

Technical Tips

EMERGENCY DEPARTMENT MANAGEMENT OF SHOULDER DYSTOCIA

Daniel A. del Portal, MD,* Amanda E. Horn, MD,* Gary M. Vilke, MD,† Theodore C. Chan, MD,† and Jacob W. Ufberg, MD*

*Department of Emergency Medicine, Temple University School of Medicine, Philadelphia, Pennsylvania and †Department of Emergency Medicine, University of California, San Diego Medical Center, San Diego, California

Reprint Address: Daniel A. del Portal, MD, Department of Emergency Medicine, Temple University School of Medicine, 1316 W. Ontario Street, Jones Hall, 10th Floor, Philadelphia, PA 19140

□ **Abstract—Background:** Precipitous obstetric deliveries can occur outside of the labor and delivery suite, often in the emergency department (ED). Shoulder dystocia is an obstetric emergency with significant risk of adverse outcome. **Objective:** To review multiple techniques for managing a shoulder dystocia in the ED. **Discussion:** We review various techniques and approaches for achieving delivery in the setting of shoulder dystocia. These include common maneuvers, controversial interventions, and interventions of last resort. **Conclusions:** Emergency physicians should be familiar with multiple techniques for managing a shoulder dystocia to reduce the chances of fetal and maternal morbidity and mortality. © 2014 Elsevier Inc.

□ **Keywords—**shoulder dystocia; emergency department

INTRODUCTION

Shoulder dystocia (SD), the impaction of the fetal anterior shoulder behind the maternal pubic symphysis, is an obstetric emergency that may be encountered in the emergency department (ED) during a precipitous delivery. SD occurs due to fetal presentation with the bisacromial diameter occupying the anteroposterior plane, rather than a slightly oblique plane as occurs in normal deliveries. The reported incidence of SD varies widely in the literature, ranging from 0.2% to 7% of cephalic vaginal

deliveries (1–3). This wide variation in incidence is due in part to the difficulty in diagnosing SD, which may best be defined as an increased time between delivery of the fetal head and body or the need for obstetrical maneuvers to facilitate delivery (4). Despite its infrequent occurrence, SD is important to recognize because it requires rapid definitive action; moreover, lack of familiarity with management may result in fetal disability or death.

Risk Factors

Most predisposing factors in SD relate to the mother: diabetes mellitus, obesity, excessive weight gain, multiparity, postterm gestation, and previous history of SD. Fetal macrosomia, which is often related to gestational diabetes mellitus, is also a risk factor. However, about half of reported cases of SD occur without identifiable risk factors (5).

Diagnosis

The diagnosis is made when the clinician is unable to achieve delivery of the fetal anterior shoulder with gentle downward traction on the fetal head. It may also be recognized when, after delivery of the head, the fetal chin retracts back onto the maternal perineum (“turtle sign”).

DISCUSSION

Preparation

Ideally, plans should be in place for responding to any precipitous ED delivery. This is even more important when shoulder dystocia occurs. The emergency practitioner faced with shoulder dystocia should call immediately for assistance. At least two nurses or medically trained technicians should be available to assist in some of the maneuvers that may be required for delivery. Available specialists should be contacted to provide emergent on-site assistance: an obstetrician and an anesthesiologist in the event that surgical delivery is required or that the dystocia cannot be resolved emergently, and a second physician capable of neonatal resuscitation. Equipment should be prepared for both a complicated delivery and for a potential neonatal resuscitation.

Standard adult airway equipment, including suction apparatus, and resuscitation medications should be readily available. In addition, a newborn warmer equipped with suction, a cardiorespiratory monitor, and blankets should be prepared. A standard obstetrical pack including the tools listed in [Table 1](#) should be available (6). A tocolytic agent, such as terbutaline 0.25 mg for subcutaneous injection, should be prepared in the event that cephalic replacement (described below) is necessary, and uterotonic agents such as oxytocin, ergot alkaloids (methylergonovine, ergometrine), or prostaglandins (misoprostol, carboprost) should be available as in any

Table 1. Supplies for Precipitous Emergency Department Delivery

Antiseptic solution
Sterile gloves
#11 Blade scalpel
Surgical scissors
Absorbable suture
Hemostats
Cord clamps
Towels
Sterile sponges, 4 × 4
Rubber bulb syringe
Laryngoscope with straight blades, No. 0 (preterm) and No. 1 (term)
Suction catheters (5F to 14F)
Neonatal endotracheal tubes (2.5-, 3.0-, 3.5-, 4.0-mm internal diameter)
CO ₂ detector or capnography setup
Neonatal Ambu bag
Newborn and premature-size face masks
Oxygen source
Neonatal incubator/warmer
Cardiorespiratory monitor for mother and neonate, including pulse oximetry

For a more complete list of supplies and equipment for neonatal resuscitation, please refer to Kattwinkel J, ed. *Textbook of Neonatal Resuscitation*, 6th edn. Elk Grove Village, IL: American Academy of Pediatrics; 2011:32–3 (6).

obstetric delivery for management of postpartum hemorrhage, should it occur.

Once a dystocia is diagnosed, the patient should be instructed to stop pushing, as impaction of the anterior shoulder may be exacerbated by continued Valsalva. The bladder should be catheterized and completely drained.

Interventions to Alleviate Shoulder Dystocia

Various maneuvers intended to facilitate delivery in the setting of shoulder dystocia have been described, with the goal of preventing anoxic injury to the neonate. Fetal maneuvers are performed by the physician on the fetus while it is in the birth canal, whereas maternal maneuvers focus on maternal positioning and are often performed by an assistant. A recent review has suggested some benefit to fetal maneuvers over maternal maneuvers in terms of brachial plexus injuries, but no multicenter randomized data are available to confirm the superiority of one maneuver over another at this time (3). The American College of Obstetrics and Gynecology does recommend the McRoberts maneuver (see below) as an initial noninvasive approach (7). Ultimately, the choice of maneuver performed should be based upon clinician comfort and familiarity, as well as the presence or absence of assistants and consultant backup.

Common Maneuvers

McRoberts maneuver. This maneuver requires two assistants. The patient's legs are held in the "extreme lithotomy position" (knees pressed against the chest while lying supine, with the hips in hyperflexion). The assistants should each hold one leg in place. This position causes cephalic rotation of the pubic symphysis and flattening of the normal lumbar lordosis. The desired result is disimpaction of the anterior shoulder as the posterior shoulder advances over the sacral promontory. In one series, this maneuver alone resulted in resolution of approximately 42% of SDs (8). The McRoberts maneuver may be used alone or in combination with suprapubic pressure ([Figure 1](#)).

Suprapubic pressure. Suprapubic pressure applied by an assistant is intended to help disengage the impacted shoulder. Suprapubic pressure applied in a posterior direction (the Mazzanti maneuver) is intended to push the anterior shoulder under the pubic symphysis, whereas lateral suprapubic pressure (Rubin's first maneuver) may help rotate the bisacromial diameter from an anteroposterior lie to the desired oblique lie (9,10). While the assistant applies pressure in a posterior or lateral direction in the suprapubic region, gentle downward

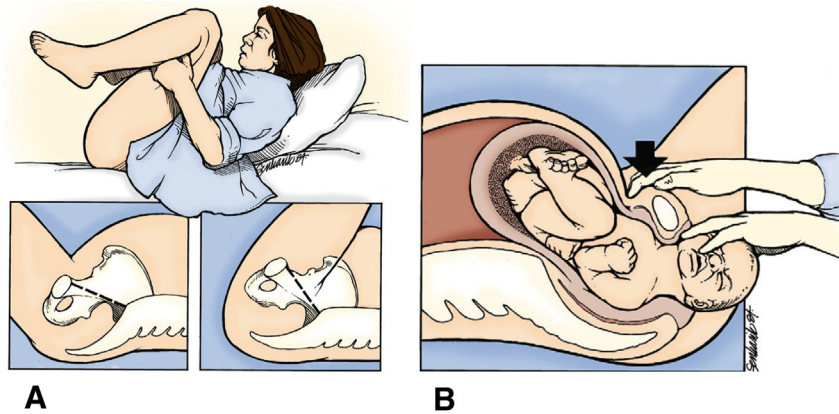


Figure 1. The McRoberts maneuver and suprapubic pressure. (A) The McRoberts maneuver causes cephalic rotation of the pubic symphysis, reduces lumbar lordosis, and may facilitate disimpaction of the anterior fetal shoulder. (B) Suprapubic pressure in the posterior direction may allow the anterior shoulder to move under the pubic symphysis. Reprinted with permission from Lew GH, Pulia MS. *Emergency Childbirth*. In: Roberts J, editor. *Roberts Hedges Clinical Procedures in Emergency Medicine*. Philadelphia: Elsevier; 2013:1170.

traction is applied to the fetal head. Suprapubic pressure is generally combined with the McRoberts maneuver (8) (Figure 1). It is important to note that this maneuver requires suprapubic, and not fundal pressure. Applying pressure on the uterine fundus can worsen the shoulder impaction and can increase the risk of uterine rupture.

Woods' screw/reverse Woods' screw (Rubin Technique). Several rotational maneuvers may be attempted. The insertion of two fingers into the vagina posteriorly allows pressure to be applied to the *anterior surface of the posterior shoulder* to rotate the infant 180°, much like turning a screw (11). The reverse Woods' screw or Rubin technique is performed similarly, but with pressure being exerted on the *posterior surface of the posterior shoulder*, effectively adducting the shoulder and reducing the bisacromial diameter (10). This has a theoretical benefit over the traditional Woods' screw, which increases the bisacromial diameter (Figure 2).

Gaskin maneuver. If the patient can be repositioned safely on a stable, wide surface, the Gaskin maneuver for delivery of the posterior shoulder can be attempted. With the patient in an "all fours" position on hands and knees, the emergency practitioner applies gentle downward traction to the head, as with traditional delivery. This allows the posterior shoulder to descend past the sacral promontory, allowing delivery of the posterior shoulder in more than 80% of cases in one series (12). This position may also aid in the performance of posterior arm delivery if necessary (see below) (Figure 3).

Delivery of the posterior arm. The emergency practitioner passes one hand into the vagina along the posterior arm to the elbow. The fetal arm is flexed until the forearm or hand can be gripped and swept across the fetal chest, delivering the posterior arm and shoulder. This alone may aid in delivery. However, it may be necessary to rotate the trunk to bring the freed arm anteriorly to relieve

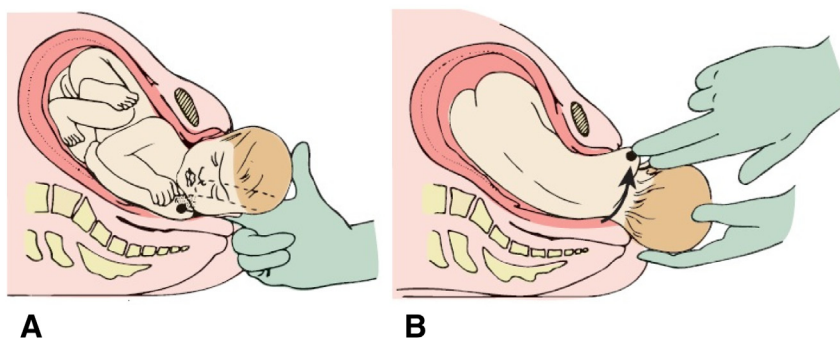


Figure 2. The Rubin technique. Also known as the Reverse Woods' Screw maneuver, the Rubin technique requires the practitioner to apply pressure on the posterior surface of the posterior shoulder (A), thereby adducting the shoulder and rotating the fetus 180° to deliver that shoulder anteriorly (B). Reprinted with permission from Lew GH, Pulia MS. *Emergency Childbirth*. In: Roberts J, editor. *Roberts Hedges Clinical Procedures in Emergency Medicine*. Philadelphia: Elsevier; 2013:1170.



Figure 3. The Gaskin maneuver. Placing the mother in the all-fours position may allow the posterior shoulder to descend. Reprinted with permission from Kovavisarach E. The “all-fours” maneuver for the management of shoulder dystocia. *Int J Gynaecol Obstet* 2006;95(2):153–4.

the dystocia. Fracture of the clavicle, humerus, or both may result (Figure 4).

Controversial Interventions

Episiotomy. Episiotomy is a surgical incision of the perineum to extend the opening of the birth canal. The emergency practitioner may consider performing a generous episiotomy in either the median or mediolateral direction to enhance the fetal manipulation techniques described below. Episiotomy is controversial, however, as dystocia is primarily considered a bony obstruction (5). At least one retrospective review has suggested that episiotomy confers a seven-fold risk of severe perineal

trauma without reducing the occurrence of neonatal respiratory depression or brachial plexus injury (13).

Interventions of Last Resort

Several techniques have been described as last-resort options in the case of severe SD unrelieved by the maneuvers described above. These last-resort options carry significant risk of fetal morbidity and mortality as well as maternal morbidity, but may be considered if the physician has exhausted all other options without success. It should be noted that use of these interventions is controversial.

Zavanelli maneuver. Otherwise known as cephalic replacement, this maneuver may be considered only if the means for emergent cesarean delivery are available. This maneuver requires reversal of the cardinal movements of labor. The emergency practitioner rotates the head back to the occiput-anterior position, then flexes and repositions it back into the vagina. Release of pressure on the umbilical cord may allow time for emergency cesarean section (14). Tocolysis with subcutaneous terbutaline may increase the chance of success with cephalic replacement. One case series reported success rates around 90% for this maneuver, and noted no maternal deaths or fetal injuries, though the author acknowledged that this could be due to a reporting bias (15). Maternal injuries, including uterine laceration and uterine rupture, are possible (16).

Intentional fracture of the clavicle. Intentional fracture of the clavicle is intended to decrease the bisacromial diameter, allowing further adduction of the shoulders. Pressure is applied anteriorly and superiorly away from the infant’s lung, or the clavicle is pressed against the maternal pubic ramus. Sharp instrument fracture of the clavicle should never be attempted (17). Often, the clavicle is

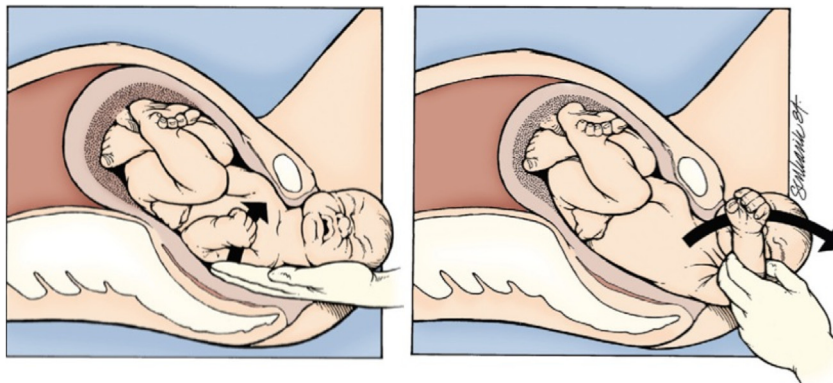


Figure 4. Delivery of the posterior arm. By passing one hand into the vagina along the posterior arm, the practitioner may flex the fetal arm until the forearm may be gripped and swept across the fetal chest, delivering the posterior arm and shoulder. Reprinted with permission from Lew GH, Pulia MS. *Emergency Childbirth*. In: Roberts J, editor. *Roberts Hedges Clinical Procedures in Emergency Medicine*. Philadelphia: Elsevier; 2013:1170.

difficult to intentionally fracture, or fractures spontaneously during the performance of other techniques. This maneuver may increase risk of pneumothorax as well as brachial plexus injury in the neonate.

Symphysiotomy. Symphysiotomy is a procedure practiced in some developing countries. It involves sharp dissection of the pubic symphysis in the midline, taking care to avoid the urethra. It often results in orthopedic and lower urinary tract injury and urinary incontinence, and probably has no place in the ED unless absolutely no other alternative is available.

Complications

Shoulder dystocia is associated with significant risk of morbidity to both mother and neonate. Uterine atony, or lacerations to the vagina and cervix may result in postpartum hemorrhage. One study of SD reported an 11% rate of maternal postpartum hemorrhage and almost 4% rate of fourth-degree perineal laceration (8). As with other births uncomplicated by SD, uterine rupture and infection are also possible.

Fetal injury is prevalent in the setting of SD, and is most often orthopedic. The most commonly reported injury after SD is brachial plexus injury, most often to cervical nerve roots 5 and 6 (18). The reported incidence of brachial plexus injury after SD varies widely; though it is worth noting that one-third to one-half of brachial plexus injuries happen in the absence of SD (19). The majority of brachial plexus injuries do not lead to permanent disability, and full recovery has been reported in 90–95% of cases (18). Permanent brachial plexus injuries are more likely with extended times between delivering the fetal head and body (20). Clavicle and humerus fractures are also possible complications of SD.

The most serious neonatal complications of SD are hypoxic-ischemic encephalopathy and death. Anoxia can occur when the blood flow to the umbilical cord is disrupted in the interval between delivery of the head and the body (3). Therefore, the goal of the emergent techniques described above is to decrease the risk of neonatal asphyxia.

CONCLUSIONS

Shoulder dystocia is an uncommon but dangerous complication of vaginal delivery. In the ED, the diagnosis is generally unexpected. Clinicians who do not routinely deliver infants may see this only once or twice during a

career, but with timely and proper management, a negative outcome may be averted. An institutional plan involving multiple departments and specialties may allow for a more timely and efficacious response to precipitous ED deliveries to ensure that the proper personnel and equipment are available.

REFERENCES

- Lurie S, Levy R, Ben-Arie A, Hagay Z. Shoulder dystocia: could it be deduced from the labor partogram? *Am J Perinatol* 1995;12:61–2.
- Nocon JJ, McKenzie DK, Thomas LJ, Hansell RS. Shoulder dystocia: an analysis of risks and obstetric maneuvers. *Am J Obstet Gynecol* 1993;168:1732–9.
- Gurewitsch ED, Allen RH. Reducing the risk of shoulder dystocia and associated brachial plexus injury. *Obstet Gynecol Clin North Am* 2011;38:247–69.
- Spong CY, Beall M, Rodrigues D, Ross MG. An objective definition of shoulder dystocia: prolonged head-to-body delivery intervals and/or the use of ancillary obstetric maneuvers. *Obstet Gynecol* 1995;86:433–6.
- Bennett BB. Shoulder dystocia: an obstetric emergency. *Obstet Gynecol Clin* 1999;26:445–58.
- Kattwinkel J, ed. *Textbook of neonatal resuscitation*. 6th edn. Elk Grove Village, IL: American Academy of Pediatrics; 2011.
- Sokol RJ, Blackwell SC. American College of Obstetricians and Gynecologists. Committee on Practice Bulletins-Gynecology. ACOG practice bulletin: Shoulder dystocia. Number 40, November 2002. (Replaces practice pattern number 7, October 1997). *Int J Gynaecol Obstet* 2003;80:87–92.
- Gherman RB, Goodwin TM, Souter I, Neumann K, Ouzounian JG, Paul RH. The McRobert's maneuver for the alleviation of shoulder dystocia: how successful is it? *Am J Obstet Gynecol* 1997;176:656–61.
- Mazzanti GA. Delivery of the anterior shoulder: a neglected art. *Obstet Gynecol* 1959;13:603–7.
- Rubin A. Management of shoulder dystocia. *JAMA* 1964;189:835–7.
- Woods CE. A principle of physics is applicable to shoulder delivery. *Am J Obstet Gynecol* 1943;45:796–804.
- Bruner JP, Drummond SB, Meenan AL, Gaskin IM. All-fours maneuver for reducing shoulder dystocia during labor. *J Reprod Med* 1998;43:439–43.
- Gurewitsch ED, Donithan M, Stallings SS, et al. Episiotomy versus fetal manipulation in managing severe shoulder dystocia: a comparison of outcomes. *Am J Obstet Gynecol* 2004;191:911–6.
- Sandberg EC. The Zavanelli maneuver: a potentially revolutionary method for the resolution of shoulder dystocia. *Am J Obstet Gynecol* 1985;152:479–84.
- Sandberg EC. The Zavanelli maneuver: 12 years of recorded experience. *Obstet Gynecol* 1999;93:312–7.
- O'Leary JA. Cephalic replacement for shoulder dystocia: Present status and future role of the Zavanelli maneuver. *Obstet Gynecol* 1993;82:847–50.
- Naef RW, Morrison JC. Guidelines for management of shoulder dystocia. *J Perinatol* 1994;14:435–41.
- Lanni SM, Seeds JW. Malpresentations and shoulder dystocia. In: Gabbe SG, ed. *Obstetrics: normal and problem pregnancies*. 6th edn. Philadelphia: Saunders; 2012:407–12.
- Gottlieb AG, Galan HL. Shoulder dystocia: an update. *Obstet Gynecol Clin North Am* 2007;34:501–31.
- Allen RH, Rosenbaum TC, Ghidini A, Poggi SH, Spong CY. Correlating head-to-body delivery intervals with neonatal depression in vaginal births that result in permanent brachial plexus injury. *Am J Obstet Gynecol* 2002;187:839–42.