

Shoulder Impaction
a.k.a.
Fetal Expulsion Disorder
or
Shoulder Dystocia

Background

What is mild shoulder dystocia?

What is moderate shoulder dystocia?

What is severe shoulder dystocia?

If you ask 10 maternity providers, then you will probably get 10 different answers to each of the above questions.

What is subjectively referred to as varying degrees of shoulder impaction is more objectively defined by the interval from delivery of the head to expulsion of the fetal body. 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. (Spong 1995)

A prospective series 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 these criteria. (Beall 1998)

Utilizing the work of Spong and Beal above, it may be more accurate to state the length of time for fetal expulsion and use of any additional maneuvers used for fetal expulsion. Hence another term is: fetal expulsion disorder. Fetal expulsion disorder is described 1.) by the length of time of head to body delivery and 2.) any extra maneuvers utilized to facilitate delivery.

As previously defined, shoulder impaction occurs in 0.2 to 3 percent of all births and represents an obstetric emergency. The overall incidence of shoulder impaction varies based on fetal weight, occurring in 0.3 to one percent of infants with a birth weight of 2500 to 4000 grams, and increasing to five to seven percent in fetuses weighing 4000 to 4500 grams. Over 50 percent of shoulder impactions occur in the normal birth weight fetus and are unanticipated. Few shoulder impactions can be anticipated and prevented, as most occur in the absence of risk factors.

Once a shoulder impaction occurs, even if all actions are appropriately taken, there is an increased risk of complications. These include third and fourth degree lacerations, post partum hemorrhage, and neonatal brachial plexus palsies. (Grobman 2011)

Definition

Fetal expulsion disorder (FED) exists if the head to body expulsion time is greater than 60 seconds, or if any ancillary maneuvers are utilized to facilitate delivery.

Fetal expulsion disorder (FED) is best managed by additional obstetric maneuvers to effect delivery of the fetal shoulders at the time of vaginal delivery. Therefore, the provider must be prepared to recognize a FED immediately and proceed through an orderly sequence of steps to affect delivery in a timely manner. The goal of management is to prevent fetal asphyxia and

permanent Erb's palsy, while avoiding physical injury (eg, bone fractures, maternal trauma), but the latter are acceptable if needed to prevent permanent injury in the child.

PATHOPHYSIOLOGY — The fetal biacromial diameter (the distance between the outermost parts of the fetal shoulders) normally enters the pelvis at an oblique angle with the posterior shoulder ahead of the anterior one, rotating to the anterior-posterior position at the pelvic outlet with external rotation of the fetal head. The anterior shoulder can then slide under the symphysis pubis for delivery. If the fetal shoulders remain in an anterior-posterior position during descent or descend simultaneously rather than sequentially into the pelvic inlet, then the anterior shoulder can become impacted behind the symphysis pubis; alternately or additionally, the posterior shoulder may be obstructed by the sacral promontory.

If descent of the fetal head continues while the anterior or posterior shoulder remains impacted, then stretching of the nerves in the brachial plexus may occur and may result in nerve injury. Injuries diagnosed at birth may have resulted from prenatal insults, trauma related to labor and the impacted shoulder itself, or from the provider's attempt to deliver the infant. The most common injuries can result in Erb's or Erb-Duchenne palsy (injury to the upper brachial plexus nerve roots, C5-C6) or Klumpke's palsy (injury to the lower nerve roots C8-T1).

In 2014 the ACOG Task Force on Neonatal Brachial Plexus Palsy (NBPP) reviewed the current literature, including consensus opinion as well as multiple published cases of peer reviewed literature related to brachial plexus injury. This report concludes that NBPP occurs in 1.5 of 1000 births. Only 50% of NBPP cases are preceded by shoulder impaction. Greater than 80% of cases of NBPP occur in women with no known risk factors. In fact, NBPP has not only been associated with routine vaginal deliveries not complicated by shoulder impaction but even with routine Cesarean delivery in 4% of cases. NBPP is associated with 4-40% of clinically apparent cases of shoulder impaction. Most injuries resolve, however, the incidence of persistent NBPP at one year of life ranges from 0.5%-1.6%. (ACOG 2014, Torke 2012)

Acidemia may result from compression of the umbilical cord, from compression of the vessels in the fetal neck by a tight nuchal cord, or a combination of factors. In general, the operator has up to seven minutes to deliver a previously well-oxygenated term infant before an increased risk of asphyxial injury occurs. The mean umbilical artery pH at term is 7.27 and umbilical artery pH is estimated to theoretically fall 0.04 pH units per minute in the interval between delivery of the fetal head and trunk. The Confidential Enquiries into Stillbirths and Deaths in Infancy Fifth Annual Report noted that 47% of the infants died within 5 minutes of the head being delivered. (CESDI 1998)

Diagnosis

FED 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. This guideline will use a head to expulsion of the body of > 60 seconds or use of ancillary maneuvers to effect delivery as the definition of FED.

Example

This could be reported as "...fetal expulsion disorder with the use of McRoberts maneuver, suprapubic pressure, and removal of the posterior arm with a head to body expulsion time of 65 seconds...."

Prevention

No intervention has been identified that predicts or prevents all or even most cases of NBPP or clinically apparent shoulder impaction or FED. Anticipation of FED in the presence of risk factors such as suspected macrosomia, a history of a prior shoulder impaction, or prolonged second stage has been attempted. However, the occurrence of FED cannot be accurately predicted by antenatal risk factors or labor abnormalities. Since at least 50% of pregnancies complicated by FED have no identifiable risk factors, the predictive value of any one or combination of risk factors for FED is low (< 10%). It is clear, however, that maternal diabetes and macrosomia are the strongest risk factors for FED and that the highest risk of FED occurs when these risk factors occur together due to the combined effects of the unfavorable anthropomorphic dimensions of the infant of a diabetic mother and large absolute size.

A Cochrane review concluded that prophylactic use of maneuvers typically used to relieve FED such as McRoberts maneuver or application of suprapubic pressure, does not significantly reduce the occurrence of FED.

As well, performing routine prophylactic cesarean delivery or induction of labor for pregnancies with suspected macrosomia is not generally indicated.

On the other hand, if a non-diabetic patient has an EFW of >5,000 grams or a diabetic patient has an EFW >4,500 grams, then cesarean delivery may be a reasonable management option.

Offering elective cesarean delivery for women whose previous delivery was complicated by FED when a non-transient brachial plexus injury occurred can be associated with a large number of unnecessary procedures.

Delpapa (1991) reported that among fetuses with estimated birth weights of 4,000 g or more; an additional 76 cesarean deliveries would have prevented only five cases of shoulder impaction, none of which resulted in permanent injury. A 1996 study using a decision analysis model estimated an additional 2,345 cesarean deliveries would be required—at a cost of \$4.9 million annually—to prevent one permanent injury resulting from shoulder impaction if all fetuses suspected of weighing 4,000 g or more underwent cesarean delivery. (Rouse 1996)

The rate of shoulder dystocia in women who have had a previous shoulder dystocia has been reported to be 10 times higher than the rate in the general population. (RCOG 2012) There is a reported recurrence rate of shoulder dystocia of between 1% and 25%. (RCOG 2012) However, this may be an underestimate owing to selection bias, as caesarean delivery might have been advocated for pregnancies after severe shoulder impaction, particularly with a neonatal poor outcome.

There is no requirement to recommend elective caesarean birth routinely but factors such as the severity of any previous neonatal or maternal injury, predicted fetal size and maternal choice should all be considered and discussed with the woman and her family when making plans for the next delivery. (RCOG 2012)

Even in cases in which an elective cesarean delivery is offered, the incidence of NBPP is low and with proper informed consent, multiple clinical circumstances exist in which these risk factors alone may not dictate a specific course of management (ACOG NBPP 2014). Shoulder impaction is not a reliably predictable event in labor. Although the risk of shoulder impaction is increased with prolonged pregnancy, prolonged second stage of labor, increasing birth weight, and mid-forceps delivery, the majority of cases occur without these risk factors. (Basket 1995)

Table 1 Factors associated with shoulder impaction (RCOG 2012, ACOG 2014)

Pre-labor	Intrapartum
Previous shoulder impaction	Prolonged first stage of labor
Macrosomia	Secondary arrest
Diabetes mellitus	Prolonged second stage of labor
Maternal body mass index > 30 kg/m ²	Oxytocin augmentation
Induction of labor	Fetal malposition
Post term pregnancy	Assisted or operative vaginal delivery

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Management

In 2011 Grobman showed that there are some interventions that may improve shoulder impaction outcomes:

- 1) specific team work and team communication training
- 2) utilization of shoulder impaction protocols or guidelines
- 3) obstetrics emergency simulation training

While specific maneuvers for delivery have also been studied for efficacy, as the dynamics of the individual delivery vary, there is no specific consensus by the international benchmarks (ACOG, RCOG) that one maneuver is superior to others in all cases. However, performance of the McRoberts maneuver and suprapubic pressure are reasonable initial approaches. (ACOG 2013, Hoffman 2011)

Nevertheless, prioritization of delivery of the posterior arm has been shown in some cases to be the most useful next manipulation. In both chart review and simulation modeling by Hoffman (2011), Inglis (2011), Leung (2011), and Grimm (2010), performing posterior arm for delivery was shown to facilitate delivery with the highest rates of delivery success and lowest rates of anterior nerve stretch and force.

Anticipation: “Delivering through”

If antenatal or intrapartum risk factors (Table 1) suggest that a FED may be encountered, many tasks can be accomplished in advance of the delivery, through anticipation and preparation. Key personnel can be called prior to delivery and placed on alert. The patient and her family should be educated about the possibility of a potentially difficult delivery, and can be shown what they may be asked to do in that event. The patient’s bladder can be emptied and the room cleared of any unnecessary clutter, to make room for additional personnel and equipment. A bedpan should be available to raise the maternal pelvis if stirrups are not available.

In those patients with risk factors, the maternity provider should use the ‘head and shoulder maneuver’ to continue the momentum and allow the fetus to ‘deliver through’ until the anterior shoulder is delivered, rather than stopping to suction the oropharynx. **“Delivering through”** until the anterior shoulder is visible before suctioning the oropharynx may be helpful in patients with known FED risk factors.

Initial steps — When FED is suspected: 1) this should be announced, 2) 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 room, if not already available, to provide assistance as needed.

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

Excessive neck rotation, head and neck traction, and fundal pressure should be avoided because this combination of maneuvers can stretch and injure the brachial plexus. These actions may further impact the shoulders and cause uterine rupture or other injury. It should be noted that despite extensive research from obstetric, pediatric, orthopedic, and neurological specialties, no high quality data exist to conclude the specific amount of traction that is safe for delivery, or alternately, the amount of force needed at time of delivery to cause injury.

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.

Performing a generous episiotomy may be useful to facilitate delivery of the posterior shoulder and other internal procedures by allowing for additional space for manual maneuvers, but does not by itself help to release the anterior shoulder and increases perineal trauma.

A distended bladder, if present, should be drained.

Some providers find it useful for a nurse to verbally note the passage of time in 60 second increments.

On-site Assistance

Once FED is diagnosed, the presence of additional assistants in the delivery room is critical. One person is responsible for recording of events, obtaining designated equipment and supplies, and notifying the clinician of time intervals. Documentation of the maneuvers used and the duration of each maneuver may be valuable to prompt the clinician to move on to other maneuvers, rather than persisting in one that is not working.

Additional Back-up

A pre-arranged plan should identify members of a team ready to respond to this emergency. This team may include a family physician or an obstetrician, a pediatrician or neonatologist, one or two labor nurses to assist with maneuvers, and a special care nursery nurse. At least one other provider with maternity or neonatal skills should be called immediately when a FED is encountered.

Anesthesia staff should be called in order to administer medications as needed. A ward clerk or hospital operator should be available and prepared to assist in summoning appropriate individuals to the delivery room such as the "Labor and Delivery STAT Team" or "OB Rapid Response Team."

Reduction Maneuvers

FED becomes obvious after the head emerges and then retracts up against the perineum, commonly referred to as the "turtle sign." Excessive force must not be applied to the fetal head or neck, and fundal pressure must be avoided. These activities are unlikely to free the impaction and may cause fetal and maternal injury while wasting valuable time. If standard levels of traction do not relieve the FED, the clinician must quickly move to other maneuvers to

aid in delivery of the fetus. The family and nursing staff should be notified of the diagnosis and the staff asked to summon other personnel.

The clinician attending the delivery should direct the activities of the personnel in the room, much like running a cardiopulmonary arrest code. It is important that other personnel listen to the directions being given and all act in a team-like fashion to address this emergency. An individual recording the events should keep time. Awareness of time duration is essential so that, if one maneuver is not successful after a reasonable amount of time, another maneuver can be attempted.

The HELPER mnemonic (Table 2) is a clinical tool that can provide birth providers with a structured framework in which to deal with an extremely difficult and charged situation. Together they represent a valuable tool to help clinicians take effective steps in relieving the impacted shoulder. The order of the steps need not always be done in the same order as the mnemonic suggests (as previously noted, it may be appropriate to attempt the posterior arm as a sooner rather than a latter maneuver); it is more critical that they be employed efficiently and appropriately. Thirty to 60 seconds is recommended as the appropriate amount of time to spend on each maneuver. Although three to five minutes may seem like a brief window of time in which to act, it is adequate for following all of the maneuvers described in the HELPER mnemonic. These maneuvers are designed to do one of three things:

1. Increase the functional size of the bony pelvis.
2. Decrease the bisacromial diameter.
3. Change the relationship of the bisacromial diameter within the bony pelvis.

Table 2 The HELPER mnemonic

H	Call for help
E	Evaluate for episiotomy
L	Legs (the McRoberts' manoeuvre)
P	Suprapubic pressure
E	Enter manoeuvres (internal rotation)
R	Remove the posterior arm
R	Roll the patient

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H – Call for Help

This step refers to activating the pre-arranged plan for personnel to respond with necessary equipment to the labor and delivery unit. If such a pre-arranged plan has not yet been developed, the appropriate equipment and personnel should be requested, including someone to assist in neonatal resuscitation, and anesthesia personnel to assure that appropriate medications will be immediately available.

E – Evaluate for Episiotomy

Episiotomy should be **considered** in the management of FED. FED is a *bony* impaction, so simply performing an episiotomy will not cause the shoulder to release. Since 40-50% of cases of FED can be relieved with McRobert's maneuver and suprapubic pressure, many women can be spared a surgical incision unless it becomes necessary to make room for the clinician's hand in the vagina for performing internal maneuvers. However, as episiotomy may be more difficult to perform when the fetal head is tight against the perineum, clinical judgment may dictate performing an episiotomy before delivery if FED is strongly anticipated.

L – Legs (The McRoberts Maneuver)

The simplicity of the McRoberts maneuver makes it an ideal first step in management. The procedure involves flexing the maternal hips, thus positioning the maternal thighs up onto the maternal abdomen. This simulates the squatting position, with the advantage of increasing the inlet diameter. Nurses and family members present at the delivery can provide assistance for this maneuver. When anticipated, it is helpful to demonstrate this to family members in advance. The McRoberts maneuver also straightens the lumbosacral lordosis, flattening the sacral promontory as an obstruction. This procedure simultaneously flexes the fetal spine, often pushing the posterior shoulder over the sacral promontory and allowing it to fall into the hollow of the sacrum.

When this occurs, the symphysis may rotate over the impacted shoulder. Finally, the direction of maternal force in this position is perpendicular to the plane of the inlet. When this maneuver is successful, normal traction should deliver the fetus. Delivery should be attempted in this position for approximately 30 to 60 seconds.

The McRoberts maneuver alone is believed to relieve more than 40% of all shoulder impactions and combined with suprapubic pressure and/or episiotomy, over 50% of shoulder impactions can be delivered. Hence, performance of the McRoberts maneuver is a reasonable initial approach.

P – Suprapubic Pressure

An assistant should attempt external manual suprapubic pressure for approximately 30 to 60 seconds while the delivering clinician continues gentle traction. The suprapubic hand should be placed over the fetus' anterior shoulder, applying pressure in a "CPR" style in such a way that the shoulder will adduct or collapse anteriorly and pass under the symphysis. The pressure should be applied from the side of the mother that will allow the heel of the assistant's hand to move in a downward and lateral motion on the posterior aspect of the fetus' shoulder. The delivering clinician should direct the assistant as to the correct direction and to the effectiveness of the effort. Initially, the pressure can be continuous, but if delivery is not accomplished, a rocking motion is recommended to dislodge the shoulder from behind the pubic symphysis. If this procedure fails, the next procedure should be immediately attempted.

Fundal pressure is not appropriate and only serves to worsen the impaction, potentially injuring the fetus or mother.

E – Enter - Internal maneuvers

These maneuvers attempt to manipulate the fetus to rotate the anterior shoulder into an oblique plane and under the maternal symphysis. This can be accomplished with either the Rubin II or Woods' Screw maneuver:

1. The **Rubin II maneuver** consists of inserting the fingers of one hand vaginally *behind* the anterior fetal shoulder and pushing the shoulder *toward* the fetus' chest. Rubin makes the point that this pressure will adduct, or collapse, the fetus' shoulder girdle, reducing its diameter. The McRoberts maneuver can still be applied during this maneuver, and may help facilitate its success.
2. If this is unsuccessful, the **Woods' Screw maneuver** can be combined with the Rubin II

maneuver. The Woods' Screw maneuver calls for the provider to use the opposite hand to approach the posterior shoulder from the *front* of the fetus, and rotate the shoulder toward the symphysis in the *same direction* as with the Rubin II maneuver.

Thus, in this combination, the provider now has two fingers behind the anterior shoulder, and two fingers of the other hand in front of the posterior shoulder. The Rubin II maneuver *adducts* or flexes either the anterior or posterior shoulder while the Woods' screw maneuver *abducts* or extends the posterior shoulder. This is why the combination of the two maneuvers may be more successful than the Woods' Screw alone. With this movement, the infant's shoulders rotate and deliver much like the turning of a threaded screw.

The Woods' Screw maneuver frequently requires a large episiotomy or proctoepisiotomy to provide room for posterior manipulation, while the Rubin II maneuver generally does not.

3. If the Rubin II or Woods' maneuvers fail, the **Reverse Woods' Screw** maneuver may be tried. In this maneuver, the fingers of the entering hand are placed *on the posterior shoulder from behind* and the attempt is to rotate the fetus in the *opposite direction* as the Woods' Screw maneuver. The Reverse Woods' Screw maneuver is identical to the Rubin II maneuver when performed on the *posterior* shoulder. This rotates the fetal shoulders out of the impacted position and into an oblique plane from which they can deliver.

These maneuvers can be very difficult to perform, particularly when the anterior shoulder is partially wedged underneath the symphysis. At times it is necessary to push the posterior shoulder, or sometimes the anterior shoulder, back up into the pelvis slightly in order to accomplish the maneuvers.

R – Remove the Posterior Arm

As discussed above, this maneuver has been shown to possibly be the most effective and least traumatic if performed appropriately.

In this maneuver, the posterior arm is removed from the birth canal, thus, shortening the bisacromial diameter. This allows the anterior shoulder to collapse as the fetus drops into the pelvic hollow, freeing the impaction anteriorly.

In order to affect this maneuver, the clinician must insert his or her hand far into the vagina and attempt to locate the posterior arm. Sometimes the arm is displaced behind the fetus and must be nudged anteriorly. Once the forearm is located, the elbow should be flexed so that the forearm may be delivered in a sweeping motion over the anterior chest wall of the fetus. Grasping the fetal upper arm directly should be minimized, as this may fracture the humerus. If done correctly, first the posterior hand, then arm and finally shoulder will be reduced, facilitating delivery of the infant. Often, the fetus rotates in a corkscrew manner as the arm is removed. The anterior shoulder will then rotate backwards under the symphysis and deliver.

R – Roll the Patient

The "all fours" or "Gaskin" maneuver is a safe, rapid and effective technique for the reduction of FEB. The patient must roll from the existing position to an all-fours position. The precise mechanism by which the Gaskin maneuver acts to relieve the FED is unknown.

The pelvic diameters increase when laboring women change from the dorsal recumbent position. Radiographic studies indicate that pelvic measurements are least favorable for delivery in the dorsal lithotomy position. By rotating to the all fours position, the true obstetrical conjugate

increases by as much as 10 mm and the sagittal measurement of the pelvic outlet increases up to 20 mm.

The fetal shoulder often dislodges during the act of turning from a supine to “all fours” position, indicating that this movement alone may be sufficient to allow enough pelvic change to dislodge the impaction. Additionally, once the position change is completed, gravitational forces may aid in disimpaction of the fetal shoulders.

The “all fours” maneuver may be difficult for a woman who is fatigued or restricted by IV's, fetal monitors, epidural anesthesia or Foley catheter. The patient will often need assistance to re-position, given these entrapments. This position may be disorienting to clinicians who are unfamiliar attending a delivery in this position.

By providing gentle traction downward, the clinician can deliver the posterior shoulder first with the aid of gravity. The all-fours position is compatible with all intra-vaginal manipulations for FED, but it is incompatible with suprapubic pressure. Some tips are to remember to always go with gravity first, thus provide gentle traction downward to deliver the shoulder closest to the ceiling first. Performing a few routine deliveries in this position, before encountering an acute need to do so, may assist the provider in being prepared for more emergent situations. The order in which these maneuvers are attempted may be flexible.

Other maneuvers:

Axillary traction for delivery of the posterior shoulder

After an assistant gently flexes the fetal head toward the anterior shoulder, the obstetrician places their right middle finger into the fetus's 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 (Menticoglou maneuver). (Ansell 2019)

●Technique

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.

Pulling the posterior shoulder into the posterior pelvic space may release the anterior shoulder or allow a rotational maneuver to release the anterior shoulder.

Posterior axilla sling traction (PAST) — If the posterior arm and shoulder cannot be delivered by the methods described above, case reports have described successful outcomes using a sling to exert traction on the posterior shoulder. (UpToDate 2022)

Technique – A size 12 or 14 French soft suction catheter or urinary catheter is folded into a loop over the operator's index finger and fed through the posterior axilla until the loop can be retrieved with the operator's other index finger.

The loop is then unfolded to create a sling around the posterior shoulder.

The two ends of the sling are clamped and moderate traction is applied to the sling to deliver the shoulder.

The sling can also be used to rotate the shoulders through 180 degrees assisted by counter pressure on the back of the anterior shoulder.

“Last Resort” Measures

If the maneuvers described in the HELPERR mnemonic are unsuccessful after several attempts, the following techniques have been described as “last resort”:

1. *Deliberate clavicle or humerus fracture*

Direct upward pressure on the midportion of the fetal clavicle will result in fracture and reduce the shoulder-to-shoulder distance. Traction across the humerus directly may fracture the humerus and may allow for posterior arm manipulation and facilitate resolution of shoulder impaction.

2. *Muscle Relaxation*

Musculoskeletal or uterine relaxation can be induced with halothane or other general anesthetic. Alternatively, sublingual nitroglycerin may be used for uterine relaxation.

“Heroic” Measures

If the maneuvers described above are also unsuccessful after several attempts, the following techniques have been described for cases of catastrophic shoulder impaction or FED:

3. *Attempted Fetal Replacement for Cesarean Delivery – The “Zavanelli” maneuver*

Cephalic replacement followed by cesarean delivery involves turning the fetal head into direct occiput anterior position (if it has restituted), then flexing the head and pushing it back into the birth canal. This mechanism is the exact reverse of delivery of the head. Continuous upward pressure is then maintained on the fetal head until cesarean delivery can be accomplished. Tocolysis may be a valuable adjunct to this procedure. Before considering cephalic replacement, an operating team, anesthesia, and physicians capable of performing a cesarean delivery must be present. This maneuver should never be attempted if a nuchal cord has been previously clamped and cut.

4. *Laparotomy and Hysterotomy*

This technique has been reported to facilitate vaginal delivery of the fetus in a case of severe FED. In a small series of case reports of severe FED, general anesthesia was induced and cesarean delivery performed. The surgeon would then rotate the infant transabdominally through the hysterotomy incision, allowing the shoulders to rotate, much like a Woods Screw maneuver. Another clinician then accomplished vaginal extraction.

5. *Symphysiotomy*

Finally, the symphysis pubis may be transected to allow for enough pelvic space for delivery to be facilitated. Adequate anesthesia should be ensured, followed by placement of a foley catheter, and finally a sterile transection of the symphysis pubis can be performed with a scalpel, with care to avoid the catheterized urethra. This may be more appropriately (and more commonly) performed in low-resource settings. Complications including injury to the urinary structures and/or permanent orthopedic sequelae may result.

When one is considering performance of these “heroic” measures, the potential low chance of fetal viability after significantly prolonged entrapment must be considered. Additionally, associated significant maternal morbidity and mortality must be weighed against the likelihood of intact fetal survival.

DOCUMENTATION

Documentation of the management of FED should concentrate on the maneuvers performed and the duration of the event. (See Appendix 1) Terms like mild, moderate, or severe shoulder impaction offer little information about the maternity care that was provided or future legal issues. The documentation should also include other team members present and umbilical

cord venous and arterial cord pH (which should ideally be obtained if possible). In case subsequent nerve palsy develops, it is worthwhile to document which arm was impacted against the pubis and on which arm maneuvers were performed for removal. ACOG and RCOG both have standardized reporting forms.

References:

Shoulder dystocia. Practice Bulletin No. 178. American College of Obstetricians and Gynecologists. *Obstet Gynecol* 2017;129:e123–33. (Re-affirmed 2020)

American College of Obstetricians and Gynecologists. Neonatal Brachial Plexus Palsy, American College of Obstetricians and Gynecologists, Task Force on Neonatal Brachial Plexus Palsy. 2014. (Re-affirmed 2019)

Ansell L, Ansell DA, McAra-Couper J, Larmer PJ, Garrett NKG. Axillary traction: An effective method of resolving shoulder dystocia. *Aust N Z J Obstet Gynaecol*. 2019;59(5):627.

Baskett TF, Allen AC. Perinatal implications of shoulder dystocia. *Obstet Gynecol*. 1995;86(1):14.

Beall MH, Spong C, McKay J, Ross MG. Objective definition of shoulder dystocia: a prospective evaluation. *Am J Obstet Gynecol*. 1998 Oct;179(4):934-7

Chauhan SP, Rose CH, Gherman RB, Magann EF, Holland MW, Morrison JC. Brachial plexus injury: a 23-year experience from a tertiary center. *Am J Obstet Gynecol*. 2005;192(6):1795.

Confidential Enquiries into Stillbirths and Deaths in Infancy. Focus Group Shoulder Dystocia. In: Confidential Enquiries into Stillbirths and Deaths in Infancy. Fifth Annual Report. London: Maternal and Child Health Research Consortium; 1998. p. 73–9.

Delpapa EH, Mueller-Heubach E. Pregnancy outcome following ultrasound diagnosis of macrosomia. *Obstet Gynecol* 1991;78:340–3.

Dunn DW, Engle WA Brachial plexus palsy: intrauterine onset. *Pediatr Neurol*. 1985;1(6):367.

Gherman RB; Goodwin TM. Shoulder Dystocia; *Curr Opin Obstet Gynecol* Dec,1998;10(6):459-63.

Gittens-Williams L. Contemporary Management of Shoulder Dystocia. *Women's Health*. 2010;6(6):861-869.

Shoulder Dystocia. Chapter I ALSO Provider Syllabus: AAFP. Leawood, KS.

Shoulder Dystocia. Evidence Review. ALSO Provider Syllabus. AAFP. Leawood, KS.

Grimm MJ, et al. Effect of clinician-applied maneuvers on brachial plexus stretch during a shoulder dystocia event: investigation using a computer simulation model. *Am J Obstet Gynecol* 2010;203:339.e1,339.e5.

Grobman, WA, et al. Outcomes associated with introduction of shoulder dystocia protocol. *Am J Obstet Gynecol* 2011; 205(6):513-7.

Hoffman MK et al. A comparison of obstetric maneuvers for the acute management of shoulder dystocia. *Obstet Gynecol*. 2011 Jun;117(6):1272-8. doi: 10.1097/AOG.0b013e31821a12c9.

Inglis SR, et al. Effects of shoulder dystocia training on the incidence of brachial plexus injury. *Am J Obstet Gynecol* 2011;204:322.e1-6.

Leung TY, Stuart O, Suen SS, Sahota DS, Lau TK, Lao TT. Comparison of perinatal outcomes of shoulder dystocia alleviated by different type and sequence of manoeuvres: a retrospective review. *BJOG*. 2011 Jul;118(8):985-90. doi: 10.1111/j.1471-0528.2011.02968.x. Epub 2011 Apr 12.

Leung TY, Stuart O, Sahota DS, Suen SS, Lau TK, Lao TT. Head-to-body delivery interval and risk of fetal acidosis and hypoxic ischaemic encephalopathy in shoulder dystocia: a retrospective review. *BJOG*. 2011 Mar;118(4):474-9. doi: 10.1111/j.1471-0528.2010.02834.x. Epub 2010 Dec 24.

Paradiso G, Grañana N, Maza E. Prenatal brachial plexus paralysis. *Neurology*. 1997;49(1):261.

Rouse DJ, Owen J, Goldenberg RL, Cliver SP. The effectiveness and costs of elective cesarean delivery for fetal macrosomia diagnosed by ultrasound. *JAMA* 1996;276:1480–6.

Royal College of Obstetricians and Gynaecologists. Shoulder Dystocia. RCOG Guideline No. 42 2nd Edition March 2012. Royal College of Obstetricians and Gynaecologists Updated 2017 https://www.rcog.org.uk/globalassets/documents/guidelines/gtg_42.pdf (Accessed 10/19/22)

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 Sep;86(3):433-6.

Torki M, et al. Severe Brachial Plexus Palsy in Women Without Shoulder Dystocia. *Obstet Gynecol* 2012.

Rondis JF. UpToDate. Shoulder dystocia: Intrapartum diagnosis, management, and outcome. (Accessed 10/19/22) https://www.uptodate.com/contents/shoulder-dystocia-intrapartum-diagnosis-management-and-outcome?search=shoulder%20dystocia&source=search_result&selectedTitle=1~45&usage_type=default&display_rank=1#H523783555

Cochrane Database

Athukorala C, Middleton P, Crowther CA. Intrapartum interventions for preventing shoulder dystocia. *Cochrane Database of Systematic Reviews* 2006, Issue 4. Art. No.: CD005543. DOI: 10.1002/14651858.CD005543.pub2. (Accessed 10/19/22)

Boulvain M, Stan CM, Irion O. Elective delivery in diabetic pregnant women. *Cochrane Database of Systematic Reviews* 2001, Issue 2. Art. No.: CD001997. DOI: 10.1002/14651858.CD001997. (Accessed 10/19/22)

Boulvain M, Irion O, Dowswell T, Thornton JG. Induction of labour at or near term for suspected fetal macrosomia. Cochrane Database of Systematic Reviews 2016, Issue 5. Art. No.: CD000938. DOI: 10.1002/14651858.CD000938.pub2. (Accessed 10/19/22)

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Appendix 1: Fetal expulsion worksheet

Diabetes status: A1 A2 Pre-existing EFW_____ (method)
Length of labor: First stage: _____ Second stage: _____

Delivery of head: Spontaneous: _____ Vacuum*: _____ Forceps*: _____

*Indication, fetal station, position of the head, instrument used, and time required to effect delivery.

Oxytocin? _____ Epidural? _____ Position of the head at diagnosis _____

Anterior shoulder: Right _____ Left _____ Posterior shoulder: Right _____ Left _____

Bladder drained? Yes/No Bed broken down? Yes/No

Indicate the direction force applied for each maneuver and order, e.g., from maternal left to right

H - Call for Help Time _____ Who performed? _____
E - Evaluate for Episiotomy
 Episiotomy: _____ Order _____ Who performed? _____
L - Legs
 McRoberts: _____ Order _____ Who performed? _____
P - Pressure
 Suprapubic pressure: _____ Order _____ Who performed? _____
E - Enter
 Rubin II: _____ Order _____ Who performed? _____
 Woods screw: _____ Order _____ Who performed? _____
 Reverse Woods screw: _____ Order _____ Who performed? _____
R - Remove the Posterior Arm
 Remove Posterior Arm _____ Order _____ Who performed? _____
R - Roll the patient
 Gaskin all-fours _____ Order _____ Who performed? _____
Other maneuvers (Specify): _____

Fundal pressure Not done _____

Time delivery of head _____ Delivery of body: _____ Total time FEB _____

Lacerations: _____ Other injury: _____ Blood loss: _____

Gender: _____ Apgar scores: _____ Birthweight: _____

Cord pH: _____ (Umbilical cord gases (arterial and venous) should be obtained at birth in FED cases)

PEDS Physical exam: Fractured humerus: _____ Fractured clavicle: _____ Brachial plexus injury: _____

Respiratory status: _____ Bruising: _____ Horner's syndrome: _____ Any other injury? _____

Resuscitation? _____ By whom? _____

Discussed events of delivery with Pt: _____ Discussed condition of infant with Pt: _____

Who assisted at delivery? _____

Who was present in room during delivery? _____

Comments: _____

Debrief with family _____

Signature _____ Date _____

Addressograph