Standardized Skill Based Training for Managing Shoulder Dystocia and Vacuum Assisted Deliveries

Perinatal Patient Safety Program

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Shoulder Dystocia

- Delivery requiring additional obstetrical maneuvers following failure of gentle downward traction on the fetal head to effect delivery of the shoulders
- Incidence: 0.6 to 1.9 % of vaginal vertex deliveries
- Up to 50 % of cases occur in women with no risk factors
Risk Factors For Shoulder Dystocia

- Prior shoulder dystocia
- Maternal Diabetes: risk is twice that of nondiabetic moms at all birthweights
- Macrosomia or history of macrosomia
- Postdates gestation
- Maternal obesity
- Multiparity
- Induction of labor
- Operative Vaginal Delivery
- ? Labor Abnormalities
Combined Risk Factors

- Evaluation 175,886 vaginal deliveries >3500g in CA, 1992
- Odds Ratio of Shoulder dystocia:
  - 4000-4500 gm 3.6
  - >4500 gm 10.1
  - DM 1.7
  - Induction 1.3
  - Assisted delivery 1.9

Maternal Complications Of Shoulder Dystocia

- Postpartum hemorrhage 11 %
- 4<sup>th</sup> degree lacerations 4 %
- Risk of emergency surgery
- Emotional trauma

Gherman, Am J Obstet Gynecol 1997; 176:656
Neonatal Complications Of Shoulder Dystocia

• Brachial Plexus Injury 4-40 %
  ▪ Permanent Injury <10 %
  ▪ Risk with C-section 4 %
  ▪ % cases with no Sh Dys 34-47 %

• Clavicle fracture 0.5 %

• Humeral fracture

• Hypoxic ischemic encephalopathy/death
Brachial Plexus Injury

- Rapidly induced forces of moderate level applied in lateral direction induce greatest injury (Allen RH. Clin Obste Gynecol 50:607; 2007)
- Fetal maneuvers (rotational & posterior arm) have significantly less brachial plexus injury than lateral downward traction (Baskett et al. OG 86:14; 1995)
- Appears to be an increasing incidence of shoulder dystocia and brachial plexus injury over the last 15 years (Gherman et al. AJOG 195: 657; 2006)
Hypoxic Ischemic Encephalopathy

Head to body interval time critical

- Based on 22 cases delivered < 4 minutes, suggested pH drop 0.14/minute (Wood et al. J OG Br Commonwealth 80:295;1973)
- Data from 3 studies with over 200 deliveries indicates 6-8 minutes for CNS injury: more rapid deterioration in cases with complete abruption, uterine rupture, or cord clamp before delivery of trunk (Gurewitsch E Clinical Obstet Gyncecol 50:592, 2007)
- English data (Tim Draycott) suggests 5 minute cutoff
- 56 stillbirths with SD: 5 minute median interval (Hope et al. BJOG 105:1256; 1998)
Shoulder Dystocia in Prior Pregnancy

- Recurrence risk 1-16%
- Review risk factors:
  - EFW, GA, DM, Parity, Obesity
- Severity of injury if any
- Consider minimizing risk by avoiding labor induction and instrumented delivery
- Document informed consent discussion including option of elective c-section
When To Consider C-section

• ACOG Practice Bulletin #40, Nov. 2002:
  - No DM & EFW > 5000 gms
  - DM & EFW > 4500 gms
  - Hx Prior Shoulder Dystocia
  - Prolonged Second Stage With DM & EFW > 4000 gms
Management Of Shoulder Dystocia

Be Prepared:

- Educate staff on policy
- Team drills
- Practice maneuvers with manekin
- Proper equipment (stepstool)
- Proper positioning to avoid staff injury

**Remember: Can Happen With Any Delivery**
Points To Remember!

- Call Time At Head Out/Note on Strip
- No Fundal Pressure!
- Have Time Called Out By Minute
- Call For Help
- Exert any pressure axially not laterally
- Maneuvers
Timing of Maneuvers

- Consider waiting until next contraction before exerting any traction on head
- During this time attempt to sweep a finger along the dorsal aspect of the trunk to adjust orientation of fetal shoulders anterior to posterior
- This may allow time for natural rotation of shoulders to oblique diameter of pelvis in precipitous deliveries

Effect of Maneuvers

- McRoberts increases tilt of pelvis to allow additional 1 cm space
- Rotates anterior shoulder cephalad potentially increasing lateral stretch

Allen RH Clin Obste Gynecol 50:607
Sept 2007
Effects of Maneuvers

- Rotational maneuvers expand the space available by about 2 cm by use of the oblique diameter

Allen RH Clin Obstet Gynecol 50:607
Sept 2007
Effect of Maneuvers

Delivery of the posterior arm increases available space by 2 cm

McRobert’s Maneuver

- Hyperflex the thighs & abduct hips
- Flattens lumbar spine
- Cephalad rotation of symphysis pubis
- Accomplishes Delivery in 42 % Cases

Gherman, Obstet Gynecol 1997; 176:656
Suprapubic Pressure

- Assistant using stepstool
- Pushes shoulder below symphysis
- Direct vs. Lateral pressure: Note head position
Internal Rotation Maneuver – Woods Screw

- Apply pressure to posterior shoulder
- Rotate shoulder 180 degrees
- Allows rotational descent
Alternative Rotational Maneuver – Rubin’s Maneuver

- Apply pressure to posterior aspect, most accessible shoulder
- Push on scapula to adduct shoulders
Delivery Posterior Arm

- Insert hand posteriorly & sweep arm across the chest and into vagina
- Rotate shoulders obliquely to deliver anterior shoulder
- Have RN stop suprapubic pressure first!
Gaskin Maneuver

- Patient in all fours position on hands and knees
- Should have no significant motor blockade
- Described by Ida May Gaskin, The Farm Midwifery Center in Tennessee
Gaskin Maneuver

- Retrospective study over 17 years
- 4452 deliveries with 82 shoulder dystocias
- All managed successfully with Gaskin Maneuver
- No IUFD, neonatal death, Erb’s Palsy, seizures, HIE, CP, or fractured clavicle

Zavanelli Maneuver

- Reversal of cardinal labor movements by manually flexing and replacing head into uterus
- Give SQ terbutaline
- Deliver by C-section
- Risk of decortication and death
- 91% Success

Sandberg EC AmJObstet Gynecol 1985;152:479
Episiotomy & Shoulder Dystocia

- 2 retrospective studies:
  - 141 cases shoulder dystocia defined by clinician
- 242 cases of severe shoulder dystocia
- Episiotomy increased the risk for anal sphincter laceration without improving outcome of shoulder dystocia

Youssef, BJOG 2005; 112:941
Additional Maneuvers

• Subcutaneous symphysiotomy
• Partial cephalic replacement, shoulder rotation, and vaginal delivery
• Cleidotomy : Cutting of clavicle
• Abdominal hysterotony, rotation of shoulder, and vaginal delivery
Shoulder Dystocia Team Simulation

- Provider
- Primary RN
- Secondary RN
- Charge RN
- Second OB Provider
- Anesthesia
- Pediatric Team
Documentation Is Critical

- Use of Smartphrases in HealthConnect
- Document time head out to delivery
- Document maneuvers used and in which order
- Document episiotomy if done, or if felt not necessary and why
- Document infant condition
- Document communication with family
Communicating with the Family

• Important to use simple terms to explain the situation
• If necessary explain some members may need to leave to allow adequate space for the team to work
• Be aware of cultural and language differences and potential for misunderstandings:
  - Said: Called for suprapubic pressure
  - Heard: Called for superhuman strength!
Remember:

- Slow down, use your time wisely
- Team and family communication important
- Rehearse rare events so you have the skills, equipment, supplies, communication tools, and personnel necessary to handle them well
- This is often an unexpected event

Be prepared in all patients!
VACUUM ASSISTED VAGINAL DELIVERY
- Need for CAUTION when using vacuum assisted delivery devices
- VAVD may cause serious or even fatal complications
- Five-fold increase morbidity and mortality
  - 12 neonatal deaths; 9 serious injuries
- "Deficient device?"
- Use increased...
Station

- Measured in centimeters (±5)
  - not thirds (per 1988 ACOG Classification)
- All operative vaginal deliveries should be classified
  - mid (0 to +1); low (+2 to +3); outlet (+4 to +5);
- Distance between the leading bony point of the skull and the ischial spines
- Beware of severe molding—can be misleading
  - Crichton’s “Rule of Fifths” (1974)

Degree of Molding

Mild

Moderate

Severe

Excessive molding (not): overlapping of the parietal bones that is fixed and does not relax with pressure

Courtesy of Vacca; Handbook of Vacuum Delivery
Assessing Other Obstetrical Factors

- Previous difficult delivery/labor
- Estimated fetal weight
- Diabetes
- Condition of the fetus and mother
- Length of first & second stages of labor
- Uterine contractions—adequate labor?
- Evidence of CPD
- Experience of the operator
Indications for VAVD

• Prolonged second stage of labor
• Suspicion of potential fetal compromise or NRFHT
• Shortening of second stage for maternal benefit
  □ Exhaustion
  □ Pathology

ACOG; Technical Bulletin, Number17 – February 2000; Operative Vaginal Delivery
Contraindications to VAVD

- Prematurity <34-36 weeks and/or <2500 gms
- Live fetus known to have bone demineralization or bleeding disorder
- Fetal head not engaged
- Cervix not completely dilated
- Cephalopelvic disproportion (CPD)
- Unknown position of fetal head

ACOG; Technical Bulletin, Number17 – February 2000; Operative Vaginal Delivery
Classification and Incidence of Neonatal Effects

Transient Cosmetic Effects

- Cup mark (approx. 100%)
- Chignon (Artificial Caput Succudaneum)
  - Interstitial fluid, not blood
  - Spontaneously resolves within hours
  - Trumpet/Bell styled-cups
    - Less Chignon, but Pop-off rate is 30-35%
  - Mushroom/Malmstrom styled-cups
    - Chignon (100%), but Pop-off rate is 10-12%

The Chignon
Classification and Incidence of Neonatal Effects

• Clinically **Non-Significant** Injuries
  ▪ Superficial Abrasions (10-12%)
  ▪ Retinal Hemorrhages (20-40%)
  ▪ Neonatal Jaundice
  ▪ Cephalohematoma (10-15%)

• Clinically **Significant** Injuries
  ▪ Subgaleal Hemorrhage (≤0.5%)
  ▪ Intracranial Hemorrhage (<0.3%)
  ▪ Skull Fracture (<0.1%)

McQuivey RW, J Mat Fetal Neon Med 2004;16:171-9
Scalp Abrasions
Cephalohematoma
Subgaleal Hemorrhage
Signs of Subgaleal Hemorrhage

1. **Diffuse swelling of the head**
   + Shifts dependently; indents easily on palpation
   + In some cases difficult to distinguish from scalp edema
   + May be unremarkable

2. **Hypovolemic shock**
   + Pallor, hypotension, tachycardia and increased respirations

3. **Signs of cerebral irritation**
   + Convulsions, lethargy, obtundation, apnea, bulging fontanelle
   + Poor feeding, increased irritability, bradycardia and/or shock
   + May be present at delivery or not clinically apparent until several hours to a few days afterward

Can we avoid these complications?
Location, Location, Location!

• Goal: to recreate the normal mechanism of labor
  ▪ “Tow-truck” vs. “Front-end realignment”
• Correct cup placement is **KEY** to our success and safety
• Where is the best location to place the cup on the fetal head?
The Flexion Point

Mentovertical diameter

Suboccipitobregmatic diameter

3cm

Importance of the Flexion Point

Flexing Median Application

Failure Rate: 4%

Flexing Paramedian Application

Failure Rate: 17%

Importance of the Flexion Point


Failure Rate: >29%

Failure Rate: >35%
Which Vacuum Cup to Use?

“Hard?!?”

Or “Soft?!?”
Maneuverability of Vacuum Cup is Key to Our Success
Modern ‘Posterior’ Cups

Kiwi OmniCup
Clinical Innovations

Mityvac M-Select Cup
Cooper Surgical
Locating the Flexion Point

“Vacuum by Numbers”

Method of Traction

- Constant, smooth traction in the axis of pelvis
  - Regardless of fetal position
- **Avoid rotating or side-to-side movements**
  - 1998 FDA Health Advisory Conclusions
- With maternal expulsive efforts
- What is considered a pull?
  - Pulls = Contractions (not maternal efforts)
Upward traction should be delayed until the BP diameter has reached the level of the pubic arch.

Traction: How hard is too hard?
Importance of the “Non-Pulling Hand”

Courtesy of Vacca; Handbook of Vacuum Delivery
Vacuum Assisted Delivery is about ‘RESTARTING’ the Stalled Mechanism of Labor.

descent
engagement
flexion
internal rotation
descent
extension
Vacuum use during c/s was originally reported in 1962.
Used to avoid extension of hysterotomy.
Decreases discomfort to patient.
Decreases need for fundal pressure.
Best in non-labor, high-floating fetal presentations.

Solomons, E., Obstet Gynecol 1962; 19: 201
Method

- **Placement over the flexion point remains paramount**
  - Determine fetal head position
  - Use low-profiled, maneuverable cup
- **Apply vacuum (450-600mmHg)**
- **Lower the table to lowest point and/or use a ‘lift’**
- **Apply gentle traction out of uterine incision**
  - Minimal fundal pressure (if needed)
- **Hand-held devices are better because they reduce the risk of contamination**
  - Conveniently packaged
Know When to Say “When”!

• Vacuum assisted delivery should be abandoned:
  - If descent does not occur with EACH traction
  - If delivery is not achieved or *imminent* after 3(?) tractions
  - 15-20 minute total time limit
  - If the vacuum cup detaches (“pops-off”) ≥2x

• **DO NOT** attempting forceps after failed VAVD
  - Intracranial hemorrhage rates increase 3 times¹,²

Recognizing the “Red-Flags”

Four general obstetric categories involved in obstetrical malpractice litigation:

Failure to identify *when appropriate* to attempt operative vaginal delivery

Failure to *accept limitations* of procedure and *plan* for alternative

Failure to *abandon* trial in timely manner

Failure to *recognize CPD*

O’Grady et al, OBG Mngmt, 1995
Op del note:

- 23yo G2 P1 LowVAVD
- OP >> OA, no epis, no lac
- Apgar 8,9  P intact w/ 3-V cord;
- EBL 400
- M and B in good cond.

● Signature
Annotating the Medical Record

- A lot of Information: Templates can help...
- Indication(s)
- Informed consent
- EFW
- Fetal station, position, degree of molding & asynclitism
- Number of pulls, detachments (pop-offs)
- Max. vacuum pressure; Max. traction force
- Duration of time cup was on fetal scalp
- Outcome and appearance of fetal head, Peds notified

In addition to the normal findings for vaginal deliveries (ie., fetal BW, APGARS, maternal lacerations etc.)
Informed Consent

• Not just a ‘signed form’, but an interaction
• When?
  ▪ Late in 3\textsuperscript{rd} trimester in clinic
  ▪ As patient is admitted to L&D
• “Reasonable Physician Standard”
  ▪ Less common
  ▪ Dictated by physician
• “Patient-View Standard”
  ▪ More common
  ▪ More information
  ▪ Dictated by relationship with patient
Reducing the Risks of VAVD

**Before vacuum delivery:**
- Respect the procedure
- Obtain informed consent
- Match experience of operator with difficulty of delivery
- Properly select patients and classify the procedure

**During vacuum delivery:**
- Achieve *flexing median* cup application
- Correct traction technique, avoid pop-offs and excessive traction
- Know when to say ‘when’

**After vacuum delivery:**
- Examination of scalp for injury (and site of cup placement)
- Notify Pediatrician/Nursery vacuum was used
- Record procedural details; arrange follow-up if injury evident
Improving the Outcomes of Your Vacuum Deliveries

- Correct cup application
- Maneuverability with ‘stemmed’ cups is limited
- Flexing median

- Axis traction more posteriorly
- Controlled traction finger-thumb position

Knowing when to say ‘WHEN’!