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Shoulder dystocia: Simulation and a team-centered protocol

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ABSTRACT

Shoulder dystocia is an obstetric emergency that has been reported to occur in 0.2–3% of all vaginal deliveries. Several characteristics of shoulder dystocia make it a particular challenge to manage effectively. It is relatively infrequent, the diagnosis cannot be made according to a single objective criterion that can be recognized to exist by all members of the care team who are present, it is unpredictable, and there is the need for coordinated actions of all members of the health care team who have come together on the day of the delivery and may not have worked together before or specifically during a shoulder dystocia. In general, there is evidence from different medical disciplines that checklists/protocols and simulation may be used to enhance team performance. There is also some evidence, albeit limited, that such techniques may be used to improve shoulder dystocia outcomes.

Shoulder dystocia is an obstetric emergency that has been reported to occur in 0.2–3% of all vaginal deliveries.[1] From a clinical standpoint, a shoulder dystocia is most often diagnosed when the typical gentle downward traction on the fetal head, which is used to deliver the anterior shoulder, is not sufficient to deliver the anterior shoulder. Alternatively, some investigators have defined a shoulder dystocia as an occurrence when the delivery of the anterior shoulder can only be accomplished by ancillary obstetric maneuvers. In an attempt to establish a more objective definition of this emergency, other investigators have attempted to use a component of time, such as a lapse of more than 60 s between delivery of the fetal head and delivery of the body, to define the occurrence of a shoulder dystocia.[2] There is no consensus, however, as to the exact time threshold that is optimal to use in order to indicate that a shoulder dystocia has occurred.

Multiple factors have been associated with shoulder dystocia. For many of these factors though, the associations are neither independent (i.e., their apparent association with shoulder dystocia is only because of their association with another factor, which is truly associated with shoulder dystocia) nor consistently demonstrated.[3] Even when a factor has been shown to be independently and consistently associated with the occurrence of shoulder dystocia, these associations have not been able to be used to accurately predict who will and who will not have a shoulder dystocia.[4,5] One example of the discordance between association and prediction is with regard to birth weight. There is little controversy that shoulder dystocia is more frequent at higher birth weights.[6] Nevertheless, approximately 40–60% of shoulder dystocias occur in infants weighing less than 4000 g.[5] The usefulness of a factor such as birth weight to predict shoulder dystocia is also lessened because birth weight cannot be

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known with certainty until after a shoulder dystocia and a delivery have occurred. It is readily apparent that a factor cannot be used to predict an outcome if that factor is not even known until after the outcome has occurred. While birth weight can be estimated from fetal weight, the estimation of fetal weight, using presently available modalities, has inherent inaccuracy. Ultrasonography has been shown to display low sensitivity and poor predictive value for birth-weight thresholds (such as >4000 g or >4500 g).[7] In fact, the accuracy of sonography has not been shown to be better than that of clinical palpation (Leopold maneuvers) or a parous woman's assessment of her own fetus' weight.[8]

Correspondingly, strategies incorporating estimated fetal weight in an effort to significantly reduce the frequency of shoulder dystocia have not been shown to be effective in practice. For example, induction of labor due to suspected fetal macrosomia has not been shown to improve health outcomes. In a prospective study, non-diabetic women with an ultrasonographic fetal weight estimation of 4000–4500 g were randomized to induction of labor or expectant management. The frequency of shoulder dystocia was similar in the two groups.[9] Similarly, prophylactic cesarean delivery has not been consistently demonstrated to result in a reduction of shoulder dystocia without incurring significant increases in cesarean delivery and its associated complications.[10,11]

Once a shoulder dystocia occurs, there is no uniform agreement that a particular alleviating maneuver or sequence of alleviating maneuvers is preferred. In some cases, shoulder dystocia may be heralded by the classic "turtle sign," during which the fetal head, after it has delivered, retracts back tightly against the maternal perineum. Under these circumstances, some clinicians have advocated immediately attempting to deliver the fetal shoulders to maintain the forward momentum of the fetus. Alternatively, others support a short delay that allows the endogenous rotational mechanics of the second stage to spontaneously alleviate the obstruction. Regardless, once shoulder dystocia is recognized, due to either a "turtle sign" or the lack of delivery of an anterior shoulder after typical gentle downward traction on the fetal head, alleviating maneuvers should be utilized. After the patient is asked to temporarily cease expulsive efforts, many providers initially will employ the McRoberts' maneuver, suprapubic pressure, or both because of ease of implementation, relatively high success rate of 40–60%, and involvement of only maternal manipulation.[5] Consisting of exaggerated abduction and hyperflexion of the maternal thighs upon the abdomen, the McRoberts' maneuver does not change the actual dimensions of the maternal pelvis. Rather, it relieves shoulder dystocia via marked cephalad rotation of the symphysis pubis and flattening of the sacrum.[12] Despite their effectiveness, once a shoulder dystocia has occurred, the McRoberts' maneuver or suprapubic pressure or a combination of both has not been shown to be beneficial as a prophylactic measure for patients who are at increased risk of shoulder dystocia.[13]

In addition to the aforementioned maneuvers, techniques that involve fetal manipulation also may be helpful. One such technique is a rotational maneuver, in which the operator rotates the fetus to an oblique, rather than anterior–posterior axis, thereby allowing disimpaction of the anterior shoulder from the symphysis pubis. Many different variations of rotational maneuvers have been described, including the "Wood's" and "Rubin's" maneuvers. In the former, the practitioner attempts to rotate the fetus by exerting pressure on the anterior surface of the posterior shoulder and pushing toward the fetal back. In the latter, the practitioner applies pressure to the posterior surface of either the posterior or anterior fetal shoulder and pushes toward the fetal chest, an action which also may assist in the alleviation of the dystocia by causing shoulder adduction. Another type of alleviating action is the delivery of the posterior arm. To perform this maneuver, the provider should apply pressure at the antecubital fossa to flex the fetal forearm and then sweep the arm across the fetus' chest, with ultimate delivery of the arm over the perineum. After delivery of the arm, there is a 20% reduction in shoulder diameter, thereby allowing the dystocia to be relieved.[14]

Although the maneuvers so far described are the ones most commonly performed, others also may be attempted. In the Gaskin maneuver, the patient is moved onto her hands and knees. This position has been reported to help with shoulder dystocia resolution. When a shoulder dystocia appears intractable, the operator may need to consider the performance of cephalic replacement (Zavanelli maneuver) and subsequent cesarean delivery. Other reported but relatively rarely performed techniques include symphysiotomy, intentional fetal clavicular fracture, and hysterotomy or abdominal rescue. Given that these maneuvers are inherently associated with maternal or fetal trauma, they only should be utilized in situations when other maneuvers cannot relieve the dystocia.

Based on the aforementioned description of shoulder dystocia and the approach to its care, several characteristics are evident that make it a particular challenge to manage effectively. It is relatively infrequent; even a relatively busy provider may experience and need to respond to a shoulder dystocia once every year or so. The diagnosis cannot be made according to a single objective criterion that can be recognized to exist by all members of the care team who are present. In addition, although there are many factors that have been identified to be associated with shoulder dystocia, many women who have these factors will not experience a shoulder dystocia, and many shoulder dystocias will occur in the absence of these factors. Thus, it is unpredictable, and health care providers cannot reliably know when a shoulder dystocia will occur. Finally, there is the need for coordinated actions of all members of the health care team who have come together on the day of the delivery and who may not have worked together before or specifically during a shoulder dystocia.

Given these challenges, investigators have attempted to enhance the care of shoulder dystocias by utilizing protocols and checklists. There is evidence from different disciplines that the use of protocols (i.e., items selected for completion to lead the user to a predetermined outcome) and checklists (i.e., a list of action items or criteria arranged in a systematic manner, allowing the user to record the presence/absence of the individual items listed to ensure that all are considered or completed) can improve outcomes. Pronovost et al.[15] have demonstrated how the introduction of a checklist reduced catheter-related blood stream infections in the intensive care