How to predict recurrent shoulder dystocia

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OBJECTIVE: Our aim was to determine the rate and risk factors for recurrent shoulder dystocia.

STUDY DESIGN: A retrospective analysis of patients diagnosed with shoulder dystocia was performed by searching a computerized database from January 1, 1993, to June 30, 1999 for the following information: (1) vaginal deliveries, either spontaneous or operative, (2) shoulder dystocia, (3) birth weight, (4) duration of second stage of labor, (5) parity, and (6) gestational diabetes. Statistical analyses included $\chi^2$ and $t$ test.

RESULTS: There were 39,681 vaginal deliveries with 602 (1.5%) complicated by shoulder dystocia. Sixty-six patients underwent a subsequent vaginal delivery, and 11 (16.7%) experienced another shoulder dystocia. The odds ratio for a recurrent shoulder dystocia was 10.98 ($P < .000001$). Nine of the 11 patients with recurrent shoulder dystocia compared with 28 of 55 without a recurrence were nulliparous women in their index pregnancy ($P < .001$). The mean fetal weights were 3885 g in the recurrent dystocia group and 3702 g in the group without recurrence ($P < .03$). Gestational age, operative delivery, and gestational diabetes were similar in the two groups.

CONCLUSION: Factors that appear to increase the recurrence risk of shoulder dystocia include fetal weight and maternal parity. Prior shoulder dystocia is the single greatest predictive factor. (Am J Obstet Gynecol 2001;184:1427-30.)

Key words: Shoulder dystocia, recurrence of shoulder dystocia, fetal weight and shoulder dystocia

Shoulder dystocia is a serious complication of labor with an incidence between 0.15% and 1.35%. It is generally defined as a difficult delivery of an infant’s shoulders, usually requiring additional maneuvers beyond downward traction of the head and an episiotomy. It carries the potential for serious perinatal morbidity, including asphyxia, birth trauma, and permanent neurologic injury, and has also become an area of great medicolegal concern for obstetricians. Despite numerous studies elucidating risk factors for shoulder dystocia, its accurate prediction and prevention remain elusive.

Predicting a recurrent shoulder dystocia is equally difficult. It seems logical that a patient who experienced a shoulder dystocia in one pregnancy would have a higher risk of a shoulder dystocia in subsequent pregnancies than the general population. This view has been challenged by a comprehensive study by Baskett and Allen, in which the recurrence risk of shoulder dystocia was found to be only 1%. The purpose of this study was to further evaluate the recurrence risk for shoulder dystocia, as well as to identify potential risk factors for its recurrence.

Material and methods

The Northwestern University Medical Center obstetric database was used to identify patients whose vaginal deliveries between January 1, 1993 and June 30, 1999 were complicated by a shoulder dystocia. The diagnosis of shoulder dystocia was a clinical one made by the delivering physician.

The study group consisted of patients for whom a subsequent pregnancy and vaginal delivery could be identified in the database. The initial pregnancy complicated by the shoulder dystocia was considered the index pregnancy. Data obtained from the database regarding the index pregnancies and subsequent pregnancies included maternal parity, fetal weight, length of second stage of labor, mode of delivery, and incidence of gestational diabetes.

Patients with subsequent vaginal deliveries were divided into two groups, those who experienced a recurrent shoulder dystocia and those who did not. The data for these two groups was compared with the $\chi^2$ and Student $t$ tests. A $P$ value < .05 was considered significant.

Results

During the study period there were a total of 39,681 vaginal deliveries, 602 of which were complicated by a shoulder dystocia, for an overall incidence of 1.5%. Of these 602 patients, we identified 73 who were subsequently delivered at our hospital. Seven of the 73 patients were delivered by cesarean, leaving 66 patients with a subsequent vaginal delivery. These 66 patients formed our
Shoulder dystocia is a problem that almost every practicing obstetrician will encounter. It is defined as impaction of the anterior fetal shoulder against the symphysis pubis and is believed to result from failure of truncal rotation during labor and an anteroposterior alignment of the fetal shoulders at the pelvic inlet. Allowing a clinical diagnosis for shoulder dystocia may have biased the results some, because the definition may vary between individual practitioners. Although a methodical use of additional delivery maneuvers will generally resolve dystocia, a difficult dystocia is often accompanied by significant perinatal morbidity including asphyxia, birth trauma, and permanent neurologic injury. Baskett and Allen found a 4.9% incidence of 5-minute Apgar scores <7, a 12.9% incidence of brachial plexus palsies, and a 5.1% incidence of clavicular fractures among 254 cases of shoulder dystocia. The persistence of the brachial plexus palsies is not reported in this study but has been reported to be between 1% and 5%.4

Numerous risk factors for shoulder dystocia have been identified in previous studies. These include fetal macrosomia, maternal gestational diabetes, maternal obesity, postdate pregnancy, and prolonged second stage of labor. Despite this knowledge, the accurate prediction and prevention of perinatal morbidity remain difficult. Approximately 50% of brachial plexus palsies occur without shoulder dystocia, and some have been reported to occur with cesarean deliveries, suggesting that many of these palsies were the result of an unavoidable intrapartum or antepartum event. Furthermore, approximately 50% of shoulder dystocias occur in nonmacrosomic infants. Even strategies aimed at reducing morbidity among macrosomic infants are fraught with the inaccuracy of estimating fetal weight.

Predicting a recurrent shoulder dystocia appears to be equally difficult. We found two previous studies evaluating the recurrence risk of shoulder dystocia. Baskett and Allen reviewed 40,518 vaginal deliveries and found only one recurrent dystocia among 93 subsequent vaginal deliveries. Lewis et al reviewed 37,465 deliveries and found 17 recurrent shoulder dystocias among 123 subsequent deliveries, for a recurrence rate of 13.8%. Our finding of 11 recurrent shoulder dystocias among 66 subsequent vaginal deliveries (recurrence rate of 16.7%) is more in accord with the findings of Lewis et al. It seems logical that patients with a history of shoulder dystocia would have a higher risk of a subsequent dystocia than would be found in the general population. That is because many of the risk factors for dystocia are present in subsequent pregnancies. Baskett and Allen did not report the incidence of gestational diabetes or maternal obesity in their study, and it is possible that the demographics of their population differed from those of Lewis et al and ours.

### Table I. Pregnancy and labor characteristics

<table>
<thead>
<tr>
<th></th>
<th>Repeat dystocia (n = 11)</th>
<th>No dystocia (n = 55)</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nulliparity in index pregnancy</td>
<td>9/11 (81%)</td>
<td>28/55 (50%)</td>
<td>P &lt; .001</td>
</tr>
<tr>
<td>Gestational age (wk, mean)</td>
<td>39.26</td>
<td>39.75</td>
<td>NS</td>
</tr>
<tr>
<td>Operative delivery</td>
<td>2/11 (18.2%)</td>
<td>15/55 (27.2%)</td>
<td>NS</td>
</tr>
<tr>
<td>Length of second stage of labor (min)</td>
<td>83</td>
<td>45</td>
<td>NS</td>
</tr>
<tr>
<td>Birth weight (g, mean)</td>
<td>3885</td>
<td>3792</td>
<td>P &lt; .03</td>
</tr>
<tr>
<td>Current birth weight compared with index pregnancy birth weight (g)</td>
<td>+80</td>
<td>−235</td>
<td>NS (P = .05)</td>
</tr>
</tbody>
</table>

NS, Not statistically significant.
This is further suggested by the relatively low incidence of shoulder dystocia in the index pregnancies in the study of Baskett and Allen,6 0.6% compared with 2% in the study of Lewis et al7 and 1.5% in ours. Other possible explanations for the low recurrence risk of shoulder dystocia in the study of Baskett and Allen5 are underreporting of its occurrence and different levels of clinical experience of the delivering obstetricians.

Several factors were found to be associated with an increased risk of recurrence in the study7—maternal obesity, fetal macrosomia (fetal weight >4000 g), and fetal weight greater than that in the index pregnancy. The mean weight in the repeat dystocia group was 4135 g whereas that in the group without recurrence was 3335 g, and in 82% of the patients in the repeat dystocia group the birth weights of the infants were greater than in their index pregnancies compared with 22% in the group without a repeat dystocia.7 Other known risk factors for shoulder dystocia were also compared between the two groups but were not found to be statistically significant, as follows: parity, gestational diabetes, and postdate pregnancy. Although the length of the second stage of labor was statistically significant (35 minutes in the group with recurrent dystocia vs 17 minutes in the group without), the clinical significance is questionable.

In our study parity was statistically significant; 81% of the repeat dystocia group were nulliparous in their index pregnancies compared with 50% in the group without a recurrence. Therefore lower parity appeared to be a risk factor for recurrence. Another factor that emerged to be statistically significant in our study was fetal weight. The mean fetal weight in the group with a repeat shoulder dystocia was greater than that in the group without a recurrence. Also, when compared with the mean fetal weight in the index pregnancies, the mean fetal weight in the group with a recurrent dystocia was greater (＞80 g) than that in the group without recurrence (＜235 g). Whereas the 235-g difference is statistically significant, this small difference is not likely to be clinically significant.

In our study there were no cases of gestational diabetes, and the gestational age, length of second stage of labor, and incidence of operative deliveries were similar between the two groups. Maternal weight and weight gain were not available on our database.

Our study shows that patients with a history of shoulder dystocia are at significant risk for recurrence in subsequent pregnancies. The data fail to point to any one factor that is highly predictive of a recurrent shoulder dystocia. Rather the data suggest that each case needs to be individualized. Those fetuses whose size is equal to or greater than the size of the index pregnancy are the ones at greatest risk of a recurrence.

Because not all shoulder dystocias are equal, we propose the adoption of the grading system of O’Leary and Leonetti6 that divides shoulder dystocias into 4 grades. Grades 1 and 2 are relatively mild, grade 3 requires several maneuvers, and grade 4 would be those that are undeliverable vaginally. Consideration of cesarean delivery after the index case would more likely center around grades 3 and 4 dystocias. We believe this to be a reasonable management approach; however, it is important to emphasize that it is our opinion and is not supported by data in this study or any other studies.

In conclusion, this retrospective investigation, in our population, confirms a significant risk for recurrence of shoulder dystocia. No reliable single factor could be determined to predict with any degree of certainty those that would experience the recurrence. Further research is needed before absolute recommendations can be made. Until more is known, clinical management still remains the method of choice.

**REFERENCES**


**Discussion**

**Dr William Roberts,** Brandon, Mississippi. This retrospective analysis by investigators Ginsberg and Moisidis is entitled “How to Predict Recurrent Shoulder Dystocia.” Whenever I read an article or chapter regarding shoulder dystocia, I am reminded of the quote by Langer et al11: “Shoulder dystocia is the infrequent, unanticipated, unpredictable nightmare of the obstetrician.” I would, as would most of us, sleep better at night if we could only predict this infrequent nightmare. Oftentimes, when one mentions shoulder dystocia in obstetric circles, the quick response is that “shoulder dystocia cannot be predicted and, therefore, is not preventable.” Well, automobile accidents are not entirely preventable, yet I still wear a seat belt and drive defensively. Much the same, one should be aware of those factors that have been shown to be associ-
ated with an increased incidence of shoulder dystocia. The authors have nicely reviewed these factors in their presentation.

One factor not as extensively studied is a prior episode of shoulder dystocia. Because of the infrequent occurrence of shoulder dystocia and the likelihood that a subsequent pregnancy would be managed with an elective cesarean delivery, one would need an institution with large numbers of vaginal deliveries. One retrospective analysis of >40,000 deliveries noted only a 1% incidence of recurrent shoulder dystocia, a number not significantly different from that in their general obstetric population. However, another retrospective review published that same year demonstrated a recurrence risk of shoulder dystocia of 13.8%. Today’s analysis is the third in a series of recurrent shoulder dystocia and may serve as the “tie breaker.” As in the other institutions, Northwestern University, with >39,000 vaginal deliveries during the 6½-year study period, has a sufficient number of vaginal deliveries to statistically answer the question regarding recurrent shoulder dystocia. The 1.5% incidence of shoulder dystocia at this institution is in line with other studies.

Of the 602 patients with shoulder dystocia in the index pregnancy, only 66, or 11%, had a subsequent vaginal delivery. Can the investigators provide data on the other 89% of patients? If many were subsequently managed with a cesarean delivery, then the study group has probably been selected on why they did not have a successful, uncomplicated vaginal delivery. As a result, the finding that shoulder dystocia recurred in >16% of the patients in this group, which represents an odds ratio of 11, is especially sobering.

The finding that birth weight of the infant was significantly higher in those patients experiencing recurrent shoulder dystocia is not surprising and needs no further comment. However, shoulder dystocia is thought to be a bony dystocia. This helps to explain why maternal weight is not consistently noted to be a risk factor in studies of shoulder dystocia. How then do the authors explain that more patients in the index pregnancy were nulliparous?

Finally, I pose to the authors a question I am often asked by my next-door neighbor, who is a certified public accountant. What is the bottom line? Has the results of your scientific analysis changed the way you do business? In a patient who has previously encountered shoulder dystocia, is a 16% risk of recurrence sufficient to warrant a cesarean delivery? If not, does an estimated fetal weight, either ultrasonographically or clinically derived, factor into the decision, and if so, at what estimation? Does the fact the patient was nulliparous in the index pregnancy influence your decision? Furthermore, what if the patient has one or more intervening vaginal deliveries not complicated by shoulder dystocia? All these are situations I have encountered in my practice, and I look forward to finding out how you would manage these different scenarios.

I congratulate the authors on their work and the presentation of their data.

REFERENCES

DR GINSBERG (Closing). If the initial dystocia was mild and the estimated fetal weight on the basis of clinical and ultrasonographic assessments was similar to or less than that in the prior pregnancy, a vaginal delivery was offered. If the initial dystocia was moderate or severe and the estimated fetal weight was significantly greater, our data suggest that vaginal delivery would pose a significant risk for a recurrent dystocia. We agree that, at this time, there is no method of fetal assessment that is accurate to <200 g.

The fetal pelvic index may have some value, because it individualizes the fetus to the mother, but the index does not measure the shoulders. Furthermore, there is some potential risk to the fetus from radiation exposure. A more objective definition of shoulder dystocia, such as that of O’Leary and Leonetti (see reference 6 of article), would be better. We propose grading shoulder dystocias as mild, resolve with suprapubic pressure or with Wood or Reuben maneuvers; moderate, attempt several maneuvers, including delivery of the posterior arm; and severe, abandon vaginal delivery. Decisions regarding future deliveries could be based in part on the severity of the initial dystocia.

Although our database analysis did not allow us to determine the reasons for which the cesarean deliveries were done, the cesarean rate for the group of patients who were subsequently delivered at our hospital was 9.5% (7/73). This rate is lower than the national average, suggesting that the patients were given a fair trial of labor and that the cesarean deliveries were done for standard indications.

Unfortunately, the database we used did not have information regarding fetal injury or incidence of labor induction. Both points are excellent and would be important issues to address in future studies.