to the mother.

    The components for accurate and detailed documentation when encountering shoulder dystocia include all of the following EXCEPT:
    a. Order, duration, and results of all maneuvers used
    b. Position and rotation of the fetus's head
    c. Prediction for future shoulder dystocia births
    d. Lack of arm muscle tone of the neonate
    e. Information given to the mother that shoulder dystocia has occurred

5. All of the following labor and delivery factors increase risk for shoulder dystocia EXCEPT:
    a. Increased maternal anteroposterior pelvic diameter
    b. Instrument-assisted vaginal delivery (forceps or vacuum)
    c. Delayed head-to-body delivery time
    d. Prolonged second-stage labor

PENNSYLVANIA PATIENT SAFETY ADVISORY

THE PENNSYLVANIA PATIENT SAFETY AUTHORITY AND ITS CONTRACTORS

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An Independent Agency of the Commonwealth of Pennsylvania

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