

eNeonatal Review

Jointly Presented by The Johns Hopkins University School of Medicine and The Institute for Johns Hopkins Nursing

Supported by an educational grant from INO Therapeutics



[Newsletter Archive](#) | [Program Directors](#) | [CE Information](#) | [Ask the Author](#) | [Contact Us](#) | [Edit Profile](#)

JUNE 2006 VOLUME 3, NUMBER 10



eNeonatal Review is proud to announce our new PODCAST feature. [Listen online.](#)

The eNeonatal Review podcast is a lively fifteen-minute discussion between our June authors and Robert Busker, eNeonatal Review's Medical Editor.

To learn more about podcasting and how to enjoy this exciting new feature of eNeonatal Review, please [visit this page](#).

In this issue...

Birth injuries are a major cause of morbidity and mortality, and although the incidence has decreased over the years, they still present a major challenge to the neonatal health care provider. Shoulder dystocia, a major problem in obstetrical practice, can result in significant morbidity to the infant, with the most common birth injuries being brachial plexus palsy and fractures of the clavicle and humerus. Further, the increasing trend in the use of vacuum extraction creates complications related to the development of extracranial hemorrhages, the most serious of these being a subgaleal hemorrhage.

In this issue we address these increasingly common birth trauma injuries and review the latest guidelines in prevention and management.

This Issue

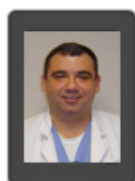
- **COMMENTARY** Our guest editor opinion
- **INCIDENCE OF BIRTH INJURIES**
- **OPERATIVE VAGINAL DELIVERY**
- **NEONATAL SUBGALEAL HEMORRHAGE (SGH) FOLLOWING VACUUM EXTRACTION DELIVERY**
- **SHOULDER DYSTOCIA**
- **BRACHIAL PLEXUS INJURY (BPI) AND CLAVICULAR FRACTURES**
- **ASK THE AUTHOR**

Guest Editors of the Month



Commentary & Reviews:
Hilton M. Bernstein, M.D.

Assistant Professor
Division of Neonatology
Department of Pediatrics
University of Florida



Commentary & Reviews:
Juan C. Roig, M.D.

Assistant Professor
Division of Neonatology
Department of Pediatrics
University of Florida

Guest Faculty Disclosure:

Hilton M. Bernstein, M.D.

Program Information

CE Info

[Accreditation](#)
[Credit Designation](#)
[Target Audience](#)
[Learning Objectives](#)
[Faculty Disclosure](#)
[Disclaimer Statement](#)
[Internet CE Policy](#)

Length of Activity

1.0 hours

Expiration Date

June 26, 2008

Next Issue

July 15, 2006

Complete Post Test
and Receive CME/CE Credit



Visit this link to ask our author a question.



For a limited time, get a free subscription to

EPOCRATES ESSENTIALS

for submitting a question.

Newsletter Archive

Our comprehensive library of accredited programs



Course Directors

Edward E. Lawson, M.D.
Professor

Department of Pediatrics Neonatology
The Johns Hopkins University
School of Medicine

Lawrence M. Noguee, M.D.
Associate Professor

Department of Pediatrics Neonatology
The Johns Hopkins University
School of Medicine

Christoph U. Lehmann, M.D.
Assistant Professor

Department of Pediatrics,
Health Information
Science and Dermatology
The Johns Hopkins University
School of Medicine

Mary Terhaar, RN
Assistant Professor

Undergraduate Instruction,
The Johns Hopkins University
School of Nursing

Robert J. Kopotic, MSN, RRT, FAARC
Director of Clinical Programs

ConMed Corporation

Faculty Disclosure: No relationship with commercial supporters.

Juan C. Roig, M.D.

Faculty Disclosure: No relationship with commercial supporters.

Unlabelled/Unapproved Uses:

No faculty member has indicated that their presentation will include information on off-label products.

Recommend to a Colleague



Learning Objectives

The Johns Hopkins University School of Medicine and The Institute for Johns Hopkins Nursing take responsibility for the content, quality, and scientific integrity of this CME/CE activity.

At the conclusion of this activity, participants should be able to:

- Discuss the current research regarding operative vaginal delivery
- Discuss the current research regarding subgaleal hemorrhage following vacuum delivery
- Discuss current recommendations regarding communications between neonatal health care providers to anticipate, recognize, manage, and prevent brachial plexus and other birth injuries

Commentary

With the increasing incidence of cesarean section delivery for suspected breech presentation and/or suspected fetal macrosomia, the incidence of birth injuries has declined over the years, currently ranging at between 2%-7% of all deliveries¹. Nevertheless, birth injuries still present a major challenge to health care workers. Various reasons for birth injuries deserve mention, namely shoulder dystocia, macrosomia, and operative vaginal deliveries.

Shoulder dystocia is most often an unpredictable and unpreventable obstetric emergency that places both mother and fetus at risk of birth injury. Neonatal complications associated with this condition include brachial plexus injuries, and fractures of the clavicle and humerus².

According to a series of 2005 articles in *Advances in Neonatal Care* by Kathleen Benjamin (reviewed herein), brachial plexus injuries are common birth injuries, with an incidence of 0.13 to 5.1 per 1000 live births³. Shoulder dystocia, macrosomia, and excessive traction by the obstetrician have been implicated in the etiology of this injury; however, a recent article by Herbert F. Sandmire, M.D et al.⁴ challenges this statement, finding that only 50% of ERB's palsies are associated with shoulder dystocia. Benjamin's articles further stress the need for repeated assessment of these injuries. The higher brachial plexus injuries have a better prognosis than the lower injuries. Persistent loss of biceps function at three months of age, complete brachial plexus injury, and associated "Horner syndrome" has a poor prognosis for spontaneous recovery and almost always require surgical intervention. Benjamin further reports that there are, however, major differences in opinion as to the indications for surgery as well as the type of surgery to be performed, between different centers.

Operative vaginal deliveries have increased over the years, with vacuum extractions becoming more popular than forceps deliveries. As reported in the June 2002 ACOG Practice Bulletin⁵, this has led to an increase in extracranial hemorrhages. A subgaleal hemorrhage is the most severe form of extracranial hemorrhage; other forms include cephalohematomas and caput succedaneum. Because of the potential for severe consequences of subgaleal hemorrhage, it is critical to be able to recognize and differentiate these conditions. A large, boggy, elongated, and swollen head that persists after 24 hours should alert the health care provider to the possibility of a subgaleal bleed. As Houchang et al. report⁶, this condition is associated with severe blood loss which can result, if left untreated, in severe hypovolemic shock, disseminated intravascular coagulation, hyperbilirubinemia, and death.

A majority of the articles reviewed in this issue stress the importance of communication between health care workers, as well as on-going training with regard to the indication and application of forceps and vacuums. It is also very important for the neonatologist to be aware of the mode of delivery in order to be able to anticipate complications related to the birth. A prime example is the strong association between vacuum extractions and extracranial hemorrhages. Operative deliveries should be undertaken by health care professionals who are experienced in their application, and residents in both obstetrics and pediatrics should be trained in the recognition and management of birth injuries.

References:

1. Leslie A. Parker, RNC, MSN, NNP. [Part 1: Early Recognition and Treatment of Birth Trauma: Injuries to the Head and Face](#) *Advances in Neonatal care*, Vol 5, issue 6. 288-297.
2. ACOG Practice Bulletin. Shoulder dystocia. Nov. 2002. Number 40. 921-926.
3. Kathleen Benjamin, RNC, MS, NNP. [Part 1. Injuries to the Brachial Plexus: Mechanisms of Injury and Identification of Risk Factors](#). *Advances in Neonatal care*, Vol 5, No 4 (August), 2005: 181-189
Kathleen Benjamin, RNC, MS, NNP. [Part 2. Distinguishing Physical Characteristics and Management of Brachial Plexus Injuries](#). *Advances in Neonatal Care*, Vol 5, No 5 (October), 2005: 240-251.
4. Herbert F. Sandmire, M.D and Robert K. DeMott, M.D. [Erb's Palsy Causation, iatrogenic or resulting from labor forces?](#) *J Reprod Med* 2005; 50:563-566.
5. ACOG PRACTICE BULLETIN, Clinical Management Guidelines for The Obstetrician-Gynecologist. Number 17, June 2002. Operative Vaginal Delivery Pages 780-787.

Recommend eNeonatal Review to a Colleague 

Ask a Question about this Newsletter 

INCIDENCE OF BIRTH INJURIES

Joint Commission on Accreditation of Healthcare Organizations, **Sentinel Event Alert, issue 30 Preventing infant death and injury during delivery** (2004) July 21.

With the objective of making medical personnel aware of birth trauma as an important cause of neonatal morbidity and mortality, JCAHO issued a Sentinel Event Alert on December 31, 2005, reporting on 109 cases of perinatal death or permanent disability (updating the 47 cases of perinatal death or permanent disability reported since 1996). Of these 109 cases, 93 resulted in infant death and 16 cases involved major permanent disability. Cases considered reviewable under the Sentinel Event Policy are "any perinatal death or major permanent loss of function unrelated to a congenital condition in an infant having a birth weight greater than 2500 grams".

Communication issues topped the list of identified root causes, where the ability to function as a team was impaired due to "hierarchical intimidation", as well as a failure to follow the chain-of-communication. Other factors included staff competency, orientation and training processes, inadequate fetal monitoring, and the unavailability of monitoring equipment.

To address these issues, JCAHO have made the following recommendations:

1. Team training in perinatal areas to teach staff to work together and communicate effectively.
2. Conducting clinical drills to help staff prepare for high-risk events such as shoulder dystocia, emergency Cesarean section, maternal hemorrhage, and neonatal resuscitation.
3. Applying AAP and ACOG guidelines for perinatal care.
4. Using a standardized maternal fetal record form for each admission.

OPERATIVE VAGINAL DELIVERY

ACOG PRACTICE BULLETIN, **Clinical Management Guidelines for The Obstetrician-Gynecologist**. Number 17, June 2002. Operative Vaginal Delivery Pages 780-787.

Forceps compared with vacuum. Rates of neonatal and maternal morbidity. Aaron B. Caughey, MD, MPP, Per L. Sandberg, MD, Marya G. Zlatnik, MD, MMS, Mari-Paule Thiet, MD, Julian T. Parer MD, PhD, Russell K. Laros Jr, MD. *Obstetrics and Gynecology* 2005; vol 1 No. 5, Part 1; 106:908-12.

Article Options

[View journal abstract](#)

[View full article](#)



(For non-journal subscribers, an additional fee may apply for full text articles)

The ACOG Practice Bulletin presents a review of the current literature regarding the use of forceps versus vacuum extraction, with a focus on complications, and clinical considerations and recommendations.

A 1996 survey by [Bofill et al.](#) estimated the incidence of operative vaginal delivery in the United States to be between 10-15%. Over the last few years the use of vacuum deliveries has surpassed forceps deliveries, due to a decrease in maternal genital lacerations associated with vacuum deliveries. Although these procedures are safe in appropriate circumstances, controversy about them persists. Further, research into the complications of operative vaginal delivery is hampered by a number of potential biases, including the level of experience of the operators, the small number of patients studied under similar circumstances, changes in practice and definition, and the inability to achieve statistical power to answer relevant questions.

Maternal complications related to forceps deliveries include an increased incidence of perineal trauma, especially in primiparous women. Although there is significantly less trauma to the perineum associated with vacuum extractions, the study by Caughey et al. reported a much higher rate of shoulder dystocia related to vacuum deliveries. This study was a retrospective cohort study of 4120 term, cephalic, singleton deliveries at a single institution, where 2075 neonates were delivered by forceps and 2045 delivered by vacuum. Outcomes included perineal lacerations, shoulder dystocia, and neonatal trauma. The rate of shoulder dystocia was lower in women undergoing forceps deliveries (1.5% compared with 3.5%, $p < 0.001$), as was the rate of cephalohematomas (4.5% compared with 14.8%, $p < 0.001$). Maternal trauma as illustrated by third and fourth degree perineal tears was significantly higher with forceps deliveries (36.9% compared to 26.8%, $P < 0.001$).

Operative vaginal deliveries have been thought to be contraindicated in the delivery of macrosomic infants. A study by [Kolderup LB et al.](#) (cited in the ACOG Bulletin) has shown that with increasing birth weight there is a higher incidence of morbidity with the use of forceps deliveries, specifically a six-fold higher rate of significant injury and a four-fold risk of clinically persistent neurological abnormalities as compared to spontaneous vaginal and cesarean section deliveries. However, the overall incidence of persistent injury is low. The authors further concluded that in order to prevent one case of persistent injury, 258 cesarean sections would have to be performed for macrosomia. ACOG states that a trial of labor and the judicious use of operative vaginal delivery techniques for macrosomic infants are not contraindicated, although caution should be used given the possibility of shoulder dystocia.

Forceps delivery may cause corneal abrasions, external ocular trauma, and skull trauma to the infant. However, as found in a 1999 study by [Johanson et al.](#) as well as in a prior study by [Dell et al.](#) (both cited in the ACOG Bulletin), vacuum extraction is associated with a higher incidence of scalp lacerations, cephalohematoma (14-16% with vacuum vs. 2% with forceps), and subgaleal hemorrhages. Other potential complications cited in the ACOG Bulletin include intracranial hemorrhage, retinal hemorrhages and neonatal jaundice related to cephalohematomas and subgaleal hemorrhages.

The long-term sequelae related to operative delivery are low. A 1999 study by [Towner et al.](#) (cited in the ACOG bulletin) evaluating the incidence of severe birth trauma following operative deliveries assessed the outcome of 583,340 singleton deliveries born to nulliparous women between 1992 and 1994. Results showed a significantly higher rate of subdural or cerebral hemorrhage when comparing forceps, vacuum and cesarean section with labor to spontaneous vaginal delivery. There was no significant difference in the occurrence of these complications and these three modes of delivery. However, babies delivered by cesarean section without labor did not show higher rates of intracranial hemorrhages, suggesting that the common risk factor for hemorrhage is abnormal labor. Two additional studies cited in the ACOG bulletin ([Wesley et al.](#); [Ngan et al.](#)) found no significant long-term infant consequences when comparing operative deliveries to spontaneous vaginal deliveries.

Key conclusions drawn from these reviews are that:

1. The use of operative deliveries should be by practitioners who are skilled in their application, with specific criteria for their use;
2. Macrosomia is not a contraindication to a trial of labor or operative delivery;
3. Clinicians must always anticipate shoulder dystocia and its complications under these circumstances; and
4. The pediatrician/neonatologist should be made aware of the mode of delivery so that complications can be anticipated.

References:

1. Bofill JA, Rust OA, Perry KG, Roberts WE, Martin RW, Morrison JC. [Operative vaginal delivery: a survey of fellows of ACOG](#). *Obstet Gynecol* 1996; 88:1007-1010.
2. Kolderup LB et al., [Incidence of persistent birth injury in macrosomic infants: association with mode of delivery](#). *Am J Obstet Gynecol.* 1997 Jul;177(1):37-41.
3. Johanson RB, Menon BKV. [Vacuum extraction versus forceps for assisted vaginal delivery \(Cochrane Review\)](#). In the Cochrane Library, Issue 4, 1999. Oxford: Update Software (Meta-analysis).
4. Dell DL, Sightler SE, Plauche WC. [Soft cup vacuum extraction: a comparison of outlet delivery](#). *Obstet Gynecol* 1985; 96:537-544.
5. Towner D, Castro MA, Eby-Wilkens E, Gilbert WM. [Effect of mode of delivery in nulliparous women on neonatal intracranial injury](#). *N Engl J Med* 1999; 341:1709-1714.
6. Wesley BD, van den Berg BJ, Reece EA. [The effect of forceps delivery on cognitive development](#). *Am J Obstet Gynecol* 1993; 169:1091-1095.
7. Ngan HY, Miu P, Ko L, Ma HK. [Long-term neurological sequelae following vacuum extractor delivery](#). *Aust N Z J Obstet Gynaecol* 1990; 30:111-114.

NEONATAL SUBGALEAL HEMORRHAGE (SGH) FOLLOWING VACUUM EXTRACTION DELIVERY

Houchang D. Modanlou: **Neonatal Subgaleal Hemorrhage Following Vacuum Extraction Delivery**. *The Internet Journal of Pediatrics and Neonatology*. 2005. Volume 5 Number 2.

(For non-journal subscribers, an additional fee may apply for full text articles)

Article Options

[View journal abstract](#)

[View full article](#)



The Houchang article reviews the rare (or perhaps not so rare) complication of SGH related to vacuum extraction. As mentioned previously (and in [Curtin S](#), as cited in Houchang), the incidence of the estimated use of vacuum-assisted delivery has increased from 3.5% of deliveries to 5.9%. While several prospective and retrospective studies have examined the association between vacuum-assisted deliveries and the incidence of intracranial hemorrhages, there is a large discrepancy between the studies as to the true incidence. As cited in the article, a study by [Towner et al.](#) reported an incidence of 1 in 860 deliveries via vacuum extraction, while a study by [Plauche \(1\)](#) cited in the article found an incidence of 1 in 286 infants delivered by vacuum. Further, none of the studies report the incidence of SGH. However, another study by [Plauche](#) (referenced in Houchang's article), reported an incidence of SGH of 4/10000 spontaneous vaginal deliveries and 59/10000 vacuum-assisted deliveries.

Houchang's study reports 15 cases of SGH following vacuum assisted delivery, with two cases discussed in

detail. In one case, a 34-35 week 2200g female infant was delivered by vacuum extraction to a GBS + mother. Shoulder dystocia was noted. The 1-minute Apgar score was 2, the 5-minute Apgar 4, and the Apgar at 10 minutes was 6. The infant was admitted to the NICU with a diagnosis of septic shock with secondary disseminated intravascular coagulation (DIC). A large caput was noted to be mushy by the neonatologist. At 24 hours a neurosurgery consult diagnosed an SGH. The infant developed multi-system failure and later died.

The second case was a 37-week 3100g male infant who was delivered by vaginal delivery with forceps after numerous failed vacuum attempts. Bag mask ventilation at delivery was administered, and the Apgar score at 1 minute was 6, at 5 minutes 8, and at 10 minutes 9. The infant was sent to the newborn nursery. Initial hematocrit was 54% and after 6 hours was 41.7%. An examination by the attending neonatologist revealed severe cranial molding. The possibility of a cephalohematoma or SGH was entertained. The serum bilirubin at 35 hours was 8.3mg%. On discharge a nurse noted molding of the head with an elongated and misshapen head and puffy eyes. The child was seen again on day 4 of life. Repeat bilirubin was 30.6 mg%. Despite a double exchange transfusion, the infant developed seizure activity and neurosensory hearing loss.

Although the limitations of this report are due to personal clinical experiences, it illustrates the importance of training and experience in the recognition of this devastating complication. The authors also mention that lack of training by pediatricians, due to their limited time spent in the NICU, may be a contributing factor. The findings from these studies also highlight the difficulty in diagnosing an SGH. In both cases presented by Houchang, there was a delay in the diagnosis of SGH, which may have contributed to the catastrophic events. Further, SGH is often confused with caput succedaneum or cephalohematoma. As a general rule, a large elongated boggy head that persists longer than 24 hours should be diagnosed as SGH until otherwise proven.

The authors believe that SGH occurs more commonly than reported, and that early diagnosis and management are essential to avoid the devastating complications. They further reinforce that it is important for the obstetrician to inform neonatal personnel regarding the mode of delivery, and that neonatal staff be educated about the specific complications of vacuum devices. Further, neonatal healthcare personnel should evaluate the infant frequently in order to timely diagnose and institute appropriate therapy to avoid serious morbidity and neonatal death.

References:

1. Curtin S, Park M. [Trends in the Attendant, Place and Timing of Births, and the use of Obstetric Interventions: United States, 1989-97](#). National Vital Statistics Reports 47(18). National Center for Health Statistics 1999).
2. Towner D, Castro MA, Eby-Wilkens E, Gilbert WM. [Effect of mode of delivery in nulliparous women on neonatal intracranial injury](#). N Engl J Med 1999; 341:1709-1714.
3. Plauche WC (1). [Fetal cranial injuries related to delivery with the Malmstrom vacuum extractor](#). Obstet Gynecol 1979; 53:750-7.
4. Plauche WC. [Subgaleal haematoma: a complication of instrumental delivery](#). JAMA 1980; 244: 1597-1598.

SHOULDER DYSTOCIA

Gherman RB. **Shoulder dystocia: An evidence based evaluation of the Obstetrical Nightmare**. Clinical Obstetrics and Gynecology. 2002. Vol. 45. Number 2. 345-362.

(For non-journal subscribers, an additional fee may apply for full text articles)

Article Options

[View journal abstract](#)

[View full article](#)



ACOG Practice Bulletin. **Clinical management guidelines for obstetrician-gynecologists**. Number 40, November 2002. Shoulder Dystocia

Shoulder dystocia continues to represent the "infrequent, unanticipated, unpredictable nightmare" of the obstetrician. The articles published by ACOG and Gherman were observational reports with the goal of aiding practitioners in making appropriate decisions when dealing with obstetrical emergencies, and are particularly valuable because of the lack of randomized trials to guide clinicians with prevention, prediction, and management of these types of clinical situations.

According to the ACOG bulletin, shoulder dystocia is caused by the impaction of the anterior fetal shoulder behind the maternal pubis symphysis. It can also occur from impaction of the posterior fetal shoulder on the sacral promontory. Quoting [Resnik](#), the ACOG defines this condition as a delivery that requires additional obstetric maneuvers following gentle downward traction on the fetal head to effect delivery of the shoulders. The Gherman article, citing [Dignam](#), reports that the incidence ranges from 0.2 to 3% among vaginal deliveries of fetuses in the vertex presentation.

The articles published by ACOG and Gherman were observational reports with the goal of aiding practitioners in making appropriate decisions when dealing with obstetrical emergencies, and are particularly valuable because of the lack of randomized trials to guide clinicians with prevention, prediction, and management of these types of clinical situations.

According to the ACOG bulletin, shoulder dystocia is caused by the impaction of the anterior fetal shoulder behind the maternal pubis symphysis. It can also occur from impaction of the posterior fetal shoulder on the sacral promontory.

Taken together, Gherman and the ACOG Bulletin present the following list of predictors of shoulder dystocia:

PRE-PARTUM CONDITIONS

- maternal obesity
- previous delivery of a macrosomic infant
- preexisting or pregnancy induced DM
- Multiparity
- Previous delivery of infant with shoulder dystocia
- Excessive maternal weight gain
- Post dates

INTRAPARTUM CONDITIONS

- Labor induction
- Epidural anesthesia
- Operative vaginal deliveries
- Prolonged deceleration phase of labor
- Prolonged 2nd stage of labor
- Protracted descent of the fetus

Gherman concludes that preconception factors were poor predictors for shoulder dystocia, a finding further emphasized in the [Acker et al.](#) study cited by the ACOG Bulletin, where both diabetes and macrosomia accurately predicted only 55% of cases of shoulder dystocia.

Neonatal complications of shoulder dystocia listed by both the ACOG bulletin and Gherman include brachial plexus injuries, fractured clavicles and humerus fractures.

ACOG made the following recommendations:

- Shoulder dystocia cannot be predicted or prevented because accurate methods for identifying which fetuses will experience this complication do not exist.
- Elective cesarean section or elective induction of labor for all women suspected of carrying a fetus with macrosomia is not appropriate.
- A history of shoulder dystocia, estimated fetal weight, gestational age, maternal glucose intolerance, and severity of prior neonatal injury should be evaluated and the risks and benefits of cesarean section discussed with the patient.
- Cesarean section should be planned for fetal weights >4500g in women without diabetes and >4000g in women with diabetes.

References:

1. Resnik R. [Management of shoulder girdle dystocia](#). Clin Obstet Gynecol 1980; 23:559-64
2. Dignam WJ. [Difficulties in delivery, including shoulder dystocia and malpresentations of the fetus](#). Clin Obstet Gynecol.1976; 19:577-585.
3. Acker DB, Sachs BP, Friedman EA. [Risk factors for shoulder dissociation](#). Obstet Gynecol 1985; 66:762-8.

BRACHIAL PLEXUS INJURY (BPI) AND CLAVICULAR FRACTURES

ACOG Practice Bulletin. **Clinical management guidelines for obstetrician-gynecologists**. Number 40, November 2002. Shoulder Dystocia.

Kathleen Benjamin, RNC, MS, NNP, **Part 1. Injuries to the Brachial Plexus: Mechanisms of Injury and Identification of Risk Factors**. Advances in Neonatal care, Vol 5, No 4 (August), 2005: 181-189.

[Article Options](#)

[View journal abstract](#)



Kathleen Benjamin, RNC, MS, NNP, **Part 2. Distinguishing Physical Characteristics and Management of Brachial Plexus Injuries**. Advances in Neonatal Care, Vol 5, No 5 (October), 2005: 240-251.

[Article Options](#)

[View journal abstract](#)



Herbert F. Sandmire, M.D., and Robert K. DeMott, M.D. **Erb's Palsy Causation. Iatrogenic or resulting from labor forces?** J of Reprod Med 2005; 50:563-566.

[Article Options](#)

[View journal abstract](#)



McNeely PD, Drake JM. **Systemic review of brachial plexus surgery for birth-related brachial plexus injury**. Pediatr Neurosurg. 2003; 38; 57-62.

[Article Options](#)

[View journal abstract](#)



(For non-journal subscribers, an additional fee may apply for full text articles)

[View full article](#)





According to the ACOG bulletin, the overall incidence of brachial plexus injury (BPI) varies widely, ranging from 4% - 40 % for infants who were reported as having suffered shoulder dystocia during their birth. Of infants suffering from BPI, the majority involve the C5-C6 roots and led to Erb-Duchenne palsy, as reported in Part 2 of Kathleen Benjamin's article. Benjamin further notes that most of the cases of BPI will, with time, resolve without permanent disability, with the risk of permanent life-long disability ranging from between 5 to 25%.

As reported by both Sandmire and in Benjamin Part 1, continued controversy exists in the literature regarding the exact etiology of BPI. Previously, traction applied during the delivery process of large infants with shoulder dystocia had been implicated as the single most important cause. However, more recent studies suggest that the etiology is multi-factorial. The article by Sandmire is a literature review to determine whether there is direct evidence that Erb's palsy is caused by clinician-applied excessive lateral traction, or if maternal forces generated from uterine contractions and maternal pushing are etiological factors. The authors suggest that mechanical forces generated during the process of labor and delivery may indeed play a significant role. Their rationale is their finding that Erb's palsy appears in 50% of cases without evidence of shoulder dystocia; other reasons include the association of BPI with a rapid second stage in up to 40% of cases, as well the occurrence of BPI involving the posterior presenting arm at delivery in 33% to 39% of cases. The authors also found no association between the experience of the clinician and the development of BPI.

Because of the high spontaneous recovery of BPI, there is great interest in trying to select patients that will benefit from surgical intervention. Benjamin's review Part 2 provides the following conclusions:

- The higher the lesion, the better the spontaneous cure rate.
- Complete BPI involving all 5 roots (C5-T1) as well as BPI associated with "Horner syndrome" is an indication for surgical repair.
- Lack of biceps flexion at 2 months of age mandates referral to "a BPI center" and when recovery is not apparent by 3 months then most experts will agree to surgical intervention.

With regard to permanent BPI, there are currently no randomized control trials of conservative versus surgical treatment. McNeely et al (cited in the Benjamin Part 2 article) reported postoperative improvements of between 65% to 80%. In that study, the authors reviewed 23 papers on BPI with the objective of making recommendations for surgical intervention. Two prospective studies of relevance were found, one describing the natural history of birth-related brachial plexus injury, and one evaluating surgery for these patients (the remainder consisted of retrospective case series). Outcomes from surgical series were generally favorable (Level III and V evidence); however, no conclusive evidence showing a benefit of surgery over conservative management was found. Therefore, given the Level III and V evidence, surgery remains a valid practice option.

According to Rosenfeld et al, clavicular fractures are associated with 15% of cases with shoulder dystocia. Rosenfeld suggests that the most reliable sign aiding clinicians in the diagnosis of these injuries in the newborn is the ability to palpate the presence of an intact margin of the clavicles. The prognosis of these lesions is generally favorable.

In conclusion BPI still presents a major birth injury in obstetric practice. Its occurrence is often unpredictable and the indications for surgical repair are not always clear-cut.

[Complete Post Test and Receive CME/CE Credit](#)



[Recommend eNeonatal Review to a Colleague](#)



Ask the Authors

[Ask a Question about this Newsletter](#)

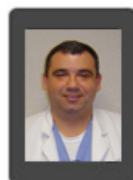


THIS MONTH'S Q & A June 2006 - Volume 3 - Issue 10



Commentary & Reviews:
Hilton M. Bernstein, M.D.

Assistant Professor
Division of Neonatology
Department of Pediatrics
University of Florida



Commentary & Reviews:
Juan C. Roig, M.D.

Assistant Professor
Division of Neonatology
Department of Pediatrics
University of Florida

We received the following question from one of our subscribers.



Regarding "deliveries in water": What is your experience and what does the literature say about related birth injuries and complications?

A Our personal experience with water births is limited, and the literature provides a wide difference in opinion with regard to related injuries. A retrospective review of the literature by Pinette et al, while not identifying an adequately controlled trial of delivery underwater compared with delivery in air, found 16 citations that described associated complications, including fresh water drowning, neonatal hyponatremia, neonatal waterborne infectious disease, cord rupture with neonatal hemorrhage, hypoxic ischemic encephalopathy, and death. The authors conclude that while water births may be associated with potential complications not seen with land deliveries, the rates of these complications are likely to be low and are not well defined. Conversely, an observational study by Geissbuehler et al looked at 9518 spontaneous singleton cephalic presentation births, of which 3617 were waterbirths and 5901 landbirths. The authors found fewer complications with regard to the infant and mother noted with waterbirths, and no deaths related to spontaneous labor. They conclude that waterbirths are associated with low risks for both mother and child when obstetrical guidelines are followed.

Reference:

1. Pinette MG, Wax J, Wilson E, [The risks of underwater births](#). AJOG, Vol 190, issue 5, May 2004; 1211-1215.
2. Geissbuehler V, Stein S, Eberhard J, [Waterbirths compared with landbirths: an observational study of nine years](#). J Perinat Med. 2004;32(4):308-4

The eNeonatal Review Team asked the June faculty a few questions.

Q Birth injuries and cerebral palsy (CP) are often blamed on poor obstetrical care. How does this impact on the expert witness called upon to give his or her opinion in these unfortunate cases?

A This is an extremely difficult task that in our opinion is often overshadowed by the emotional aspect associated with these cases. A four year study by Gaffney et al looked at the relation between suboptimal intrapartum obstetric care and cerebral palsy in the Oxford regional health authority; the authors found that neonatal encephalopathy only accounted for 6.8% of cases of cerebral palsy. Their conclusion: "there is an association between quality of intrapartum care and death as well as an association between suboptimal care and cerebral palsy, but this seems to have a role in only a small proportion of cerebral palsy". The authors also note that the contribution of adverse antenatal factors in the origin of cerebral palsy need further study.

Therefore, in our opinion, when evaluating these cases it is important to evaluate all the factors before concluding that the cause of the cerebral palsy is birth related.

Reference:

1. Gaffney G, Squier MV, Johnson A, [Case-control study of intrapartum care, cerebral palsy, and perinatal death](#). BMJ. 1994 Mar; 308(6931):743-50.

Q What are the most important criteria for defining the pathogenesis of neonatal encephalopathy as a cause of cerebral palsy?

A In a review by Hankins and Speer ([Defining the pathogenesis and pathophysiology of neonatal encephalopathy and cerebral palsy](#). Hankins GD, Speer M. Obstet Gynecol. 2003 Sep; 102(3):628-36.) they quote both The American College of Obstetricians and Gynecologists (ACOG) and the international cerebral palsy task force in identifying four essential criteria as a prerequisite to diagnosing an intrapartum hypoxic-ischemic insult as cause for moderate to severe neonatal encephalopathy that results in cerebral palsy. Importantly all four criteria must be present. They are:

1. Evidence of metabolic acidosis in fetal umbilical cord arterial blood obtained at delivery (pH<7 and a base deficit of 12mmol/L or more).
2. Early onset of severe or moderate neonatal encephalopathy in infants born at 34 weeks or more gestation.
3. Cerebral palsy of the spastic quadriplegic or dyskinetic type.
4. Exclusion of other identifiable etiologies, such as trauma, coagulation disorders, infectious conditions, or genetic disorders.

Complete Post Test and Receive CME/CE Credit 

Recommend eNeonatal Review to a Colleague 

Accreditation · [back to top](#)
Physicians

The Johns Hopkins University School of Medicine is accredited by the ACCME to provide continuing medical education for physicians.

Nurses

The Institute for Johns Hopkins Nursing is accredited as provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

Respiratory Therapists

Respiratory Therapists should [visit this page](#) to confirm that AMA PRA category 1 credit is accepted toward fulfillment of RT requirements.

Credit Designations • [back to top](#)

Physicians

The Johns Hopkins University School of Medicine designates this educational activity for a maximum of 1.0 *AMA PRA Category 1 Credit(s)*TM. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Nurses

This 1.0 contact hour (for each eNewsletter or a maximum of 6 contact hours for all twelve eNewsletters) Educational Activity (Provider/Directed) is provided by The Institute for Johns Hopkins Nursing.

Respiratory Therapists

Respiratory Therapists should [visit this page](#) to confirm that your state will accept the CE Credits gained through this program.

Target Audience • [back to top](#)

This activity has been developed for Neonatologists, NICU Nurses and Respiratory Therapists working with Neonatal patients. There are no fees or prerequisites for this activity.

Learning Objectives • [back to top](#)

At the conclusion of this activity, participants should be able to:

- Discuss the current research regarding operative vaginal delivery
- Discuss the current research regarding subgaleal hemorrhage following vacuum deliver
- Discuss current recommendations regarding communications between neonatal health care providers to anticipate, recognize, manage, and prevent brachial plexus and other birth injuries

Statement of Responsibility • [back to top](#)

The Johns Hopkins University School of Medicine and The Institute for Johns Hopkins Nursing takes responsibility for the content, quality, and scientific integrity of this CME/CNE activity.

Faculty Disclosure Policy Affecting CE Activities • [back to top](#)

As providers accredited by the Accreditation Council for Continuing Medical Education and American Nursing Credentialing Center's Commission of Accreditation, it is the policy of The Johns Hopkins University School of Medicine and The Institute of Johns Hopkins Nursing to require the disclosure of the existence of any significant financial interest or any other relationship a faculty member or a provider has with the manufacturer(s) of any commercial product(s) discussed in an education presentation. The presenting faculty reported the following:

- Dr. Nogee has indicated a financial relationship of grant/research support with Forest Laboratories and has received an honorarium from Forest Laboratories.
- Dr. Lawson has indicated a financial relationship of grant/research support from the NIH. He also receives financial/material support from Nature Publishing Group as the Editor of the Journal of Perinatology.
- Dr. Lehmann has indicated a financial relationship with the Eclipsys Corporation.

All other faculty have indicated that they have not received financial support for consultation, research, or evaluation, nor have financial interests relevant to this e-Newsletter.

Unlabelled/Unapproved Uses • [back to top](#)

No faculty member has indicated that their presentation will include information on off-label products.

Disclaimer Statement • [back to top](#)

The opinions and recommendations expressed by faculty and other experts whose input is included in this program are their own. This enduring material is produced for educational purposes only. Use of Johns Hopkins University School of Medicine name implies review of educational format design and approach. Please review the complete prescribing information of specific drugs or combination of drugs, including indications, contraindications, warnings and adverse effects before administering pharmacologic therapy to patients.

Internet CE Policy • [back to top](#)

The Offices of Continuing Education (CE) at The Johns Hopkins University School of Medicine and The Institute for Johns Hopkins Nursing are committed to protect the privacy of its members and customers. The Johns Hopkins University maintains its Internet site as an information resource and service for physicians, other health professionals and the public.

The Johns Hopkins University School of Medicine and The Institute For Johns Hopkins Nursing will keep your personal and credit information confidential when you participate in a CE Internet based program. Your information will never be given to anyone outside The Johns Hopkins University program. CE collects only the information necessary to provide you with the service you request.

Copyright

© JHUSOM, IJHN, and eNeonatal Review

Created by [DKBmed](#).

Name: This message was sent to the ([email](#)) email address because you signed up for the eNeonatal Review newsletter from Johns Hopkins. If you no longer wish to receive this newsletter, please [visit this page](#).
720 Rutland Avenue, Baltimore, MD 21205-2196