In the name of God

Shoulder dystocia: Intrapartum diagnosis, management, and outcome

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Contributor Disclosures

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"Society guideline links: Shoulder dystocia"

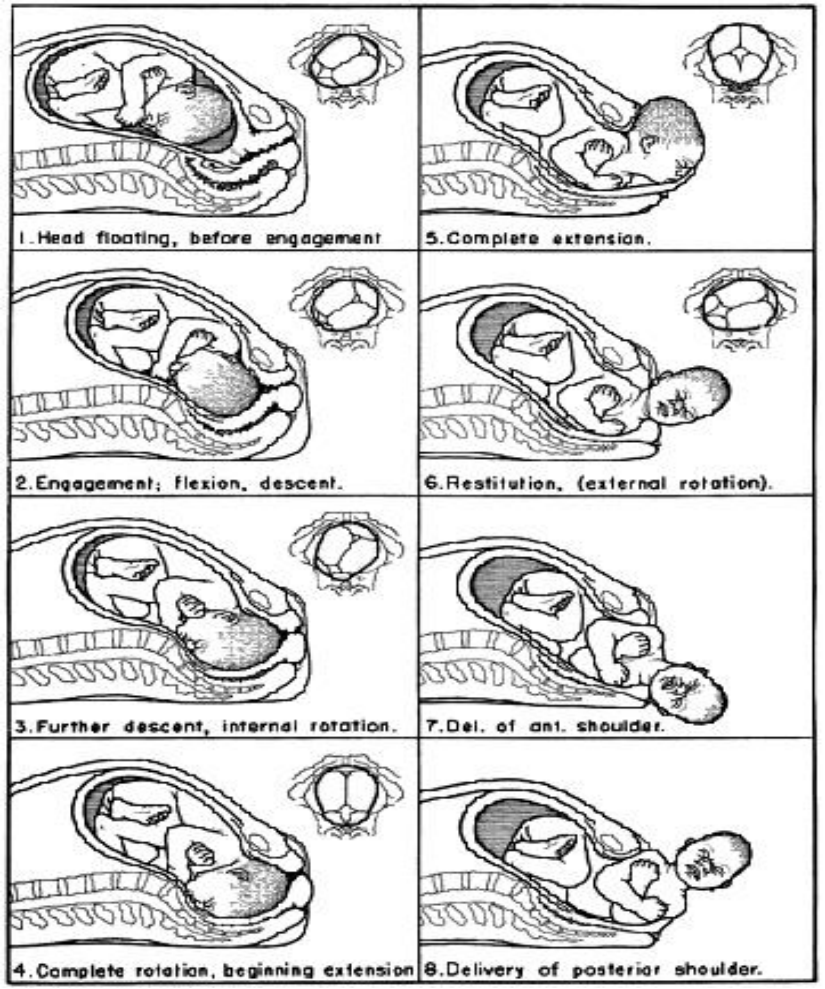
INTRODUCTION

A vaginal delivery is complicated by shoulder dystocia when, after delivery of the fetal head, additional obstetric maneuvers beyond gentle traction are needed to enable delivery of the fetal shoulders.

Intrapartum diagnosis and management of shoulder dystocia will be reviewed here. Risk factors for shoulder dystocia and planning delivery of pregnancies at high risk are discussed separately

PATHOPHYSIOLOGY

It is hypothesized that the fetal trunk fails to rotate to an oblique position because of increased resistance between the fetal skin and vaginal walls or a large fetal chest relative to the biparietal diameter, which may occur with macrosomia, or because of rapid fetal descent, which may occur with precipitous labor



PREVALENCE

Shoulder dystocia occurs in 0.2 to 3 percent of births .

The prevalence of shoulder dystocia has been increasing, probably related to the increasing prevalence of risk factors for high birth weight, such as maternal obesity, and diabetes . In the United States, African American women appear to be at higher risk of shoulder dystocia than Caucasians

DIAGNOSIS

Shoulder dystocia is a subjective clinical diagnosis. It should be suspected when the fetal head retracts into the perineum (ie, turtle sign) after expulsion due to reverse traction from the shoulders being impacted at the pelvic inlet. The diagnosis is made when the routine practice of gentle, downward traction of the fetal head fails to accomplish delivery of the anterior shoulder.

One group attempted to devise objective criteria for diagnosis of shoulder dystocia by first determining the mean interval from delivery of the head to expulsion of the body in 210 patients who did not undergo any ancillary obstetrical maneuvers (eg, McRoberts position, delivery of the posterior arm, suprapubic pressure) . The upper limit of normal for head-to-body delivery time was considered to be two standard deviations above this mean value (24 seconds) or 60 seconds. A subsequent prospective series by the same group found that deliveries complicated by a head-to-body expulsion time greater than 60 seconds or use of ancillary maneuvers to effect delivery described a subpopulation of infants who had higher birth weight, lower one-minute Apgar scores, and a greater prevalence of birth injury than infants who did not meet either of these criteria

Of interest, only 24 of the 99 cases of objectively defined shoulder dystocia were reported as shoulder dystocia by the clinician, even though ancillary maneuvers were used to effect delivery in 46 cases. This discrepancy illustrates the difficulty in collecting and analyzing data for a condition that is subjectively determined. Although the time interval between delivery of the fetal head and complete expulsion of the fetus is an objective measure, it is not routinely measured and would require a change in standard practice. Further research is needed to determine an objective, clinically relevant, practical definition of shoulder dystocia.

MANAGEMENT

The mean umbilical artery pH at term is 7.27; in two studies, umbilical artery pH was estimated to fall 0.01 and 0.04 pH units per minute, respectively, in the interval between delivery of the fetal head and trunk However, in practice, there is a poor correlation between the head-to-body delivery interval and pH, pCO_2, base deficit, neonatal encephalopathy, or death

the clinician should be prepared for possible shoulder dystocia in all vaginal deliveries, be cognizant of the various maneuvers that have been shown to be effective for delivering the impacted shoulders, and have a step-wise plan of action, which allows expeditious execution of diagnosis and treatment.

The normal umbilical vein pH is higher than umbilical artery pH (7.25 to 7.45 versus 7.18-7.38). A sample from the umbilical vein should be sent if an umbilical artery sample cannot be obtained. In one study, over 50 percent of infants with cord venous pH ≥7.07 had cord arterial pH>7.0 and over 90 percent with cord venous pH ≥7.14 had cord arterial pH>7.0

Some clinicians prefer to obtain separate samples from both the artery and vein, although the cost-effectiveness for this practice has not been established . If both vessels are sampled, the median arteriovenous pH difference is 0.09 (range 0.02 to 0.49).

Reference range for umbilical artery blood gas values in preterm newborns

Umbilical arterial blood	Mean	5th to 95th percentile
pH	7.28	7.14 to 7.4
PCO_2 (mmHg)	50.2	32 to 69.2
HCO_3 (mEq/L)	22.4	16 to 27.1
Base excess (mEq/L)	−2.5	−7.6 to 1.3

Values represent findings from umbilical artery cord blood analysis after vaginal delivery of 1015 unselected preterm infants delivered at Shands Hospital, University of Florida, 1992-1993.

Reference range for umbilical artery blood gas values in term newborns

Umbilical arterial blood	Mean	5th to 95th percentile
pH	7.27	7.15 to 7.38
PCO_2 (mmHg)	50.3	32 to 68
HCO_3 (mEq/L)	22	15.4 to 26.8
Base excess (mEq/L)	−2.7	−8.1 to 0.9

Values represent findings from umbilical artery cord blood analysis after vaginal delivery of 3522 unselected term infants delivered at Shands Hospital, University of Florida, 1992-1993.

Indications for fetal acid-base analysis'

Umbilical artery blood acid-base analysis should be performed after any delivery in which a fetal metabolic abnormality is suspected, such as any delivery with low Apgar scores (<5 at 5 minutes and 10 minutes), a category III fetal heart rate pattern, low birth weight, or maternal intrapartum fever. These neonates are at increased risk of an adverse outcome, but only a minority are acidotic at delivery.

Initial steps

When shoulder dystocia is suspected, the gravida and labor room personnel should be given instructions in a clear and calm manner.

●Nursing, anesthesia, obstetric, and pediatric staff should be called to the labor room, if not already available, to provide assistance as needed.

●The patient should be positioned with her buttocks flush with the edge of the bed to provide optimal access for executing maneuvers to affect delivery.

●The mother should be told not to push while preparations are made and maneuvers are undertaken to reposition the fetus.

●Excessive downward traction, greater than usual head and neck traction, and fundal pressure should be avoided because this combination of maneuvers can stretch and injure the brachial plexus .These actions also may further impact the shoulders and cause uterine rupture or other injury.

●A tight nuchal cord, if present, should be released over the fetal head and left intact as umbilical blood flow helps in neonatal resuscitation and transition. Clamping and cutting the cord does not help to release the impacted shoulder. If cutting the cord is necessary to extract the fetus, it should be done after the shoulder dystocia has been resolved.

Clamping and cutting the cord with the head at the perineum is potentially harmful if a Gunn-Zavanelli-O'Leary maneuver is performed since there is no oxygen delivery to the fetus between the time the cord is clamped and cut and the time of birth via cesarean

Performing a mediolateral or a third- or fourth-degree median episiotomy may be useful to facilitate delivery of the posterior shoulder and other internal procedures, but does not by itself help to release the anterior shoulder and increases perineal trauma .If the perineum was not already adequately cut or torn with expulsion of the fetal head, cutting or extending the tear/episiotomy immediately following failed downward traction with and without McRoberts and before attempting any of the vaginal maneuvers for resolution of the dystocia is a practical approach.

Gunn-Zavanelli-O'Leary maneuver

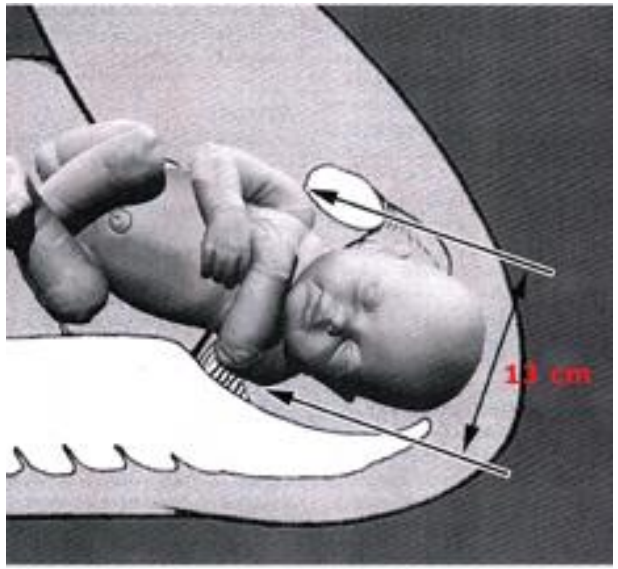
This procedure requires replacement of the fetal head in the pelvis, followed by cesarean delivery . The following steps are taken:

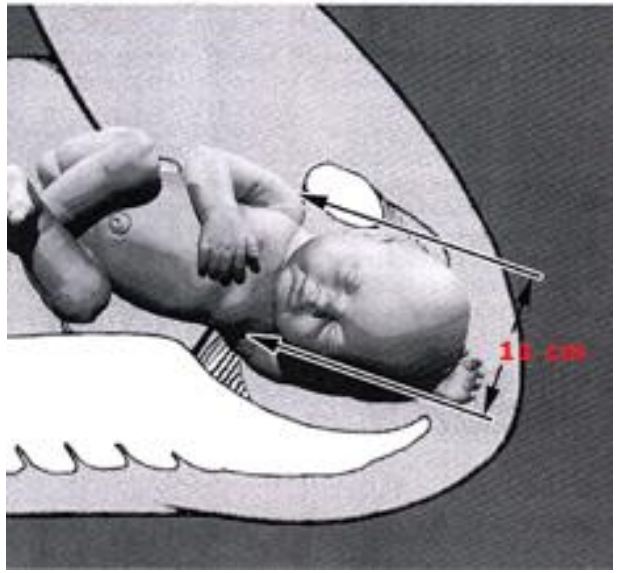
- **Administer terbutaline (0.25 mg subcutaneously) or another uterine relaxant (nitroglycerin 50 to 500 mcg intravenously in aliquots of 50 to 100 mcg).**
- **Place a fetal scalp electrode.**
- **Rotate the head back to an occiput anterior position (reversal of restitution).**
- **Flex the head from its extended position and push it as far cephalad as possible using firm pressure with the palm of one hand. The other hand may be used to depress the perineum. This may relieve umbilical cord compression.**

If cephalic replacement is successful, the patient is prepared for surgery and cesarean delivery is performed.

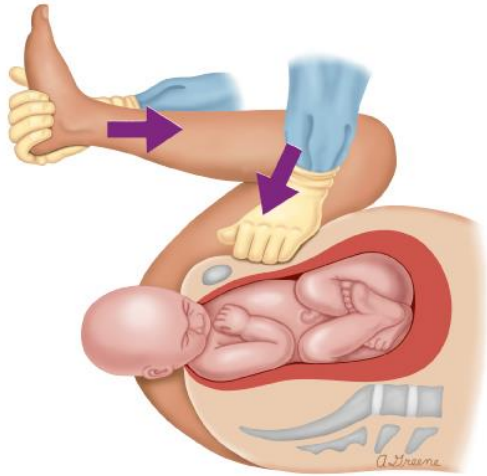
Delivery of the posterior arm

Delivery of the posterior arm almost always relieves impaction of the anterior shoulder and resolves the dystocia . It is an appropriate second maneuver if the less technically demanding and often successful McRoberts maneuver and suprapubic pressure fail

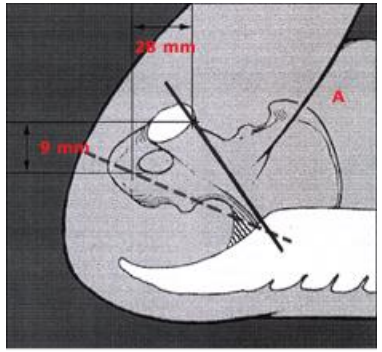


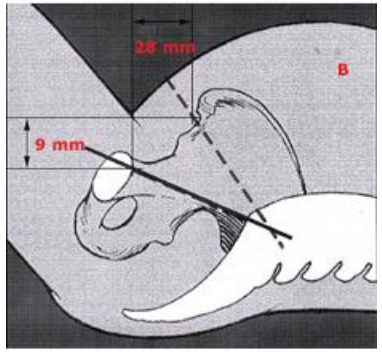


The operator has already inserted a hand into the vagina and delivered the posterior arm by sweeping it across the fetal chest, and thus delivered the posterior shoulder as well (not shown). A 13-cm bisacromial diameter becomes an 11-cm axillo-acromial diameter upon delivery of the arm.



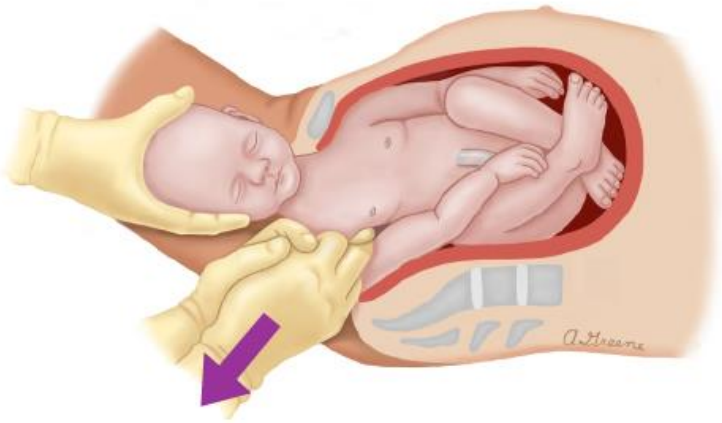
An assistant applies pressure suprapubically with the palm or fist, directing the pressure on the anterior shoulder both downward (to below the pubic bone) and laterally (toward the baby's face or sternum), and in conjunction with the McRoberts maneuver. Suprapubic pressure is supposed to adduct the shoulders or bring them into an oblique plane, since the oblique diameter is the widest diameter of the maternal pelvis. It is most useful in mild cases and those caused by an impacted anterior shoulder.





(A) The patient's legs have been hyperflexed by assistants. The 16 degree rotation for a 10.5-cm obstetric conjugate (ideally) moves the symphisis pubis 9 mm anteriorly and 28 mm in a cephalad direction. (B) Lithotomy position.

Menticoglou maneuver



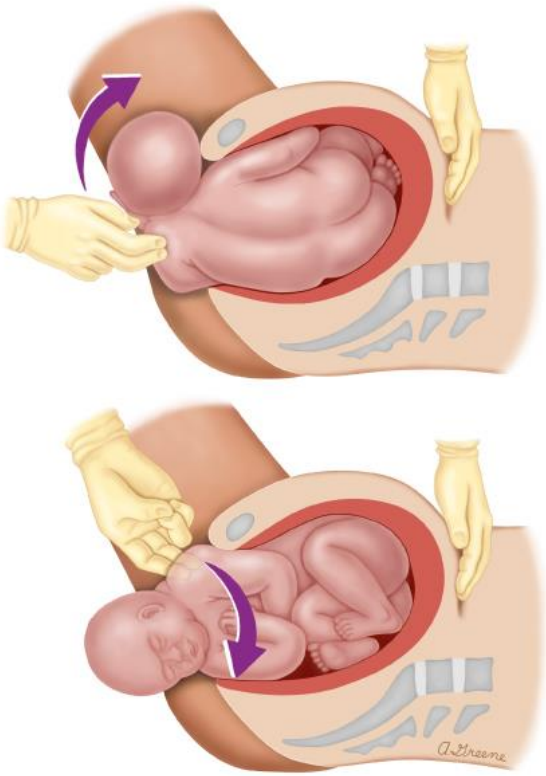
After an assistant gently flexes the fetal head toward the anterior shoulder, the obstetrician places his/her right middle finger into the fetus' posterior axilla from the left side of the pelvis and the left middle finger into the posterior axilla from the right side of the pelvis. The two middle fingers in the axilla are then used to pull the posterior shoulder downward along the curve of the sacrum. Once the shoulder has been brought down sufficiently, the posterior arm can be grasped and delivered.

Modified from: Menticoglou SM. A modified technique to deliver the posterior arm in severe shoulder dystocia. Obstet Gynecol 2006; 108:755.

Secondary maneuvers

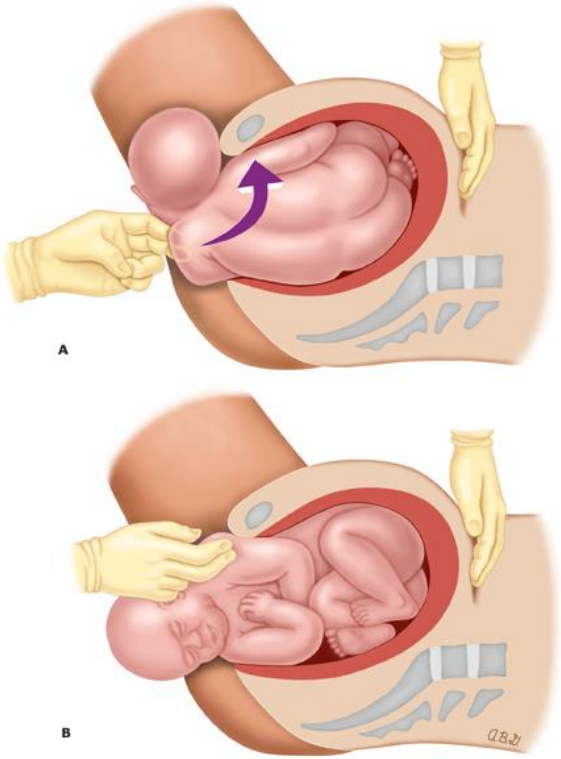
Rubin maneuver

The clinician places one hand in the vagina behind the posterior fetal shoulder and then rotates it anteriorly (towards the fetal face). If the fetal spine is on the maternal left, the operator's right hand is used. Alternatively, the Rubin maneuver can be attempted by placing a hand behind the anterior shoulder, if it is more accessible.



Woods screw maneuver

(A) The posterior shoulder is rotated counterclockwise until (B) it becomes anterior The anterior shoulder rotates out from under the symphysis pubis and descends during this process.



Documentation of delivery complicated by shoulder dystocia

Date Patient

Antepartum information

Diabetic? no yes
if yes: Pregestational____ Gestational____test and result_____

Insulin yes no

Estimated fetal weight _____

Labor and delivery Note Time for:

onset of active labor _____

start of second stage _____

delivery of head _____

delivery of posterior shoulder _____

delivery of infant _____

When and how was the diagnosis of shoulder dystocia made?

Forceps used? yes no Vacuum used? yes no

Indication_____
Instrument used_____

Station when applied _____ Position of fetal head _____
Time forceps or vacuum applied _____
Number of pulls to extract fetus _____

Enter the time of day the following assistance was requested:

Additional obstetrician (name) _____ Arrived _____

Anesthesia (name) _____ Arrived_____

Pediatrician(s) (name) _____ Arrived _____

Additional nurse(s) (name) _____ Arrived _____

Others present _____

Documentation of delivery complicated by shoulder dystocia, continued

Maneuvers (indicate if maneuver performed, order from first(1) to last, and result)

_____ Extended episiotomy

_____ Wood's corkscrew (posterior shoulder rotated in a corkscrew fashion)

_____ Suprapubic pressure (Note: Fundall pressure should NOT be used)

_____ Rubin (rocking fetal shoulders to decrease girth)

_____ McRoberts (legs flexed back onto maternal abdomen)

_____ Delivery of posterior arm

_____ Fracture of anterior clavicle

_____ Zavanelli (head pushed back into vagina)

_____ Other (describe)

Neonatal outcome

Apgar score: 1 min _____ 5 min _____ If less than 7 also include 10 min _____

Birth weight: _____ pounds _____ounces OR _____grams

Umbilical cord gas results _____

Pediatric evaluation performed by: _____ at (time) _____

Brachial plexus palsy present? yes _____no _____

_____ Erb's

_____ Klumpke's (includes forearm and small muscles of the hand)

Horner's facial palsy present? yes _____ no _____

Fracture present? yes _____no _____

_____

Signature of delivering attendant Date

COMPLICATIONS

Infant — Approximately 95 percent of shoulder dystocias were not associated with infant injury in one large series (n = 2018 cases) . Injury among the remaining infants was due to trauma, asphyxia, or both. The following types and frequencies of infant injury have been described in studies including at least 100 cases of shoulder disorder . The newborn may have more than one injury.

- **Transient brachial plexus palsy (3.0 to 16.8 percent)**
- **Clavicular fracture (1.7 to 9.5 percent)**
- **Humerus fracture (0.1 to 4.2 percent)**
- **Permanent brachial plexus palsy (0.5 to 1.6 percent)**
- **Hypoxic-ischemic encephalopathy (0.3 percent)**
- **Death (0 to 0.35 percent)**

SUMMARY AND RECOMMENDATIONS

Approach to shoulder dystocia

Notify nursing, anesthesia, obstetric, and pediatric staff to come to patient's room, if not already available, to provide assistance as needed.
Stop maternal pushing while preparations are made and maneuvers are undertaken to reposition the fetus.
Check for and release a tight nuchal cord, if present.
Position the patient with her buttocks flush with the edge of the bed to provide optimal access for executing maneuvers to affect delivery.
Consider performing a mediolateral or median third- or fourth-degree episiotomy to facilitate delivery of the posterior shoulder and other internal procedures. Episiotomy by itself does not help to release the anterior shoulder and increases perineal trauma.
Drain a distended bladder, if present.
Avoid excessive neck rotation, head and neck traction, and fundal pressure because this combination of maneuvers can stretch and injure the brachial plexus.
Perform maneuvers sequentially until shoulder dystocia is released. The sequence may be modified based on provider expertise with the various maneuvers. ▪ Perform McRoberts maneuver ▪ Perform McRoberts maneuver with suprapubic pressure ▪ Deliver the posterior arm or Gaskin all-fours maneuver* ▪ If the posterior arm cannot be delivered, deliver the posterior shoulder ▪ Rotate the fetus (Rubin or Woods maneuver) ▪ Fracture the fetal clavicle Procedures of last resort: ▪ Gunn-Zavanelli-O'Leary maneuver ▪ Abdominal rescue ▪ Symphysiotomy (potentially high maternal morbidity)
Document your evaluation, assessment, and management.


Thanks for Attention