Shoulder Dystocia

Shoulder dystocia is most often an unpredictable and unpreventable obstetric emergency. Failure of the shoulders to deliver spontaneously places both the pregnant woman and fetus at risk for injury. Several maneuvers to release impacted shoulders have been developed, but the urgency of this event makes prospective studies impractical for comparing their effectiveness. The purpose of this document is to provide clinicians with information based on published studies regarding management of deliveries at risk for or complicated by shoulder dystocia.

Background

Shoulder dystocia is most often defined as a delivery that requires additional obstetric maneuvers following failure of gentle downward traction on the fetal head to effect delivery of the shoulders (1). Retraction of the delivered fetal head against the maternal perineum (turtle sign) may be present and may assist in the diagnosis. Shoulder dystocia is caused by the impaction of the anterior fetal shoulder behind the maternal pubis symphysis. It also can occur from impaction of the posterior fetal shoulder on the sacral promontory. Because the delivering attendant must determine whether ancillary maneuvers are actually necessary, the diagnosis of shoulder dystocia has a subjective component. Although severe cases are readily apparent, milder forms may be overdiagnosed or underdiagnosed. The reported incidence ranges from 0.6% to 1.4% among vaginal deliveries of fetuses in the vertex presentation (2–7). Differences in reported rates are partly because of clinical variation in describing shoulder dystocia and the patient population being studied.

Maternal Complications

A study of 236 shoulder dystocia cases reported an 11% rate of postpartum hemorrhage and a 3.8% rate of fourth-degree lacerations (8). These complications were not more common with rotational maneuvers or other fetal manipu-
lation when compared with the McRoberts maneuver alone (8). It should be noted that the performance of certain "heroic" maneuvers in cases of catastrophic shoulder dystocia, such as the Zavanelli maneuver and symphysiotomy, may be associated with significant maternal morbidity (9, 10).

**Neonatal Complications**

Brachial plexus injuries and fractures of the clavicle and humerus are associated with shoulder dystocia. The reported incidence of brachial plexus injuries following a delivery complicated by shoulder dystocia varies widely from 4% to 40% (2, 3, 5, 6, 11–18). Fortunately, most cases resolve without permanent disability; that is, fewer than 10% of all cases of shoulder dystocia result in a persistent brachial plexus injury (3, 14–16). Data suggest that a significant proportion (34–47%) of brachial plexus injuries are not associated with shoulder dystocia; in fact, 4% occur after cesarean delivery (11, 19–21). Some severe cases of shoulder dystocia may result in hypoxic-ischemic encephalopathy and even death (22, 23). A study of outcomes from 6,238 cases of shoulder dystocia found that asphyxia was more common among births complicated by shoulder dystocia regardless of maternal diabetic status (22).

**Clinical Considerations and Recommendations**

- **Can shoulder dystocia be predicted accurately?**

Shoulder dystocia is most often unpredictable and unpreventable. Although fetal macrosomia and maternal diabetes increase the risk of shoulder dystocia (3, 5, 6, 22, 24–28), a substantial proportion of cases occur among women who do not have diabetes and among infants with birth weights less than 4,000 g. In one study, the presence of both diabetes and macrosomia accurately predicted only 55% of cases of shoulder dystocia (5). Additional studies failed to find any combination of risk factors that could accurately predict which pregnancies would be complicated by shoulder dystocia (3, 4, 6, 25, 26). Maternal obesity is associated with macrosomia, and, thus, obese women are at risk for shoulder dystocia. Other antepartum conditions associated with shoulder dystocia include multiparity, postterm gestation, previous history of a macrosomic birth, and a previous history of shoulder dystocia (5, 29). Associated intrapartum factors include labor induction, epidural anesthesia, and operative vaginal delivery (forceps and vacuum-assisted delivery) (3, 4). In each case, risk factors can be identified, but their predictive value is not high enough to be useful in a clinical setting.

- **Do labor abnormalities predict shoulder dystocia?**

Three studies have specifically evaluated labor patterns in patients who develop shoulder dystocia (30–32). The largest study, comparing 276 consecutive cases of shoulder dystocia with 600 matched controls, did not identify labor patterns as predictive among any of the cohort, even those with diabetes or macrosomia (30). Another found a significant association between active-phase abnormality and shoulder dystocia, but it included only 36 patients (31). A retrospective analysis of 52 cases of shoulder dystocia reported no difference in protracted dilatation and mean duration of second stage of labor (32). Therefore, data are inadequate to suggest that the labor curve is a useful predictor of shoulder dystocia.

- **Does labor induction for suspected fetal macrosomia affect the risk of shoulder dystocia or brachial plexus injury?**

A small, randomized trial of 273 patients with an ultrasound-estimated fetal weight of 4,000–4,500 g comparing labor induction with expectant management reported no significant difference in the rate of shoulder dystocia (3.7% versus 4.3%) or brachial plexus palsy (0% versus 1.4%) (33). Another retrospective study found labor induction with an antenatal diagnosis of macrosomia significantly increased the cesarean delivery rate (36% versus 17%) (34). Labor induction in a woman who does not have diabetes for the sole indication of suspected macrosomia has not been shown to be effective in decreasing the occurrence of shoulder dystocia or decreasing the rate of cesarean delivery (35).

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

A policy of planned cesarean delivery for suspected macrosomic fetuses (>4,000 g) in women who do not have diabetes is not recommended. Ultrasonography is not an accurate predictor of macrosomia (36–38). Furthermore, most macrosomic infants do not experience this complication. Consequently, if all fetuses suspected of being macrosomic underwent cesarean delivery, the cesarean delivery rate would increase disproportionately when compared with the reduction in the rate of shoulder dystocia (6, 24). For example, one study projected a 27% increase in the total cesarean delivery rate (increasing from 15.1% to 19.1%) if cesarean deliveries were performed for all patients with fetuses that weighed 4,000 g or more; unfortunately, the number of shoulder dystocia cases would be reduced by only 42% (6). Another study
reported similar results among fetuses with estimated birth weights of 4,000 g or more; in that study, an additional 76 cesarean deliveries would have prevented only five cases of shoulder dystocia, none of which resulted in permanent injury (39). A 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 dystocia if all fetuses suspected of weighing 4,000 g or more underwent cesarean delivery (11). Although the diagnosis of fetal macrosomia is imprecise, prophylactic cesarean delivery may be considered for suspected fetal macrosomia with estimated fetal weights greater than 5,000 g in women without diabetes and greater than 4,500 g in women with diabetes (40).

What should the obstetrician do in cases of shoulder dystocia?

The performance of the McRoberts maneuver is a reasonable initial maneuver (41). One study described this maneuver as involving hyperflexion and abduction of the hips causing cephalad rotation of the symphysis pubis and flattening of the lumbar lordosis that frees the impacted shoulder (42). Suprapubic pressure may be used at the same time to assist in dislodging the impacted shoulder (1). In contrast, fundal pressure may further worsen impaction of the shoulder and also may result in uterine rupture (12, 17). Controversy exists as to whether episiotomy is necessary, because shoulder dystocia typically is not caused by obstructing soft tissue. Direct fetal manipulation with either rotational maneuvers or delivery of the posterior arm also may be used (43). In these circumstances, performance of a proctoepisiotomy may be helpful to create more room within the posterior vagina.

In cases of severe shoulder dystocia that are not responsive to commonly used maneuvers, more aggressive approaches may be warranted. Cephalic replacement (Zavanelli maneuver) has been described for relieving catastrophic cases (9, 10, 44–46); however, it is associated with a significantly increased risk of fetal morbidity and mortality and maternal morbidity. Intentional fracture of the fetal clavicle may help decrease the bисacromial diameter; however it may be difficult to perform in emergent situations. It is clear that brachial plexus injury can occur regardless of the procedure or procedures used to disimpact the shoulders (3, 4, 47, 48).

How should a woman with a history of delivery complicated by shoulder dystocia be counseled regarding subsequent deliveries?

A history of shoulder dystocia is associated with a recurrence rate ranging from 1% to 16.7% (3, 26, 49–51). 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 a complicated delivery or an injured infant.

Because most subsequent deliveries will not be complicated by shoulder dystocia, the benefit of universal elective cesarean delivery is questionable in patients who have such a history of shoulder dystocia. Other factors that may aid in the decision-making process for mode of delivery include the present estimate of fetal weight compared with the prior pregnancy birth weight, gestational age, the presence of maternal glucose intolerance, and the severity of the prior neonatal injury. A discussion and review of the prior delivery events should be undertaken with the patient, preferably before the intrapartum period. After discussion with the patient, either method of delivery is appropriate.

Summary of Recommendations

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

- Shoulder dystocia cannot be predicted or prevented because accurate methods for identifying which fetuses will experience this complication do not exist.
- Elective induction of labor or elective cesarean delivery for all women suspected of carrying a fetus with macrosomia is not appropriate.

The following recommendations are based primarily on consensus and expert opinion (Level C):

- In patients with a history of shoulder dystocia, estimated fetal weight, gestational age, maternal glucose intolerance, and the severity of the prior neonatal injury should be evaluated and the risks and benefits of cesarean delivery discussed with the patient.
- Planned cesarean delivery to prevent shoulder dystocia may be considered for suspected fetal macrosomia with estimated fetal weights exceeding 5,000 g in women without diabetes and 4,500 g in women with diabetes.
- There is no evidence that any one maneuver is superior to another in releasing an impacted shoulder or reducing the chance of injury. However, performance of the McRoberts maneuver is a reasonable initial approach.
References

24. Langer O, Berkus MD, Huff RW, Samueloff A. Shoulder dystocia: should the fetus weighing greater than or equal to 4000 grams be delivered by cesarean section? Am J Obstet Gynecol 1991;165:831–7. (Level II-2)
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 November 2000. 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 could also 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.