PRACTICE BULLETIN

Shoulder Dystocia

Shoulder dystocia is an unpredictable and unpreventable obstetric emergency that places the pregnant woman and fetus at risk of injury. Studies have shown that prepregnancy, antepartum, and intrapartum risk factors have extremely poor predictive value for shoulder dystocia. Several techniques to facilitate delivery exist, and there is evidence that a systematic approach and simulation training can improve outcomes and documentation. The purpose of this document is to provide clinicians with evidence-based information regarding management of pregnancies and deliveries at risk of or complicated by shoulder dystocia.

Background

Shoulder dystocia typically occurs when the descent of the anterior shoulder is obstructed by the symphysis pubis, but it also can result from impaction of the posterior shoulder on the maternal sacral promontory. A persistent anterior–posterior location of the fetal shoulders at the pelvic brim can occur when there is increased resistance between the fetus and the vaginal walls (eg, in the setting of fetal macrosomia), when there is a large fetal chest relative to the biparietal diameter (eg, in fetuses of diabetic women), and when truncal rotation does not occur (eg, with precipitous labor) (1).

Shoulder dystocia is most commonly diagnosed as failure to deliver the fetal shoulder(s) with gentle downward traction on the fetal head, requiring additional obstetric maneuvers to effect delivery (2). The reported incidence of shoulder dystocia among vaginal deliveries of fetuses in the vertex presentation ranges from 0.2% to 3% (1, 3). Reasons for the variation in reported rates include differences in the definition of shoulder dystocia, variability between study populations, and reliance on the delivering health care provider's clinical judgment to determine whether ancillary maneuvers are actually

necessary. Retraction of the delivered fetal head against the maternal perineum (the "turtle sign") is suggestive, but not diagnostic, of the presence of shoulder dystocia.

Maternal Complications

Shoulder dystocia has been shown to be associated with an increased risk of postpartum hemorrhage as well as higher degree perineal lacerations. A study of 236 cases of shoulder dystocia reported that the rate of postpartum hemorrhage was 11%, the rate of fourth-degree lacerations was 3.8%, and that the incidence of these complications was not related to the maneuvers used to resolve the shoulder dystocia (4). Maternal symphyseal separation and lateral femoral cutaneous neuropathy have been shown to be associated with aggressive hyperflexion of the maternal legs (5). Two recent studies showed that shoulder dystocia cases that required fetal manipulation incurred an increased risk of obstetric anal sphincter injuries (OASIS). In one of these studies, the need for any fetal manipulation increased the risk of OASIS (6), whereas in the other study the use of fetal manipulation or four or more maneuvers was associated with an increased risk of OASIS after controlling for confounders (7). It should be noted that the performance of certain

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The information is designed to aid practitioners in making decisions about appropriate obstetric and gynecologic care. These guidelines should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.

"heroic" maneuvers in cases of catastrophic shoulder dystocia, such as the Zavanelli maneuver and symphysiotomy, have a high incidence of significant maternal morbidity (8, 9), such as cervico–vaginal lacerations, uterine rupture, urethral injury, and bladder lacerations.

Neonatal Complications

Most shoulder dystocia cases are relieved without injury to the fetus. Brachial plexus injuries and fractures of the clavicle and humerus, which commonly resolve without long-term sequelae, are the most commonly reported immediate neonatal injuries associated with shoulder dystocia (10). A large multicenter study that evaluated 2,018 cases of shoulder dystocia found 60 cases of Erb palsy, 4 cases of Klumpke palsy, 41 cases of clavicular or humeral fractures, and 6 cases of hypoxic–ischemic encephalopathy, for a total neonatal injury rate of 5.2% (11). Although the rate of transient brachial plexus injuries after shoulder dystocia varies, most series report a 10–20% injury rate immediately after the delivery (1). Because most shoulder dystocia series lack long-term neonatal follow up and a uniform definition for recovery from brachial plexus injury has not been determined, it is difficult to ascertain the true rate of permanent or persistent neonatal brachial plexus injuries. For example, some authors have reported complete recovery rates of 80% whereas others have found that less than 50% of neonates demonstrated recovery (3). In addition, the complete scope of neonatal brachial plexus palsy is difficult to define because of the various combinations of lesions within the elements of the brachial plexus. (3). Functional recovery depends on the type of injury present; 64% of infants classified as having injury at the C5–C6 or C5–C6–C7 levels demonstrated complete recovery at 6 months, compared with 14% of C5–T1 injuries (3). Diaphragmatic paralysis, Horner syndrome, and facial nerve injuries have also occasionally been found to accompany brachial plexus palsy (3). There also have been rare reports of spiral fracture of the radius and laryngeal nerve paresis (12, 13).

Although infrequent, some cases of shoulder dystocia may result in neonatal encephalopathy and even death. A study examining 6,238 cases of shoulder dystocia that occurred in deliveries of neonates who weighed more than 3,500 grams found that 1% of infants born to diabetic women and 0.08% of infants born to nondiabetic women had severe asphyxia in the setting of shoulder dystocia. (14). In a large multicenter study of 2,018 cases of shoulder dystocia deliveries, the six cases of hypoxic–ischemic encephalopathy were all associated with the use of more than five maneuvers, and the mean time between delivery of the head and the remainder of the body was 10.75 minutes (range 3–20 minutes) (11).

The authors concluded that the need for multiple maneuvers and the high-average duration of arrested delivery highlight the extreme degree of difficulty in resolving these cases. Nonetheless, the small number of cases precluded meaningful comment on optimal management or prediction of these rare cases (11).

The duration of the shoulder dystocia alone is not an accurate predictor of neonatal asphyxia or death. A series of neonatal deaths associated with shoulder dystocia found that the head-body delivery interval was less than 5 minutes in 47% of cases of death, and only 20% had a head–body interval of greater than 10 minutes (15). Notably, *fetal compromise* (defined as abnormal fetal heart rate tracing, abnormal scalp pH, or presence of meconium) was present before delivery in 25% of these cases. Although fetal compromise was not seen more frequently in the neonates who died after a short head–body delivery interval in this small series, the authors concluded that intrapartum factors as well as differing mechanisms of injury specifically related to shoulder dystocia, (eg, excessive vagal stimulation, compression of the neck decreasing cerebral blood flow) may be factors contributing to neonatal demise in these cases (15).

Clinical Considerations and Recommendations

▶ Can shoulder dystocia be predicted accurately?

Although there are a number of known risk factors, shoulder dystocia cannot be accurately predicted or prevented. Clinicians should be aware of the risk factors for shoulder dystocia in order to anticipate those deliveries at high risk and should be prepared to address this complication in all deliveries. Increasing birth weight and maternal diabetes have been shown to be associated with an increased incidence of shoulder dystocia (14, 16–19); however, most cases occur in nondiabetic women with normal-sized infants. In one study of 221 shoulder dystocia births from a single institution, more than one half of the infants weighed less than 4,000 g, and 80% of women were not diabetic (20). Another study showed that the presence of maternal diabetes and fetal macrosomia accurately predicted only 55% of cases of shoulder dystocia (21). Furthermore, studies have shown that other proposed obstetric risk factors for shoulder dystocia (including excessive maternal weight or weight gain, operative vaginal delivery, oxytocin use, multiparity, epidural use, precipitous and prolonged second stage of labor [1, 22, 23] alone or in combination) are poor predictors for shoulder dystocia (22, 24). Patients with prior shoulder dystocia are at an increased

risk of recurrent shoulder dystocia in a subsequent pregnancy (25); management of these patients is addressed in a separate clinical question (see *What is the probability of recurrent shoulder dystocia in a subsequent pregnancy?*). Finally, the ultrasound-derived fetal abdominal diameter–biparietal diameter difference has been evaluated as a predictor for shoulder dystocia and has not been found to be clinically useful (26–28). The few studies evaluating this measure have been hindered by their retrospective nature, difficulties in measuring the fetal abdominal outline at an advanced gestational age, the limited number of cases of shoulder dystocia, and the lack of applicability to the general obstetric population.

▶ *Do labor abnormalities predict shoulder dystocia?*

Only four studies have specifically evaluated labor patterns in patients who develop shoulder dystocia or neonatal injury. In three of the four studies, the authors concluded that there was no particular pattern of prolonged or precipitous labor that accurately predicted shoulder dystocia or neonatal injury (29–31). The largest study, which compared 276 consecutive cases of shoulder dystocia with 600 matched controls, found that labor patterns were not predictive of shoulder dystocia among any of the participants, even those with diabetes or macrosomia (29). Similarly, a retrospective analysis of 52 cases of shoulder dystocia reported no difference in protracted dilation or mean duration of the second stage of labor in women who experienced shoulder dystocia compared with matched controls (30). A case–control study of 80 cases of shoulder dystocia noted that precipitous labor was the most common labor abnormality seen in shoulder dystocia; however, there was no difference in the rate of precipitous or prolonged labor in cases and controls. One study did find a significant association between active phase abnormality and shoulder dystocia; however, only 36 patients were included (32). In contrast, a recent, large multicenter study with more than 100,000 women, which was conducted in the United States, found that a prolonged second stage was not associated with a statistically significant increase in the risk of shoulder dystocia among either nulliparous or multiparous patients (33).

Although labor abnormalities are not themselves highly predictive of shoulder dystocia, some individual risk factors for a prolonged second stage (such as elevated birth weight), and interventions that may occur in the setting of a prolonged second stage (such as mid-pelvic operative delivery), have been associated with an increased risk of shoulder dystocia, particularly when encountered in combination (19). Thus, the clinician should have a heightened awareness for shoulder dystocia in these situations, although judicious use of operative vaginal delivery is reasonable even when risk factors are present. The patient should be counseled regarding these risks, caution should be exercised, and preparations should be made for the possibility of encountering shoulder dystocia.

▶ *What is the probability of recurrent shoulder dystocia in a subsequent pregnancy?*

Prior shoulder dystocia is a risk factor for recurrent shoulder dystocia. Although reports indicate that the recurrence rate ranges from 1% to 16.7% (16, 25, 34–36), most studies report the incidence of recurrence to be at least 10% (37). However, the true incidence may remain unknown because physicians and patients often choose not to attempt a trial of labor when there is a history of complicated delivery or an injured infant. When there is a history of shoulder dystocia, the prior delivery events should be discussed with the patient, preferably before the intrapartum period. Although there are no reliable factors that allow for the accurate prediction of recurrence, in patients with a history of shoulder dystocia, the estimated fetal weight, gestational age, maternal glucose intolerance, and the severity of the prior neonatal injury should be evaluated. The risks and potential benefits of cesarean delivery should be discussed with the patient. Because most subsequent deliveries will not be complicated by shoulder dystocia, universal elective cesarean delivery is not recommended for patients who have a history of shoulder dystocia. However, careful delivery planning is recommended, taking into account available clinical information, future pregnancy plans, and patient preference.

▶ *Is there any benefit to labor induction for the prevention of shoulder dystocia in the setting of suspected macrosomia or diabetes?*

Given the increased risk of shoulder dystocia in the setting of macrosomia or diabetes, the effect of a policy of induction of labor to reduce this complication has been studied in patients with both of these conditions. The results from retrospective cohort studies that examined the effect of induction of labor on the incidence of shoulder dystocia in term patients with suspected fetal macrosomia are inconsistent. Some reports show that induction of labor increases the risk of cesarean delivery without reducing shoulder dystocia or newborn morbidity (38–42); however, other studies suggest a slight decrease or no effect on the risk of cesarean delivery and no difference in the rate of shoulder dystocia with induction of labor. (43, 44)

Two randomized clinical trials have examined the effect of a policy of induction of labor at term

for suspected macrosomia. In one trial, a total of 273 nondiabetic women at 38 weeks of gestation or more with ultrasound-derived estimated fetal weights between 4,000 g and 4,500 g were randomized to either planned induction of labor or expectant management (41). The cesarean delivery rates were similar: 19.4% for the induction group and 21.6% for the expectant management group. Moreover, of the 11 cases of shoulder dystocia, five were in the induction group and six were in the expectant group, and all were managed without brachial plexus injury or other trauma. In a trial conducted in Europe, a total of 822 women with ultrasound-estimated fetal weights above the 95th percentile for gestational age at 37–38 weeks of gestation were randomized to induction of labor within 3 days or to expectant management (45). With induction of labor, the risk of shoulder dystocia was reduced from 4% to 1% (relative risk [RR], 0.32; 95% confidence interval (CI); 0.12–0.85). Importantly, there were no instances of brachial plexus injury in either group, and the cesarean delivery rates were similar, 28% in the induction group and 32% in the expectant management group (RR, 0.89; 95% CI; 0.72–1.09). A meta-analysis that was published included these trials and two smaller unpublished studies involving a total of 1,190 women with suspected fetal macrosomia (a heterogeneous cohort of nulliparous, multiparous, diabetic, and nondiabetic women) (46). Compared with expectant management, induction of labor for suspected fetal macrosomia reduced the risk of shoulder dystocia (RR, 0.60; 95% CI; 0.37–0.98) and any type of fracture (RR, 0.20; 95% CI; 0.05–0.79) with no change in the risk of cesarean delivery (RR, 0.91; 95% CI; 0.76–1.09) or instrumental delivery (RR, 0.86; 95% CI; 0.65–1.13). There were no differences between the groups for brachial plexus injury, although this outcome was infrequent (RR, 0.21; 95% CI; 0.01–4.28).

The effect of induction of labor on shoulder dystocia also has been investigated in normally grown and suspected large-for-gestational-age fetuses of diabetic women. A cohort multiple time-series study found no significant differences in the rate of macrosomia or cesarean delivery between women with insulin-treated gestational diabetes mellitus who were induced at 38–39 weeks of gestation and expectantly managed historic controls (30). There were no significant differences in macrosomia or cesarean delivery rates, but shoulder dystocia was experienced by 10% of the expectant management group beyond 40 weeks of gestation versus 1.4% in the group in which labor was induced at 38–39 weeks of gestation. A prospective study of 1,337 women with gestational or pregestational diabetes compared with 1,227 historic controls investigated the effect of a policy incorporating ultrasonography for estimated fetal weight at 37–38 weeks of gestation into delivery decisions (47). For women with an estimated fetal weight classified as large for gestational age but less than 4,250 grams, induction of labor was undertaken. If the estimated fetal weight was greater than 4,250 grams, cesarean delivery was recommended. The incidence of shoulder dystocia was 2.8% before the implementation of this protocol and 1.5% after implementation (OR, 1.9; 95% CI; 1.0–3.5). The cesarean delivery rate increased from 21.7% preimplementation to 25.1% postimplementation (P<.04). Nearly one half (47%) of the infants delivered by scheduled cesarean delivery for ultrasound-derived fetal weight estimates of at least 4,250 g had a birth weight of less than 4,000 g. Although the sample size was insufficient for comparison, the risk of birth trauma was not eliminated (two versus one brachial plexus injury and 10 versus six fractures in the control versus study cohort, respectively). These authors suggest that along with glycemic control, ultrasonography for estimated fetal weight may be a useful adjunct in determining the most appropriate timing for delivery in women with diabetes. However, the use of historic controls, the nonrandomized design of the study, the use of multiple interventions, and the small sample size severely limit the usefulness of the conclusions from this study. Furthermore, a systematic review concluded that there was insufficient evidence to inform decision making regarding the effect of labor induction in the setting of gestational diabetes and suspected macrosomia on the incidence or occurrence of shoulder dystocia (48).

The American College of Obstetricians and Gynecologists recommends against delivery before 39 completed weeks of gestation if not medically indicated (49, 50). Whether induction is better than expectant management for suspected large-for-gestational-age infants and at what gestational age delivery should be performed remains unclear (51). Although the meta-analysis of available trials is provocative and raises questions for further study, it is not clear that the reduction in shoulder dystocia found in the included trials would still persist if labor was induced after 39 weeks of gestation. At this time, and until the results of additional studies are reported, the American College of Obstetricians and Gynecologists continues to discourage induction of labor solely for suspected macrosomia at any gestational age (52).

▶ *Is there any benefit to planned cesarean delivery for the prevention of the complications of shoulder dystocia in cases of suspected fetal macrosomia?*

Most fetuses with macrosomia that are delivered vaginally do not experience shoulder dystocia. Consequently,

if all fetuses suspected of being macrosomic were delivered by cesarean, the cesarean delivery rate would increase disproportionately to the reduction in the rate of shoulder dystocia (53–55). In two reports that analyzed a policy of prophylactic cesarean delivery for macrosomia that took into account the reported sensitivity and specificity of ultrasonography for the detection of macrosomia (4,500 g or greater), it was calculated that 3,695 cesarean deliveries would be required to prevent one permanent injury, at an additional cost of $8.7 million for each permanent injury avoided (56, 57). For pregnancies complicated by maternal diabetes, the estimated ratios of cesarean deliveries and cost per permanent injury avoided were more favorable, although these figures were still high at 443 cesarean deliveries performed, at a cost of $930,000 for each permanent injury avoided. Because of the lack of well-designed and well-executed randomized clinical trials, a policy of prophylactic cesarean delivery for suspected fetal macrosomia of less than 5,000 g would be economically unsound for pregnancies in the absence of maternal diabetes. Elective cesarean delivery should be considered for women without diabetes who are carrying fetuses with suspected macrosomia with an estimated fetal weight of at least 5,000 g and for women with diabetes whose fetuses are estimated to weigh at least 4,500 g.

▶ Is the presence of a brachial plexus injury evidence that shoulder dystocia has occurred?

The presence of a brachial plexus injury is not evidence that shoulder dystocia has occurred. Over the past decade, multiple reports have indicated that not all brachial plexus injuries are related to shoulder dystocia and that the injury is multifactorial in nature (3, 58, 59). Cases of severe brachial plexus palsy have been documented in the absence of shoulder dystocia and without identifiable risk factors (60). In addition, slightly more than one half of all brachial plexus injuries are associated with uncomplicated vaginal deliveries (58). Brachial plexus injury also has been found to occur in the posterior arm of infants whose anterior shoulder was impacted behind the symphysis pubis, as well as in vertex-presenting fetuses delivered by a traumatic cesarean.

▶ What should the obstetrician do to manage shoulder dystocia?

Although management of shoulder dystocia may differ based on the specific clinical situation, there are certain elements of a systematic approach that can be integrated into every scenario. However, regardless of the maneuvers and management strategies employed, maternal and infant complications are unpredictable and may not be avoidable. Diagnosis of shoulder dystocia usually occurs when there is failure of delivery of the fetal shoulder(s) after initial traction attempt(s). Communication regarding this event is essential. The time at which the shoulder dystocia was diagnosed should be noted, as well as the time delivery is complete. Additional nursing, obstetric care provider, and anesthesia assistance should be requested. The pregnant woman should be instructed not to push while preparations are made and maneuvers are undertaken to relieve the shoulder dystocia. The patient should be positioned so that the health care provider has adequate access for performing maneuvers. If traction forces are applied, axial traction should be employed. Axial traction is applied in alignment with the fetal cervico–thoracic spine and has a downward component typically along a vector estimated to be 25–45 degrees below the horizontal plane when the laboring woman is in a lithotomy position. Laterally derived traction only should not be employed as the sole maneuver to effect delivery, in the absence of ancillary obstetric maneuvers. Among four cases managed only by lateral traction in one series, there were three brachial plexus injuries and one clavicular fracture (61).

No randomized controlled trials have compared maneuvers for shoulder dystocia alleviation. However, it is clear that brachial plexus injury can occur regardless of the procedures used to disimpact the shoulder(s) because all maneuvers can increase the degree of stretch on the brachial plexus (3). When shoulder dystocia is suspected, the McRoberts maneuver should be attempted first because it is a simple, logical, and effective technique. The McRoberts maneuver, in which two assistants each grasp a maternal leg and sharply flex the thigh back against the abdomen causes cephalad rotation of the symphysis pubis and flattening of the lumbar lordosis that can free the impacted shoulder (62, 63). Suprapubic pressure, in which an assistant applies pressure above the pubic bone with the palm or fist, directing the pressure on the anterior shoulder both downward (to below the pubic bone) and laterally (toward the fetus's face or sternum) in order to abduct and rotate the anterior shoulder may be used at the same time to assist in dislodging the impacted shoulder. In contrast, fundal pressure should be avoided as it may further worsen impaction of the shoulder and also may result in uterine rupture (64). In cases where the McRoberts maneuver and suprapubic pressure are unsuccessful, delivery of the posterior arm can be considered as the next maneuver to manage shoulder dystocia. Recent evidence has shown that delivery of the posterior arm has a high degree of success in accomplishing delivery (11, 31). In a computer model, posterior arm delivery required the

least amount of force to effect delivery and resulted in the lowest amount of brachial plexus stretch (65). The use of these maneuvers will relieve 95% of cases of shoulder dystocia within 4 minutes (61).

Several rotational maneuvers have been described for relieving shoulder dystocia. These may be used instead of posterior arm delivery, or after failure of attempted posterior arm delivery. With the Rubin maneuver, the health care provider places a hand in the vagina and on the back surface of the posterior fetal shoulder, then rotates it anteriorly towards the fetal face. With the Woods Screw maneuver, the health care provider instead rotates the fetus by exerting pressure on the anterior, clavicular surface of the posterior shoulder to turn the fetus until the anterior shoulder emerges from behind the maternal symphysis. In addition to these maneuvers, posterior axilla sling traction can be used, in which a size 12 or 14 French soft catheter is threaded to create a sling around the posterior shoulder, allowing the shoulder to be delivered by applying moderate traction to the sling (66). For women without anesthesia, the Gaskin all–fours maneuver (67), in which the woman is placed on her hands and knees and delivery is effected by gentle downward traction on the posterior shoulder (the shoulder against the maternal sacrum) or upward traction on the anterior shoulder, may be useful. If these maneuvers are not initially successful, they should be repeated. Notably, a study of 231 cases of shoulder dystocia found no association between the maneuvers employed and neonatal injury after adjusting for duration, an important surrogate for severity. The authors concluded that clinicians should use the maneuver most likely to result in successful delivery (68).

The routine use of episiotomy in the management of all shoulder dystocia cases has been advocated in the past, but with little scientific evidence to support the practice (69). The use of episiotomy should be based on clinical circumstances and is primarily reserved for cases in which additional access is needed to perform maneuvers because an incision into the soft tissue of the vagina and perineum will not resolve an impaction of the bony fetal shoulder(s). When direct fetal manipulation with either rotational maneuvers or delivery of the posterior arm is implemented, episiotomy may be helpful to create more room within the posterior vagina (10, 70).

More aggressive approaches may be warranted in cases of severe shoulder dystocia that are not responsive to commonly used maneuvers. The Zavanelli maneuver (cephalic replacement followed by cesarean delivery) has been described for relieving catastrophic cases (71); however, it is associated with a significantly increased risk of fetal morbidity and mortality and maternal morbidity (72). Abdominal rescue is also an option, in which

laparotomy and hysterotomy facilitate manual dislodging of the anterior shoulder from above, then effecting vaginal delivery (73). Intentional fracture of the fetal clavicle (by pulling the anterior clavicle outward) may help decrease the bisacromial diameter; however, it may be difficult to perform and can be associated with injury to underlying structures.

▶ *What should be documented after shoulder dystocia occurs?*

Contemporaneous documentation of the management of shoulder dystocia is recommended to record significant facts, findings, and observations about the shoulder dystocia event and its sequelae. From a clinical perspective, this information is critical for accurately informing patients and future health care providers regarding the delivery events and counseling patients about future risks. Checklists or standardized documentation forms have been suggested as tools to help ensure that critical information is noted at the time of the delivery (74); see the link provided in the For More Information page for examples.

▶ *What is the role of simulation in preparing for shoulder dystocia?*

Obstetric simulation is an effective tool in preparing for shoulder dystocia because it is a high acuity/low frequency event. Studies have shown that simulation results in improved communication, use of obstetric maneuvers, and documentation of events (75–81).

Evidence indicates that introduction of shoulder dystocia simulation and team training protocols at individual institutions may be associated with a reduction in transient brachial plexus injury when shoulder dystocia occurs. After the introduction of a mandatory clinical shoulder dystocia simulation for all personnel on a labor and delivery unit, the frequency of evidence-based management of shoulder dystocia was higher, and the rate of neonatal brachial injury at birth was lower (82, 83). Moreover, a training protocol that included a didactic component reviewing a protocol-specific response followed by repeated simulations and debriefing resulted in a significant decrease in the frequency of brachial plexus palsy, from 10.1% before training to 4.0% during training to 2.6% after training (*P*=.03) (84). Another study found that the institution of training, simulation, and a standardized shoulder dystocia protocol that prioritized a "hands off" approach" (including avoidance of maternal pushing, no traction on the fetal head, and immediately proceeding to oblique rotation before attempting any other maneuvers) resulted in a significant decrease in the likelihood of brachial plexus injury in the setting of

shoulder dystocia (RR, 0.28; 95% CI; 0.12–0.66) (85). Simulation exercises and shoulder dystocia protocols are recommended to improve team communication and maneuver use because this may reduce the incidence of brachial plexus palsy associated with shoulder dystocia.

Summary of Recommendations

The following recommendations are based on limited or inconsistent scientific evidence (Level B):

▶ Although there are a number of known risk factors, shoulder dystocia cannot be accurately predicted or prevented. Clinicians should be aware of the risk factors for shoulder dystocia in order to anticipate those deliveries at high risk and should be prepared to address this complication in all deliveries.

▶ Elective cesarean delivery should be considered for women without diabetes who are carrying fetuses with suspected macrosomia with an estimated fetal weight of at least 5,000 g and for women with diabetes whose fetuses are estimated to weigh at least 4,500 g.

▶ When shoulder dystocia is suspected, the McRoberts maneuver should be attempted first because it is a simple, logical, and effective technique.

▶ Contemporaneous documentation of the management of shoulder dystocia is recommended to record significant facts, findings, and observations about the shoulder dystocia event and its sequelae.

▶ Simulation exercises and shoulder dystocia protocols are recommended to improve team communication and maneuver use because this may reduce the incidence of brachial plexus palsy associated with shoulder dystocia.

The following recommendation is based primarily on consensus and expert opinion (Level C):

▶ In cases where the McRoberts maneuver and suprapubic pressure are unsuccessful, delivery of the posterior arm can be considered as the next maneuver to manage shoulder dystocia.

For More Information

The American College of Obstetricians and Gynecologists has identified additional resources on topics related to this document that may be helpful for ob-gyns, other health care providers, and patients. You may view these resources at www.acog.org/More–Info/Shoulder Dystocia.

These resources are for information only and are not meant to be comprehensive. Referral to these resources does not imply the American College of Obstetricians and Gynecologists' endorsement of the organization, the organization's website, or the content of the resource. These resources may change without notice.

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The MEDLINE database, the Cochrane Library, and ACOG's own internal resources and documents were used to conduct a literature search to locate relevant articles published between January 1985 and August 2015. The search was restricted to articles published in the English language. Priority was given to articles reporting results of original research, although review articles and commentaries also were consulted. Abstracts of research presented at symposia and scientific conferences were not considered adequate for inclusion in this document. Guidelines published by organizations or institutions such as the National Institutes of Health and the American College of Obstetricians and Gynecologists were reviewed, and additional studies were located by reviewing bibliographies of identified articles. When reliable research was not available, expert opinions from obstetrician–gynecologists were used.

Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventive Services Task Force:

I Evidence obtained from at least one properly designed randomized controlled trial.

II-1 Evidence obtained from well-designed controlled trials without randomization.

II-2 Evidence obtained from well-designed cohort or case–control analytic studies, preferably from more than one center or research group.

II-3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.

III Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

Level A—Recommendations are based on good and consistent scientific evidence.

Level B—Recommendations are based on limited or inconsistent scientific evidence.

Level C—Recommendations are based primarily on consensus and expert opinion.