Shoulder Dystocia

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Learning Objectives

At the end of this activity, the learner will be aware of:

1. Risk factors for shoulder dystocia
2. Maternal and neonatal complications of shoulder dystocia
3. Systematic approach to shoulder dystocia
4. Training methods to address shoulder dystocia

Definition of Shoulder Dystocia

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.

Definition of the word: Gentle

Definition: Free from harshness, sternness, or violence.
Soft, Delicate, Moderate
Risk Factors for Shoulder Dystocia

- Fetal Macrosomia
- Diabetes Mellitus
- Operative Vaginal Delivery
- Male Fetal Gender
- Obesity and High Birth Weight Gain
- Shoulder – Pelvic Disproportion
- Maternal Stature
- Advanced Maternal Age
- Tumor
- Pelvic Deformities
- Other

Maternal Complications

- 11% rate of postpartum hemorrhage
- 3.8% rate of 4th degree lacerations

These complications were not more common with rotational maneuvers or other fetal manipulation when compared with the McRoberts maneuver alone.

Heroic maneuvers in cases of catastrophic shoulder dystocia, such as: Zavanelli maneuver, Abdominal rescue, Symphsiotomy, may be associated with significant maternal morbidity.

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%.
- 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.
- 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.

Table 1. Incidence and Type of Fetal Injury Identified in 37,110 Cesarean Deliveries

<table>
<thead>
<tr>
<th>Type of Injury</th>
<th>Number of Injuries</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin laceration</td>
<td>272 (7.3)</td>
<td></td>
</tr>
<tr>
<td>Cephalohematoma</td>
<td>88 (2.4)</td>
<td></td>
</tr>
<tr>
<td>Clavicle fracture</td>
<td>11 (0.3)</td>
<td></td>
</tr>
<tr>
<td>Facial nerve palsy</td>
<td>11 (0.3)</td>
<td></td>
</tr>
<tr>
<td>Brachial plexus injury</td>
<td>5 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Skull fracture</td>
<td>6 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Long bone fracture</td>
<td>8 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Intracranial hemorrhage</td>
<td>2 (0.1)</td>
<td></td>
</tr>
<tr>
<td>Other†</td>
<td>20 (0.5)</td>
<td></td>
</tr>
</tbody>
</table>

* Nine patients had two fetal injuries.
† Includes abnormal bruising, subconjunctival hemorrhage, abrasion, and minor injuries not able to be classified.
**Neonatal Complications**

- Some severe cases of shoulder dystocia may result in hypoxic-ischemic encephalopathy and even death.

- 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.

**Fetal Macrosomia**

- ACOG - Greater than 4000 grams
  - Studies have consistently shown that macrosomia is a major risk factor for shoulder dystocia.
  - Defined as an estimate fetal weight of greater than or equal to 4500 grams, as morbidity and mortality increase above this level.
  - The overall prevalence of birth weight over 4000 grams in the general obstetric population of the USA is 10% but falls to 1.5% for birth weight over 4500 grams.
  - Macrosomia tends to be repetitive.

**Diabetes Mellitus**

- Higher incidence of fetal macrosomia in pregnancies complicated by pre-gestational and gestational diabetes than in non-diabetic pregnancies.

- There are also differences in the anthropomorphic measurements of infants of diabetic mothers (IDMs) compared to offspring of women without diabetes.

- The chest-to-head and shoulder-to-head ratios are increased in IDMs, thereby increasing the risk of shoulder dystocia independent of fetal weight.
Operative Vaginal Delivery

Operative vaginal delivery is a risk factor for shoulder dystocia.

Recurrent Shoulder Dystocia

The incidence of recurrent shoulder dystocia is 1 to 25 percent in retrospective studies.

Labor Abnormalities

Some studies have noted a higher incidence of labor abnormalities (e.g., precipitous or prolonged second stage) among nondiabetic women with large babies (4000 to 4500 g) who went on to develop shoulder dystocia compared to control women matched for birth weight.

Labor abnormalities have also been associated with shoulder dystocia in average weight infants (3500 to 3999 g).

A relationship between labor abnormalities and shoulder dystocia has not been found consistently.

Post-term Pregnancy

A significant proportion of deliveries complicated by shoulder dystocia occur in postterm pregnancies, although the majority of postterm pregnancies are not complicated by shoulder dystocia.

Gender

The frequency of male gender is higher in pregnancies complicated by shoulder dystocia than in the overall birth population (55 to 68 versus 51 percent).
Obesity and High Weight Gain

Some studies have reported that high maternal body mass index (BMI) and excessive weight gain during pregnancy are risk factors for shoulder dystocia.

Advanced Maternal Age

Advanced maternal age has been identified as a risk factor for shoulder dystocia.

Confounding variables such as an increased prevalence of gestational diabetes and higher maternal weight probably account for these associations.

Management

- Following delivery of the head, the umbilical cord is compressed within the vagina, and fetal oxygenation declines.
- Thus, reduction in the time from delivery of the head to delivery of the body is of great importance for survival.
- An initial gentle attempt at traction, assisted by maternal expulsive efforts, is recommended.
- Some clinicians have advocated performing a large episiotomy, and adequate analgesia is certainly ideal.

Shoulder Dystocia

- Applied force was measured during each simulation.
- All participants managed the same scenario with an identical fetus and pelvic mannequin.
- There was enormous variation in the pattern and degree of traction.
- Two thirds pulled more than 100N, a level of force at which neonatal injury has been observed.
PULL - SaFE

The wide range of applied force suggests a need for instruction in the use of “Minimal Traction.”

We demonstrated that those staff who received force perception training subsequently applied a significantly lower total force during shoulder dystocia simulations when compared with those who did not receive the training.

PULL - SaFE

Training must aim to instill the notion that traction will not overcome the bony obstruction of shoulder dystocia and that the recommended sequence of maneuvers must be followed appropriately.

Management

- A variety of techniques can be used to free the anterior shoulder from its impacted position behind the symphsis pubis:
  - Moderate suprapubic pressure
  - McRoberts Maneuver

Definition of the Word: Moderate

- Definition: Calm, temperate
- Part of Speech: Adjective
- Synonyms: careful, cautious, conservative, controlled, deliberate, mild, soft, steady, tame,
McRoberts Maneuver

The McRoberts Maneuver consists of removing the legs from the stirrups and sharply flexing them up on to the abdomen.

Hyper flexion and abduction of the hips causing cephalad rotation of the symphysis pubis and flattening of the lumbar lordosis that frees the impacted shoulder.
Management

- Rotational Maneuvers - Woods Corkscrew Maneuver
  (Anterior aspect of the posterior shoulder)

  - Posterior Rubin II
    Posterior aspect of the posterior shoulder

  - Anterior Rubin II
    Posterior aspect of the anterior shoulder

- Delivery of the Posterior Arm/Shoulder

Woods Maneuver

The hand is placed behind the posterior shoulder of the fetus. The shoulder is then rotated progressively 180 degrees in a corkscrew manner so that the impacted anterior shoulder is released.
Delivery of the Posterior Shoulder/Arm

Grasp hand, flex elbow and deliver arm by traction on hand.

Management

**Deliberate** fracture of the clavicle by pressing the anterior clavicle against the pubic ramus can be performed to free the shoulder impaction. However, it is **difficult** to deliberately fracture the clavicle of a large neonate.

If successful, the fracture will heal rapidly and is usually **trivial** compared with brachial nerve injury, asphyxia or death.
"At present, shoulder dystocia remains a relatively unpredictable and therefore largely unpreventable event."

The SaFE (Simulation and Firedrill Evaluation) Study was a trial commissioned by the Department of Health of England and Wales to investigate the effectiveness of multiprofessional obstetric emergency training.

The management of shoulder dystocia was one of the obstetric emergencies investigated.

During the SaFE Study, 450 simulated shoulder dystocia scenarios were video recorded and analyzed.
SaFE Study

Pre-training data revealed the following:

- 80 of 140 (57%) were unable to deliver the fetus
- Almost two thirds (85/134, 63%) failed to call for pediatric support
- 1 in 27 (5/134, 4%) used a potentially harmful maneuver (fundal pressure).

Communication Problems

- Inadequate communication between the obstetrician or midwife and the summoned assistant was observed during simulations.
- Senior doctors were least likely to communicate well ($P.001$), with only 7 of 22 (32%) stating the problem before training.

Training Message

- Good communication with the mother during and after shoulder dystocia is likely to enhance cooperation and limit psychological and possibly medico-legal problems.
- Training programs should consider the inclusion of patient–actors with mannequins to increase the fidelity of simulation exercises.
Note Keeping

- "Documentation" should be comprehensive and unambiguous.

- Note keeping can be aided by a reformatted sheet, but instruction in the key components and the importance of their documentation still should be given.

Description on How to Gain Access with the Examining Hand

The following descriptions to help obstetricians or midwives understand how to gain access with the examining hand. We have likened the process to:

1. Performing a manual removal of a placenta
2. Putting on a tight bracelet
3. Removing the last potato chip in the tube!
There was also uncertainty over delivery of the posterior arm. Some obstetricians or midwives attempted to deliver the posterior shoulder (by hooking their finger in the posterior axilla and pulling) rather than grasping the hand, flexing the elbow, and delivering the arm by traction on the hand.

We have simplified our management algorithm: both delivery of the posterior arm and internal rotational maneuvers commence with the same action (inserting the whole hand into the posterior sacral hollow).

If the posterior arm is flexed and easily reached, delivery of the posterior arm may be the most straightforward maneuver to attempt first; if the posterior arm is straight, first attempting internal rotation may be easier.

So, Diagnosis Should Be Easy?

- Older
- Short 4'10"
- Labor Abnormalities
- Male
- History of Shoulder Dystocia

Wrong !!!!!!

Obese
Diabetic
Post-term
Operative Vag Delivery
So, Delivery Should Be Easy and atraumatic if You Follow the Rules?

Maybe?

Evidence based?

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.

Summary of Recommendations

The following recommendations are based primarily on consensus and expert opinion:

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.
Summary of Recommendations

Planned cesarean delivery to prevent shoulder dystocia may be considered for suspected fetal macrosomia with EFW exceeding 5,000 g in women without diabetes and 4,500 g in women with diabetes.

Summary of Recommendations

There is no evidence that any one maneuver is superior to another in releasing an impacted shoulder or reducing the chance of injury.

Performance of the McRoberts maneuver is a reasonable initial approach.

It is clear that brachial plexus injury can occur regardless of the procedure or procedures used to disimpact the shoulders.

Posterior Access

We have simplified our management algorithm: both delivery of the posterior arm and internal rotational maneuvers commence with the same action (inserting the whole hand into the posterior sacral hollow).

If the posterior arm is flexed and easily reached, delivery of the posterior arm may be the most straightforward maneuver to attempt first; if the posterior arm is straight, first attempting internal rotation may be easier.

Evidence Based Practice?

The inspiration for the use of the all-fours maneuver in this case, which was managed by the principal author, came from an informal article written by Ina May Gaskin on the results of a previously unpublished series of shoulder dystocias in which the maneuver had proven to be extremely effective.
Thirty-five of these were complicated by shoulder dystocia, and all of them were managed by midwives. Three early births were managed with traditional maneuvers, resulting in some birth injuries.

The remaining 32 were managed by having the mother assume the all-fours position, with no mortality, no birth injuries, and with excellent Apgar scores.

The All-Fours Maneuver

CAFE
Center for Advanced Pediatric Education

Suspend disbelief: Simulation Artifact

Study #1 OB Sim 2007
Objective: Does Simulation Training Work?

We compared:
- 4 - Traditionally trained teams*
- 4 - Simulation trained teams
  * Team = 2 L&D RNs and 2 OB residents
Simulation versus Traditional Training Study

2 obstetrical crises:
- Shoulder dystocia
- Eclampsia

Traditional Training

Three hours of traditional training:
1). Lectures
2). Video
3). Task Training

Simulation Training

No lectures/videos
- Training in the simulator only

Simulation Room

- 400 square feet
- “Built to code”
- 6 pan tilt cameras
- Multiple microphones
1. Pre and post training multiple choice exam
   - Who performed better on a written test?

Results: Multiple Choice Test

<table>
<thead>
<tr>
<th>Team</th>
<th>Traditional</th>
<th>Simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre training score (max = 20)</td>
<td>12.46</td>
<td>11.43</td>
</tr>
<tr>
<td>Post training score</td>
<td>13.7</td>
<td>14.21</td>
</tr>
<tr>
<td>Improvement in score</td>
<td>1.31</td>
<td>2.78</td>
</tr>
</tbody>
</table>

(\(P\) was NS)

Conclusion: Multiple Choice Test

After training, both groups learned and performed equally well on a **written** multiple choice test.

Testing

2. Performance test of simulated shoulder dystocia and eclampsia
   - Who performed better during the simulated crisis?
Performance Testing

- Performance testing as L&D drill
  - All performance tests videotaped
  - Performance grading done by a “blinded” reviewer who was unaware of each teams’ mode of training

Performance Testing Results
Shoulder Dystocia

<table>
<thead>
<tr>
<th>Team</th>
<th>Score (Total: 14)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>6.88</td>
<td>5.5-8</td>
</tr>
<tr>
<td>Sim</td>
<td>11.75</td>
<td>10-13</td>
</tr>
</tbody>
</table>

(p=0.002)

Conclusion: Performance Testing

Simulation trained teams demonstrated superior clinical skills as compared to traditional trained teams.

Testimonial:

"On May 30th, I attended the OB Sim training during which one of our scenarios was shoulder dystocia...the very next day at work in L&D my exact same scenario would be replicated! I took care of a patient...who proceeded to have a three minute shoulder dystocia!

I felt so much better equipped in my skills to handle this emergency situation as a result of my attendance at OB Sim. Communication among the team was very clear and the emergency was handled very smoothly.

The outcome was very good (Apgars 7 & 9), I am convinced of the value and benefit of OB Sim validated by my own personal experience in the real L&D setting."