

MASTER CLASS

Shoulder Dystocia



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Routine vaginal deliveries can sometimes quickly become not-so-routine deliveries. When an otherwise normal labor process – and sometimes even a near-delivery – ends with a delayed or obstructed delivery of the fetal shoulder, the obstetrician and his or her team are challenged – physically and emotionally.

This complication is a nightmare for the family as well as the obstetrician who struggles to complete the process. What actually may be a matter of seconds or a minute can feel like an eternity.

We now know that diabetes and obesity are conditions that are increasing at a rapid pace in our society. With the rise in these two conditions (known collectively as diabetes), we can anticipate a rise in fetal macrosomia.

On the other hand, we know that not every macrosomic infant results in obstructed labor or shoulder dystocia. In addition, we currently do not have a very good biometric methodology by which we can precisely estimate fetal weight, or even the pelvic size. Thus, it is difficult to come to an objective conclusion regarding the probability of obstructed labor.

These are the variables that, together, create such a vexing and sometimes underappreciated conundrum.

To attempt to anticipate and to manage

the problem, obstetrical specialists must rely on less-than-satisfactory biomedical parameters, historical experience, and their best judgment about medical condition.

Despite such imprecision and the lack of certainty we have for addressing the problem, there is some guidance that can be helpful in predicting the level of risk of shoulder dystocia, and in managing the complication should it occur. It is in this light that we have invited Dr. Mark B. Landon, a maternal-fetal medicine specialist, to discuss the problem of shoulder dystocia. Dr. Landon is the Richard L. Meiling Professor and chairman of the department of ob.gyn. at the Ohio State University, Columbus.

As Dr. Landon discusses, it is almost impossible to be absolutely perfect in

preventing and managing shoulder dystocia. We can, however, improve our understanding of which scenarios call for the consideration of prophylactic cesarean section, and of how we can deliver affected infants as safely as possible. As Dr. Landon duly notes, it is critical for the obstetrician to be able to perform a repertoire of potentially effective maneuvers to manage shoulder dystocia. ■

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Management of Shoulder Dystocia

Shoulder dystocia is not an uncommon obstetric complication, occurring in as many as 2 per 100 vaginal births. This obstetric emergency is associated with a number of adverse perinatal outcomes for both the mother and infant, the most serious of which remains neonatal brachial plexus injury.

In a minority of cases in which there is prolonged impaction of the shoulders, birth asphyxia also may occur.

Obstetricians and other birth attendants must be fully prepared to effectively manage shoulder dystocia when it occurs. They also should understand the existing controversies regarding prevention and the pathogenesis of injuries associated with shoulder dystocia.

Shoulder dystocia generally is not a predictable event, which makes prevention extremely difficult. Because of the limited accuracy of ultrasound for estimating fetal size, the risk of shoulder dystocia and resulting injury must be fairly significant before prophylactic cesarean is considered as a preventive measure. There are, however, certain high-risk scenarios that call for consideration of prophylactic cesarean delivery.

Prevention

For the past several decades, clinical research has focused on whether shoulder dystocia can be predicted and/or prevented. Overall, most analyses have shown us that shoulder dystocia can be only minimally predicted, at best, and that prevention of this complication as well as associated injury is far from a simple undertaking.

The leading risk factor for shoulder dystocia is excessive birth weight, yet not all cases of shoulder dystocia involve infants who weigh more than 4,500 g, or even more than 4,000 g. In fact, most shoulder dystocia cases actually occur when birth weights are less than 4,000 g – especially in nondiabetic pregnancies. (In diabetic pregnancies, most shoulder dystocias and brachial plexus injuries do occur in infants with birth weights greater than 4,000 g.)

The possibility that birth weight estimates may help us to predict and/or prevent shoulder dystocia also is hindered by the fact that it remains difficult to identify large babies prior to delivery. Clinical estimation of size and the use of ultrasound are the two most commonly employed techniques for estimating birth

size, but both have limited accuracy and may either underestimate or overestimate fetal size. Most large babies, moreover, can successfully undergo vaginal birth without the complication of shoulder dystocia, let alone brachial plexus injury.

All told, these realities limit our ability to use estimated birth weight in selecting those pregnancies that might benefit from prophylactic cesarean delivery.

To consider prophylactic cesarean delivery, the level of risk for shoulder dystocia and resultant injury must be fairly significant. The following are two clinical scenarios in which the risk of complications reaches a level at which the option of prophylactic cesarean section (including informed consent) should be discussed with the mother:

► A pregnancy complicated by diabetes in which the estimated fetal weight is greater than or equal to 4,500 g. Some experts have suggested that this threshold should, in fact, be lower in diabetic pregnancies. However, utilization of a lower threshold (such as 4,000 g or 4,250 g) must come with the recognition that it will spur the use of more cesarean deliveries to prevent injury.

► A patient with a history of shoulder dystocia birth, particularly when the fetus is believed to be of similar or greater weight than the previously affected fetus.

Determining the recurrence risk of shoulder dystocia has proved difficult because, in most clinical series, a large proportion of women with a history of the complication will undergo scheduled cesarean delivery in their subsequent pregnancies. This bias toward operative delivery may lead to an underestimation of the true recurrence risk. Regardless of this potential estimation bias, unless the estimated fetal weight in the woman's current pregnancy is significantly less than that of the prior pregnancy, we should counsel women with prior shoulder dystocia and offer them prophylactic cesarean delivery.

With respect to the predictive value of labor abnormalities, studies have yielded mixed results. The bottom line is that labor abnormalities are not particularly useful in predicting shoulder dystocia – except for cases of a prolonged second stage of labor when there is suspicion of a large infant. This combination of factors should alert the physician to the potential for shoulder dystocia. Operative vaginal delivery should generally be avoided in this scenario, because delivery above an outlet station may further increase the risk of shoulder dystocia and resultant injury.

Management, Medicolegal Issues

As with any delivery, the goal of management should always be to deliver the infant as safely as possible, minimizing the risk of traumatic injury and birth asphyxia. In most cases of shoulder dystocia, the shoulders remain in an anterior-posterior position and fail to rotate. This creates the potential for brachial plexus injury as the nerves of the brachial plexus are stretched with the descent of the fetal head.

There is little objective study of the maneuvers employed for shoulder dystocia and their effectiveness in preventing neonatal injury, let alone prospective studies comparing the effectiveness of one maneuver vs. another. The choice of maneuvers thus remains provider specific. The maneuvers that are most commonly employed for shoulder dystocia, however, are utilized in order to disimpact the anterior shoulder from behind the symphysis pubis by effecting its rotation.

It is important to appreciate that the McRoberts maneuver, with or without suprapubic pressure, may be successful in only approximately 50% of shoulder dystocia cases.

Unfortunately, many young obstetricians have had limited exposure to shoulder dystocia and may have employed only this maneuver, and not others, in their clinical training. At some point, they will likely encounter a shoulder dystocia case that does not respond to the McRoberts and/or suprapubic pressure maneuvers. It is critical to be competent in performing a full repertoire of potentially effective maneuvers.

There is increasing evidence that obstetricians should have a low threshold for utilizing delivery of the posterior shoulder in the management of shoulder dystocia.

In one recently published, multicenter review of shoulder dystocia maneuvers, for instance, investigators identified women who had incurred a shoulder dystocia during delivery and compared cases involving neonatal injury with injury-free cases. Delivery of the posterior shoulder was associated with the highest rate of successful delivery, when compared with other maneuvers, and with similar rates of neonatal injury (Obstet. Gynecol. 2011;117:1272-8).

The value of posterior arm release lies in its ability to reduce the anterior-posterior diameter of the fetus more significantly than any other maneuver. It has been associated with a marked decrease in anterior nerve stretch and the force required to effect delivery (Obstet.

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Gynecol. 2003;101:1068-72; Am. J. Obstet. Gynecol. 2010;203:339.e1-5).

In many litigated cases involving shoulder dystocia and brachial plexus injury, it is asserted that unnecessary excess traction must have been employed for a permanent injury to have occurred. Such assertions imply that the obstetrician can perfectly gauge the amount of traction or force necessary to deliver the infant and yet avoid injury in the setting of shoulder dystocia, which is not the case.

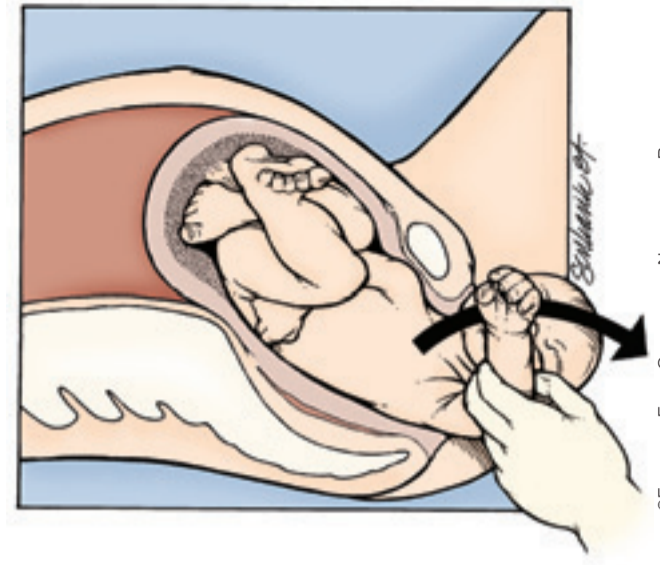
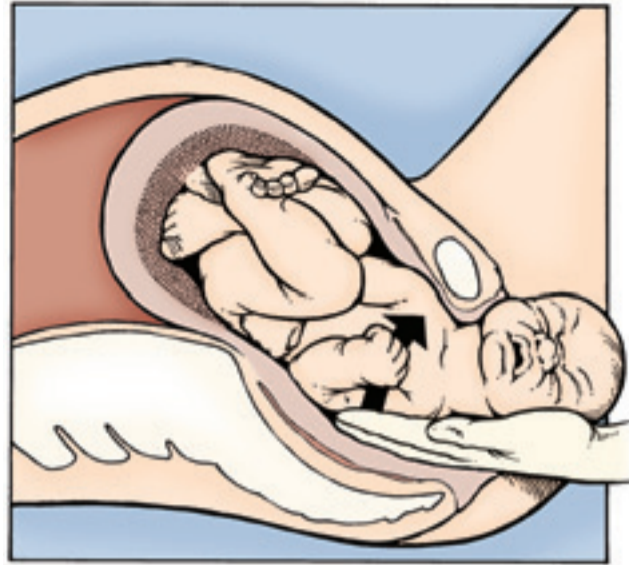
Increasing evidence suggests that many cases of brachial plexus injury accompanying shoulder dystocia are multifactorial in origin, and are not simply a result of operator-induced traction and stretching of the nerves. Obstetricians are continually instructed early on in their careers that excess traction should be avoided, as should any fundal pressure that might further disimpact the shoulders.

I simply recommend abandoning any traction efforts once shoulder dystocia is clearly recognized. When the complication occurs, a team consisting of additional nursing personnel, anesthesia, and the most experienced obstetrician available should be immediately summoned, and expulsive efforts on behalf of the mother should be curtailed while maneuvers are being undertaken to disimpact the shoulders.

If two obstetricians are present, it often is helpful for the stronger of the two to deliver appropriate suprapubic pressure from above. The goal is to move the shoulders to an oblique position by exerting pressure from the back of the fetus. This maneuver cannot really be done effectively by a single operator or from below as has been depicted in some textbooks. Again, if this fails to work, a low threshold should exist for attempting a posterior arm release.

Maintaining accurate documentation in the medical record of all events preceding and surrounding the shoulder dystocia is important. This includes but is not limited to the following:

- ▶ Consideration of significant risk factors for macrosomia, including diabetic pregnancy management and results of gestational diabetes screening tests.
- ▶ Estimation of fetal size, either clinically or by ultrasound. Most experts believe that diabetic mothers should undergo ultrasound at term to assess fetal size.
- ▶ Description of instrumental delivery, including indication and station at application and duration of use.
- ▶ A detailed step-by-step description of the maneuvers



The doctor inserts a hand (left), then he/she sweeps the arm across the baby's chest and over the mother's perineum.

used to disimpact the shoulders. The anterior shoulder should be identified as part of the documentation.

Training and Simulation

During the past few years, simulation and drills and other enhanced teaching methods have become an increasingly common part of the curriculum for training residents and nursing personnel in the management of shoulder dystocia. Because the complication occurs relatively infrequently but can have devastating consequences when it does, shoulder dystocia is one of only several obstetric emergencies to be targeted in efforts to improve patient safety.

As with the few other obstetric events that receive such attention, data on the impact of enhanced training on perinatal outcomes remain limited. There clearly is evidence that simulation and drills improve team performance, and it has been hoped that improved team performance will ultimately translate to better outcomes. At present, two studies have indicated that the incidence of brachial plexus injury may decline with the implementation of targeted training for maternity staff.

One of these studies retrospectively compared the management and neonatal outcomes of almost 20,000 births that were complicated by shoulder dystocia in the years before and after the introduction of shoulder dystocia training for all maternity staff in a hospital in the United Kingdom (Obstet. Gynecol. 2008;112:14-20). The rate of brachial plexus injury at birth was significantly reduced, from 7.4% to 2.3%, as was the rate of neonatal injury more broadly (from 9.3% to 2.3%).

In the other study – also a retrospective assessment – the rate of obstetric brachial plexus injury in cases of shoulder dystocia fell from 30% before a training protocol was implemented for maternity staff at Jamaica Hospital in New York, to 11% afterward (Am. J. Obstet. Gynecol. 2011;204:322.e1-6).

A recently published study from Ireland, however, failed to reveal any difference in the frequency of brachial plexus injury after the introduction of specific staff training in managing shoulder dystocia. In this single-hospital study, investigators assessed outcomes associated with more than 77,000 deliveries that occurred during two 5-year time periods, before and after training was instituted. The incidence of brachial plexus injury remained unchanged from 1.5 per 1,000 in 1994-1998 to 1.7 per 1,000 in 2004-2008 (Am. J. Obstet. Gynecol. 2011;204:324.e1-6).

Although the results of this latter study are disappointing, I believe they are unlikely to limit the enthusiasm for the simulation training and shoulder dystocia drills that have become fairly routine in many large maternity hospitals in the United States.

Regardless of the limited outcomes data we have available thus far, experience with simulation training has taught us that in order to retain necessary skills, repetitive participation in simulation training appears to be required. The relatively infrequent nature of severe shoulder dystocia cases makes the simulation model for learning very attractive. ■

Dr. Landon reported that he has no relevant financial disclosures.

DES Exposure Elevates Risk of 12 Adverse Outcomes

BY MARY ANN MOON

FROM THE NEW ENGLAND JOURNAL OF MEDICINE

In-utero exposure to diethylstilbestrol was associated with a high lifetime risk of a broad spectrum of adverse outcomes in a follow-up study of patients now in their 40s, 50s, and 60s.

Most of these risks were increased by a factor of more than two, compared with the risks in women of the same age who were not exposed to diethylstilbestrol (DES), said Dr. Robert N. Hoover of the National Cancer Institute, Bethesda, Md., and his associates. "Although DES has not been prescribed for pregnant women in the United States for 40 years, adverse outcomes continue to occur in women exposed in utero, and continued monitoring ... for established and unexpected adverse outcomes seems prudent," they noted.

In the early 1990s, Dr. Hoover and his colleagues combined three cohort studies of DES-exposed women that had begun in the mid-1970s, so that the pooled subjects could be followed periodically with self-report questionnaires. Their Combined Cohort Study of DES Exposure involved 4,001 DES-exposed women and 1,683 nonexposed control subjects from the original cohorts, who were born between the late 1940s and the early 1960s and whose average age at last follow-up was 48 years.

Twelve adverse health outcomes that were significantly associated with DES in previous studies were assessed in the combined cohort, and all 12 were found to be significantly associated with DES in this combined analysis.

The hazard ratios (HRs) associated with DES exposure, compared with nonexposure, ranged from a low of 1.42 for

preeclampsia to a high of 8.12 for neonatal death (usually related to preterm delivery). In ascending order, the HRs were 1.64 for spontaneous abortion; 1.82 for breast cancer diagnosed at age 40 or older; 2.28 for cervical intraepithelial neoplasia of grade 2 or higher; 2.35 for early menopause; 2.37 for infertility; 2.45 for stillbirth; 3.72 for ectopic pregnancy; 3.77 for loss of second-trimester pregnancy; and 4.68 for preterm delivery, the investigators wrote (N. Engl. J. Med. 2011;365:1304-14).

DES-exposed women who had clinical evidence of vaginal epithelial changes at a young age – a marker of high DES dose and exposure early in gestation – were found to have significantly higher risks for adverse outcomes than did exposed women who showed no vaginal epithelial changes. This finding provides additional support for the argument that DES exposure caused, and was not just linked to, the

adverse outcomes, they said.

The researchers also calculated the excess risk of adverse outcomes that could be attributed directly to DES exposure. This excess risk was 1.7% for breast cancer, 3.4% for early menopause, 3.5% for CIN, 6.3% for stillbirth, 7.2% for neonatal death, 11.7% for both spontaneous abortion and ectopic pregnancy, 12.7% for preeclampsia, 14.7% for loss of second-trimester pregnancy, 17.8% for infertility, and 35.4% for preterm delivery.

The Combined Cohort Study of DES Exposure was supported by the National Cancer Institute. Dr. Robboy reports receiving consulting fees from UCB, Belgium. Dr. Karlan reports holding stock in and receiving board membership fees from IRIS International. Dr. Hatch receives royalties as a reviewer of the DES card on the UpToDate medical information site. ■