

Shoulder Dystocia: How to Take the Fear out of Management

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Disclosures

- Nothing to disclose

At the end of this seminar, the participant should be able to:

- Describe the frequency of shoulder dystocia and brachial plexus injury
- Describe the performance of various release maneuvers designed to manage shoulder dystocia
- List key elements in the documentation of a delivery complicated by shoulder dystocia
- List major contributing factors that reduce the defensibility of a medico-legal case related to a brachial plexus injury

Topics

- Epidemiology
- Review of maneuvers
- Documentation and follow-up
- Strategies to improve defensibility of a potential medical-legal case

Shoulder Dystocia: Definition(s)

- A vaginal delivery requiring additional maneuvers following failure of gentle traction on the fetal head to deliver the shoulders
- Head to body delivery time ≥ 60 seconds

ACOG Practice Bulletin: Shoulder Dystocia, Number 40, November 2002
BeallMH et al. AmJObstetGynecol 1998; 179: 934

Epidemiology

Shoulder Dystocia: Overall Incidence and Rate of Complications

- Reported frequency of shoulder dystocia 0.6 to 1.4% of vertex deliveries; higher rates with increasing fetal weight particularly in diabetics
- Maternal complications
 - 11% rate of postpartum hemorrhage
 - 3.8% rate of 4th degree laceration
- Neonatal complications
 - 4-40% incidence of brachial plexus injury
 - Less than 10% of cases with persistent injury
 - Fractures of clavicle and humerus may also occur
 - Severe cases may result in asphyxia and even death

ACOG Practice Bulletin: Shoulder Dystocia, Number 40, November 2002

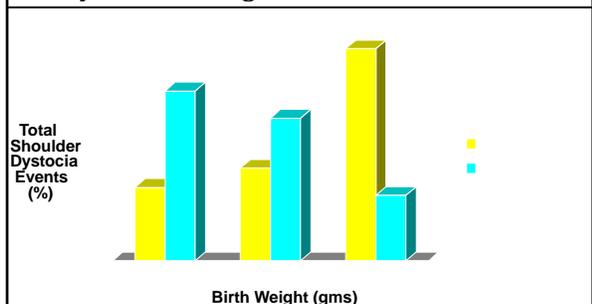
Risk Factors for Shoulder Dystocia

- | | |
|---|--|
| <ul style="list-style-type: none"> ● Antepartum Risk Factors <ul style="list-style-type: none"> – Fetal macrosomia – Diabetes – Maternal obesity – Multiparity – Postterm gestation – Prior macrosomia – Prior shoulder dystocia | <ul style="list-style-type: none"> ● Intrapartum Risk Factors <ul style="list-style-type: none"> – Labor induction – Epidural anesthesia – Operative vaginal delivery |
|---|--|

Most of these risk factors do not have a high enough predictive value to be useful clinically!

ACOG Practice Bulletin: Shoulder Dystocia, Number 40, November 2002

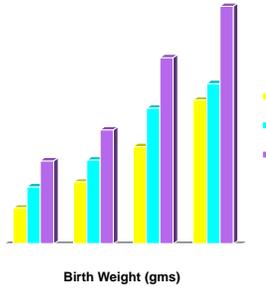
Percentage of Shoulder Dystocia Cases by Birth Weight and Diabetic Status



LangerO et al: *Am J Obstet Gynecol* 1991;165:831
 AckerDB et al: *Obstet Gynecol* 1985;66:762

Incidence of Shoulder Dystocia by Diabetic Status and Delivery Mode

Incidence (%)



NesbittTS et al:AmJObstetGynecol 1998;179:476

Comments on Macrosomia

- With parous patient with fetal weight >4000g, patient=clinical=ultrasound in estimating weight
- When birth weight exceeds 4500g, only 50% of fetuses weigh within 10% of ultrasound predicted weight
- With non-diabetic mothers, neither induction nor cesarean section warranted (by available evidence) for macrosomia with EFW < 5000g

ACOG Practice Bulletin: Fetal Macrosomia, Number 22, November 2000

Further Comments on Macrosomia

- Only 20% of shoulder dystocia cases would be prevented by cesarean section for infants of non-diabetics with weights >4500g
- Observational studies suggest that induction for macrosomia does not reduce frequency of shoulder dystocia and appears to increase risk of cesarean section compared to controls managed expectantly
- Prophylactic cesarean section for diabetics with EFW >4500g or non-diabetics with EFW >5000g reasonable to consider though supporting evidence only fair

ACOG Practice Bulletin: Fetal Macrosomia, Number 22, November 2000

Role of Mode of Delivery and Shoulder Dystocia (SD) in Brachial Plexus Palsy (BPP)

- California database study-1999
- Johns Hopkins database study-2006

Towner,D et al: *N Engl J Med* 1999; 341: 1709-1714
 GurewitschED et al. *Am J Obstet Gynecol* 2006: 194: 486-492

California Health Information for Policy Project Database Study

- Database encompasses 98% of all deliveries
- Study used birth and death certificates and maternal and neonatal discharge summaries
- Confined to nulliparous women; excluded breech deliveries
- Total of 583,340 deliveries between 1992-1994

Towner,D et al: *N Engl J Med* 1999; 341: 1709-1714

Risk of Brachial Plexus Injury by Delivery Mode

Incidence per 10,000 Infants

Spontaneous delivery	7.7
Operative vaginal delivery	
Vacuum	17.6
Forceps	25.0
Both	46.4
Cesarean section	
No labor	4.1
During labor	1.8

Towner,D et al: *N Engl J Med* 1999; 341: 1709-1714

Johns Hopkins Database Study: Can BPP Occur in the Absence of SD?

- Non-SD related BPP is uncommon (BPP 75 times more likely after SD related delivery (21.6%) than non-SD related delivery (0.3%))
- Permanent BPP rare (<2%) in non-SD related cases
- "Risk factors" for non-SD related BPP: average fetal weight, fetal acidosis, posterior arm involvement, instrumental delivery

GurewitschED et al. *AmJObstetGynecol* 2006; 194: 486

Births Complicated by Shoulder Dystocia (SD) and Brachial Plexus Palsy (BPP)*

	SD ¹	BPP ²	Rate (%)	
			SD Related BPP ³	Non-SD Related BPP ⁴
All Vag. Deliveries	2.4	0.9	21.6	0.3
Spontaneous	2.0	0.6	20.0	0.2
Instrumental	4.8	2.2	25.0	1.0
Cesarean Section	N/A	0.2	N/A	0.2

*23,273 deliveries at Johns Hopkins Hospital, June 1993-December 2004
 1. Number of SD cases per number of deliveries ≥ 34 weeks
 2. Number of BPP cases in neonates ≥2500g per number of neonates ≥2500g
 3. Number of BPP cases per number of SD related deliveries
 4. Number of BPP cases per number of non-SD related deliveries ≥34 weeks

GurewitschED et al. *AmJObstetGynecol* 2006; 194: 486

Theories Explaining Causes of Non-Shoulder Dystocia related Brachial Plexus Palsy

- Fetal acidosis decreases muscle tone and significantly alters body orientation during descent in labor leading to stretch injury
- Fetal acidosis decreases muscle tone making fetus more vulnerable when "normal" traction force is applied during delivery
- Asynclitism or pelvic abnormalities may predispose to stretch injury; are also independently associated with use of operative vaginal delivery
- Initial impaction of anterior shoulder may result in stretch injury even if it resolves spontaneously
- Pressure on posterior arm and unusual expulsive forces may lead to stretch or compression injury

GurewitschED et al. *AmJObstetGynecol* 2006; 194: 486
 JennettRJ, TarbyTJ. *AmJObstetGynecol* 1997; 176: 1354

Risk Factors for Recurrent Shoulder Dystocia

- All deliveries, Washington state, 1987-2004 (1,390,560 deliveries)
- Rate of recurrent shoulder dystocia in women with subsequent vaginal delivery, 11.8%
- Risk factors for recurrent shoulder dystocia:
 - Prior severe shoulder dystocia (OR 2.5)
 - Birth weight > 3500g (OR ranging from 2.0 to 4.2)
 - Vacuum delivery (OR 1.4)

MooreHM et al: *Am J Obstet Gynecol* 2008; 198: e16-e24

Review of Maneuvers

Shoulder Dystocia Management Algorithm

- Maternal bearing down, cranial traction
- Recognition of shoulder dystocia
- Stop bearing down and stop traction
- Communicate with staff and patient
- Call for help and begin timekeeping
- Initiate McRobert's maneuver, resume bearing down and traction, perform episiotomy (if needed for further maneuvers)

Shoulder Dystocia Management Algorithm (cont.)

- Suprapubic pressure (may be combined with Rubin's maneuver)
- Attempt delivery of posterior arm*
- Wood's screw or Rubin's maneuver*
- Repeat above steps if delivery not accomplished
- Gaskin (all fours) maneuver*
- Zavanelli maneuver and Cesarean section

*Order of performance of secondary maneuvers may vary

Are some maneuvers better than others?

- Limited information on this topic-clinical data is mostly anecdotal, i.e. "in my experience"
- Difficult to do comparative studies, therefore data is observational in clinical realm
- Keep in mind that many factors can affect likelihood of success such as maternal and infant size, parity, anesthesia etc.

Which may be less risky for the infant as an initial maneuver?

- Used a 3 dimensional model that simulated the pelvis and special force sensing gloves
- Compared McRoberts', Anterior Rubin's, and Posterior Rubin's maneuvers using 10 "subjects" in each group with one "operator"
- Rubin's maneuver-movement of shoulders about 30° to an oblique position
 - Anterior – pressure behind anterior shoulder
 - Posterior – pressure behind posterior shoulder

GurewitschED et al. *Am J Obstet Gynecol* 2005; 192: 153-160

Which may be less risky for the infant as an initial maneuver?		
Maneuver	Traction Force (lbs)*	Brachial plexus stretch (mm)**
McRoberts'	16.2 ± 2.1	7.3 ± 2.5
Posterior Rubin's	8.8 ± 2.2	6.9 ± 2.9
Anterior Rubin's	6.5 ± 1.8	2.9 ± 1.0

* p < 0.0001 ** p = 0.0003

Unclear why the difference between posterior and anterior Rubin's maneuver.

Gurewitsch ED et al. *Am J Obstet Gynecol* 2005; 192: 153-160

Which maneuver may be best after primary maneuvers fail?
<ul style="list-style-type: none"> ● Observational study of 132,198 singleton vertex vaginal deliveries beyond 34 weeks (Consortium of Safe Labor) between 2002-2008 <ul style="list-style-type: none"> – 2018 shoulder dystocias (1.5%) – 101 fetal injuries (5.2%) ● Examined use of posterior shoulder delivery v. Rubin's and Wood's corkscrew maneuvers after failure of McRoberts and suprapubic pressure

Hoffman MK et al. *Obstet Gynecol* 2011; 117: 1272-1278

Which maneuver may be best after primary maneuvers fail?		
	Odds of Successful Vaginal Delivery*	
	Odds Ratio	95% CI
Rubin's maneuver v. Posterior shoulder delivery	0.33	0.11, 0.98
Woods' corkscrew maneuver v. Posterior shoulder delivery	0.58	0.26, 1.30

*Controlled for age, race, birthweight, and study site

Hoffman MK et al. *Obstet Gynecol* 2011; 117: 1272-1278

Documentation and Follow-up

Clinical Documentation-Key Elements

- Risk factors, e.g. estimated fetal weight, ?diabetes
- Indications for: oxytocin use, operative delivery
- Duration of stages of labor
- Maneuvers employed
- Which shoulder was anterior
- Timing of maneuvers and head to body delivery time
- Status of infant
- MDs, RNs, family members attending delivery
- Discussion of delivery with patient and family

A "shoulder dystocia" check-off form ensures key elements are captured

Documentation

- Avoid charting during emergency-keep times and notes but don't record in chart
- Review steps and times with delivery team to ensure consistency in subsequent notes
- Avoid adjectives in describing maneuvers
- Do document that shoulder dystocia management was life-saving
- Do document EFW in chart-be sure to address any discrepancy with ultrasound estimate

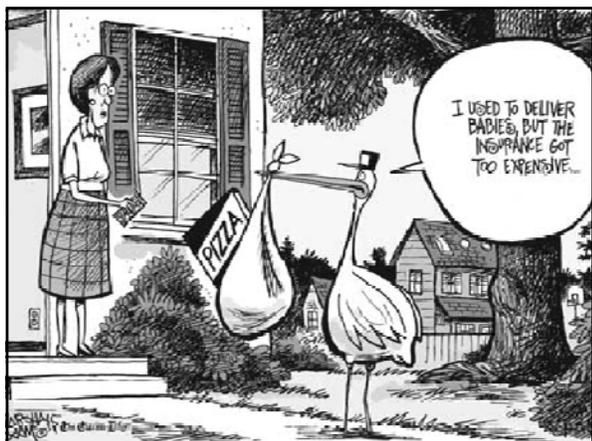
Documentation (continued)

- With a history of prior shoulder dystocia or presence of risk factors such as diabetes and/or macrosomia, important to document informed consent process including content if vaginal delivery contemplated. Ideally such discussions should occur prior to labor!
- If operative vaginal delivery performed, indications should be well-documented and defensible. An EFW along with station and position should be documented.
- With prior severe shoulder dystocia, offering “elective” cesarean section at term should be documented.

Documentation (continued)

- Coordinate family discussions with pediatrician
- Important to emphasize (and document):
 - emergency nature of event
 - likelihood of improvement over time if palsy occurs
- Should review situation relatively immediately but discuss again since families need time to process all the information
- Risk management should be involved early in process in all cases involving brachial plexus palsy or problems with patient/family communication

**Strategies to Improve
Defensibility of a Potential
Medical-legal Case**



Shoulder Dystocia/Brachial Plexus Palsy in Obstetric Liability Cases

- Is primary factor for 15.7% of obstetric claims-only neurologically impaired infants (30.8%) and stillbirth or neonatal death (15.8%) ranked higher
- Concomitant use of forceps/vacuum often cited as an important factor in awards decided by jury
- Reported average payment about \$480,000

Wilson N, Strunk A: Overview of 2006 Survey on Professional Liability; ACOG Clinical Review (12), March-April 2007

Factors Raising Risk of Litigation Related to Shoulder Dystocia/Brachial Plexus Palsy

- Based on 61 cases, 1995-2002, ProMutual Insurance Company, Massachusetts
- Prenatal factors-maternal obesity, excessive weight gain in pregnancy, diabetes, fetal macrosomia (involved in 72% of cases)
- Labor and Delivery interventions-oxytocin use (especially induction), forceps and prolonged second stage, fundal pressure (noted in 14.8% of cases)

Zylstra S et al; OBG Management 2004;16(9), 78

Basic Strategies

- Prevention
- Improved management
- Improved communication

Prevention

- Consider use of cesarean section with:
 - macrosomia (>4500g) and diabetes,
 - significant macrosomia (>5000g) with non-diabetics
 - women with prior severe shoulder dystocia
- Reconsider use of operative vaginal delivery in presence of macrosomia and prolonged second stage

Improved Management

- Training (didactic and simulation)
 - Basic maneuvers
 - Teamwork
 - Documentation
 - Communication
- Debriefing

Training Components

- Didactic-lecture(s), CD-ROM (Veritech Corporation, www.veritechmedia.com)
- Simulation
 - Basic-human "model", low fidelity (basic mannequin)
 - High fidelity-more sophisticated mannequin (NOELLE, Gaumard Scientific, Coral Gables, FL ; PROMPT Birthing Trainer, www.limbsandthingsinc.com)
- Post-test for didactic and possibly simulation both evaluates program but also increases overall stakes for participant
- Can also incorporate some or all of the components for credentialing

Low Fidelity Simulation Set-up



CroftsJF et al; *Obstet Gynecol* 2006; 108: 1477-1485

Issues Discovered During Shoulder Dystocia Simulations

- Video taped 450 simulations managed by 95 CNMs and 45 MDs in the United Kingdom
- Before training:
 - 57% unable to deliver the baby
 - 63% failed to call for pediatric support
 - 4% used fundal rather than suprapubic pressure

CroftsJF et al, *Obstet Gynecol* 2008;112: 906-912

Issues Discovered During Shoulder Dystocia Simulations

- Poor communication between team members
- Inability to gain internal access, e.g. thumb left outside or not entering vagina with whole hand
- Confusion over how to perform internal maneuvers
- Application of excess force:
 - 66% applied 100N or 22.5 lbs
 - 11% applied more than 200N or 45 lbs

CroftsJF et al, *Obstet Gynecol* 2008;112: 906-912

Skill Retention Following Shoulder Dystocia Simulation Training

- Involved 122 MDs and CNMs in England
- Achieving delivery – simulation continued until posterior arm delivered, 5 minutes elapsed from head delivery, or participant stopped

	Pre-training	Achieved Delivery (%)		
		3 weeks	6 months	12 months
Entire group	49	82	84	85
Unable to effect delivery 3 weeks after training	----	----	60	79

CroftsJF et al: *Obstet Gynecol* 2007;110:1069-1074

Bristol, UK: Results of Shoulder Dystocia Training-General Approach

- Compared pre-training results (1996-1999) to post-training results (2001-2004)
- Part of annual 1 day OB emergency course
- Required attendance by midwives and obstetricians
- Reviewed risk factors, maneuvers including mannequin practice to simplify and to use stepwise process, and documentation

DraycottTJ et al: *Obstet Gynecol* 2008; 112: 14-20

Bristol, UK: Results of Shoulder Dystocia Training-General Statistics		
	Pre-Training 1996-1999	Post-Training 2001-2004
Deliveries	15,908	13,117
Shoulder dystocia rate	2.04% (324)	2.00% (262)
Excess traction (documented)*	16.7%	9.2%
*p=0.01 DraycottTJ et al: <i>Obstet Gynecol</i> 2008; 112: 14-20		

Bristol, UK: Results of Shoulder Dystocia Training-Maneuvers		
	Pre-Training 1996-1999	Post-Training 2001-2004
McRoberts**	29.3%	87.4%
Suprapubic pressure*	27.8%	45.4%
Internal rotation maneuver**	6.8%	11.1%
Posterior arm delivery*	7.4%	19.8%
No recommended maneuvers*	50.9%	8.0%
*p<0.001 **p=0.02 DraycottTJ et al: <i>Obstet Gynecol</i> 2008; 112: 14-20		

Bristol, UK: Results of Shoulder Dystocia Training-Neonate		
	Pre-Training 1996-1999	Post-Training 2001-2004
Brachial plexus injury		
Birth*	7.4%	2.3%
6 months	2.8%	0.8%
12 months	1.9%	0.8%
Clavicle or humerus fx.	1.9%	0.8%
5 min APGAR <7	3.7%	2.3%
*p<0.05 DraycottTJ et al: <i>Obstet Gynecol</i> 2008; 112: 14-20		

Oxford, UK: Results of Shoulder Dystocia Training

- From 1991 to 2005, overall shoulder dystocia rate was 0.6% (514 cases/79,791 vaginal deliveries)
- Training interventions:
 - McRoberts'-3% use first 5 years, 91% use last 5 years
 - Shoulder dystocia (SD) training last 5 years
- Results during 15 year time frame (pre- and post-training):
 - SD rate rose steadily by 0.29 events/1000 vag. deliv./yr.
 - BPP rate rose steadily by 0.048 events/1000 vag. deliv./yr.

MacKenzielZ et al: *Obstet, Gynecol.* 2007; 110: 1059-1068

How well does simulation training result in improved outcomes?

- Detailed literature search through June 2009 for teamwork training with simulation models
- Of 97 articles, only eight met criteria: four were RCTs and four were cohort studies
- One study of using multiple simulations showed better Apgar scores and less hypoxic neonatal encephalopathy after training
- Seven other studies showed improved knowledge, practical skills, communication, and improved team performance

MerienAER et al *Obstet Gynecol* 2010; 115: 1021-1031

Improved Communication

- Risk discussions with patient
 - Ideally prior to labor
 - Consider with macrosomia, macrosomia + diabetes, and prior shoulder dystocia
- Discussions with patient after event
 - Immediate as well as repeated later
 - Factual and coordinated with pediatrician

Debriefing Checklist

- The purpose of debriefing is to objectively review critical event, decide how processes and/or outcomes could be improved and develop a plan for improvement. It is essential that all parties involved participate in debriefing. Every member of the team has a unique perspective to contribute.
- Debriefing should be a confidential, peer review process

Summary

- Shoulder dystocia is an unpredictable, challenging complication of labor
- Knowledge of and appropriate use of primary and secondary maneuvers and good teamwork will usually resolve most cases
- Appropriate documentation and communication are essential components of management

References

- Acker, D.B., B.P. Sachs, and E.A. Friedman, *Risk factors for shoulder dystocia*. *Obstet Gynecol*, 1985. **66**(6): p. 762-8.
- ACOG *Practice Bulletin*: Fetal Macrosomia, Number 22, November 2000
- ACOG *Practice Bulletin*: Shoulder Dystocia, Number 40, November 2002
- Beall, M.H., C.Y. Spong, and M.G. Ross, *A randomized controlled trial of prophylactic maneuvers to reduce head-to-body delivery time in patients at risk for shoulder dystocia*. *Obstet Gynecol*, 2003. **102**(1): p. 31-5.
- Crofts, J.F., et al., *Management of shoulder dystocia: skill retention 6 and 12 months after training*. *Obstet Gynecol*, 2007. **110**(5): p. 1069-74.
- Crofts, J.F., et al., *Observations from 450 shoulder dystocia simulations: lessons for skills training*. *Obstet Gynecol*, 2008. **112**(4): p. 906-12.
- Draycott, T.J., et al., *Improving neonatal outcome through practical shoulder dystocia training*. *Obstet Gynecol*, 2008. **112**(1): p. 14-20.

References (continued)

Gurewitsch, E.D. et al., *Comparing McRoberts' and Rubin's maneuvers for initial management of shoulder dystocia: an objective evaluation.* Am J Obstet Gynecol 2005. **192**: p. 153-160

Hoffman, M.K. et al.; *A comparison of obstetric maneuvers for the acute management of shoulder dystocia.* Obstet Gynecol 2011. **117**: p. 1272-1278

Gurewitsch, E.D., et al., *Risk factors for brachial plexus injury with and without shoulder dystocia.* Am J Obstet Gynecol, 2006. **194**(2): p. 486-92.

Jennett, R.J. and T.J. Tarby, *Brachial plexus palsy: an old problem revisited again. II. Cases in point.* Am J Obstet Gynecol, 1997. **176**(6): p. 1354-6; discussion 1356-7.

Langer, O., et al., *Shoulder dystocia: should the fetus weighing greater than or equal to 4000 grams be delivered by cesarean section?* Am J Obstet Gynecol, 1991. **165**(4 Pt 1): p. 831-7.

MacKenzie, I.Z., et al., *Management of shoulder dystocia: trends in incidence and maternal and neonatal morbidity.* Obstet Gynecol, 2007. **110**(5): p. 1059-68.

References (continued)

Moore, H.M., et al., *Risk factors for recurrent shoulder dystocia, Washington state, 1987-2004.* Am J Obstet Gynecol, 2008. **198**(5): p. e16-24.

Nesbitt, T.S., W.M. Gilbert, and B. Herrchen, *Shoulder dystocia and associated risk factors with macrosomic infants born in California.* Am J Obstet Gynecol, 1998. **179**(2): p. 476-80.

Towner, D., et al., *Effect of mode of delivery in nulliparous women on neonatal intracranial injury.* N Engl J Med, 1999. **341**(23): p. 1709-14.

Wilson N, Strunk A: Overview of 2006 Survey on Professional Liability; ACOG Clinical Review (12), March-April 2007[13]

Zylstra, S., et al., *Cutting the medicolegal risk of shoulder dystocia.* OBG Management, 2004. **16**(9): p. 78-85.