The role of the labor and delivery patient care team in the safe prevention of the primary cesarean delivery

SC Birth Outcomes Initiative
October 14, 2014

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Director, SC Birth Outcomes Initiative

DISCLAIMER

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This webinar is being recorded.

Healthy Connections

OBJECTIVES

- Describe the revised categorization of fetal heart rate tracings and discuss intrauterine resuscitation measures available to improve FHR tracing
- Understand criteria for first stage arrest of labor and role for artificial rupture of membranes
- Understand recent changes to the definition of arrest in the second stage and describe causes and treatment of fetal malpresentation.
- Describe the risk factors for and maneuvers to relieve shoulder dystocia
- Understand the utility of team simulation training and medicolegal concerns.

AGENDA

I. **Fetal Heart Rate Monitoring**
Scott Sullivan, MD, MSCR

II. **First Stage of Labor**
Chris Robinson, MD, MSCR

III. **Second Stage of Labor**
Ken Trofatter, MD, PhD

IV. **Shoulder Dystocia**
Ryan Laye, MD

VI. **Q & A**

VII. **Survey**

Healthy Connections

SPEAKING FETAL: INTRAPARTUM ASSESSMENT

Scott Sullivan, MD

Director, Maternal-Fetal Medicine
Department of Obstetrics and Gynecology
Medical University of South Carolina
Charleston

FETAL IS A FOREIGN LANGUAGE*

Latin
Russian
French
Fetal

Cannot practice obstetrics without becoming fluent in fetal

Roger Newman, MD*

How to translate?

FETAL ROSETTA STONE

"The fetus can be regarded as safe especially if reflex movements are accompanied by an obvious increase in the amplitude of oscillations in the fetal heart rate."

Hammacher, 1969

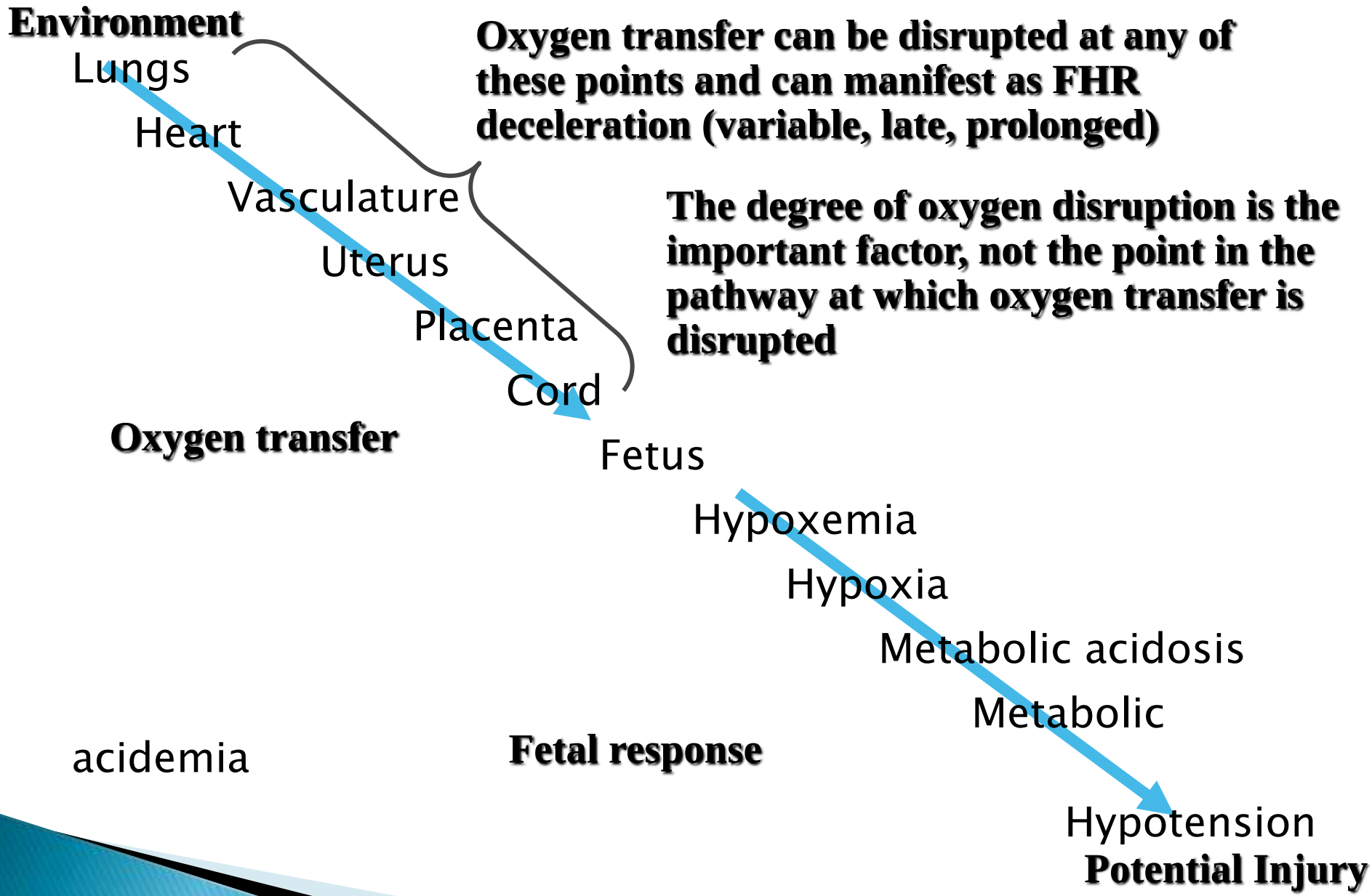
SPEAKING FETAL

Unfortunately, for the past 4 decades the lack of standardized training in FHR monitoring has lead :

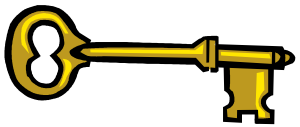
- Ill-defined, confusing terms
- Unsubstantiated theories
- Myths and urban legends passed down from generation to generation of OB providers
- Communication failures that jeopardize the safety of mothers and babies

SPEAKING FETAL

- Progress in standardization of FHR definitions: 1997 NICHD Consensus Conference Report (AJOG 1997; 177)
- Consensus definitions endorsed by:
  - ACOG – May 2005
  - AWHONN – May 2005
  - ACNM – Dec 2006
- First time that physicians, nurses, and midwives have agreed on language
- 2008 NICHD Workshop Report on EFM updated definitions and interpretation (OBGYN 2008; 112)


Environment
Lungs
Heart
Vasculature
Uterus
Placenta
Cord
Oxygen transfer
Fetus
Hypoxemia
Hypoxia
Metabolic acidosis
Metabolic
acidemia
Fetal response
Hypotension
Potential Injury
Oxygen transfer can be disrupted at any of these points and can manifest as FHR deceleration (variable, late, prolonged)
The degree of oxygen disruption is the important factor, not the point in the pathway at which oxygen transfer is disrupted

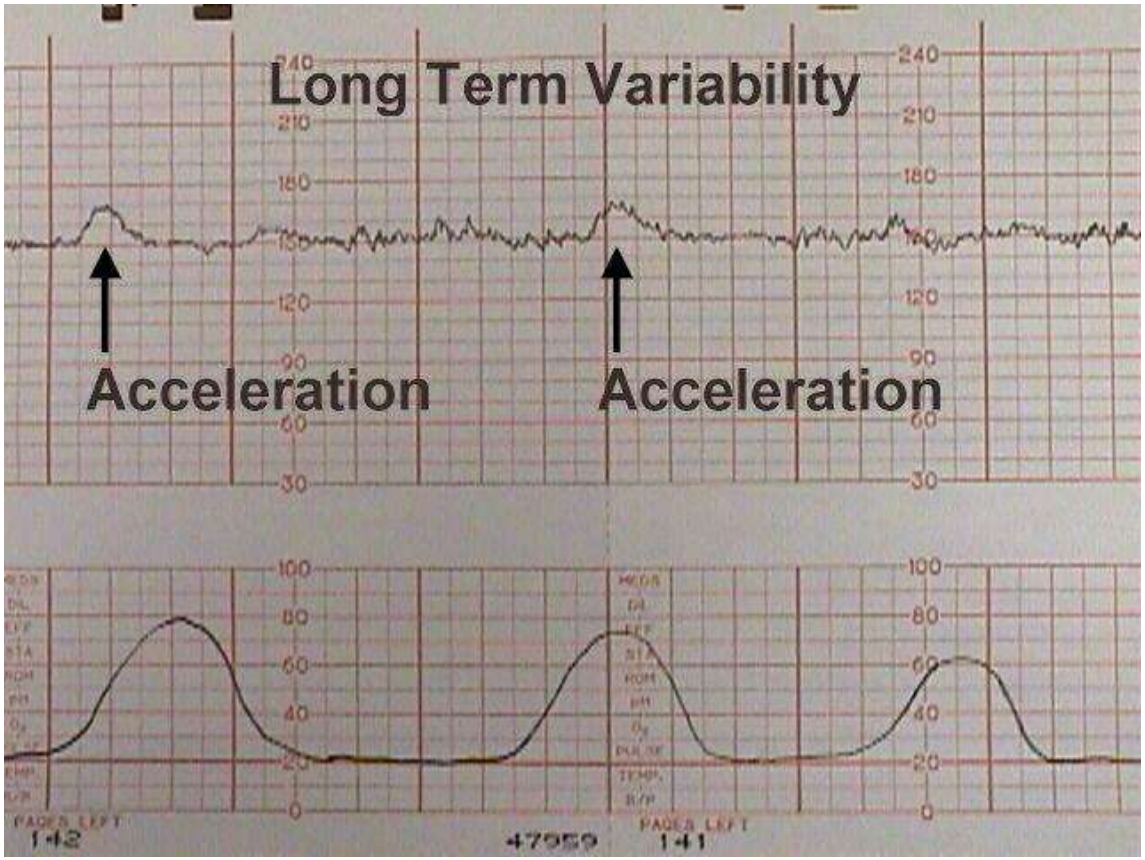
SPEAKING FETAL

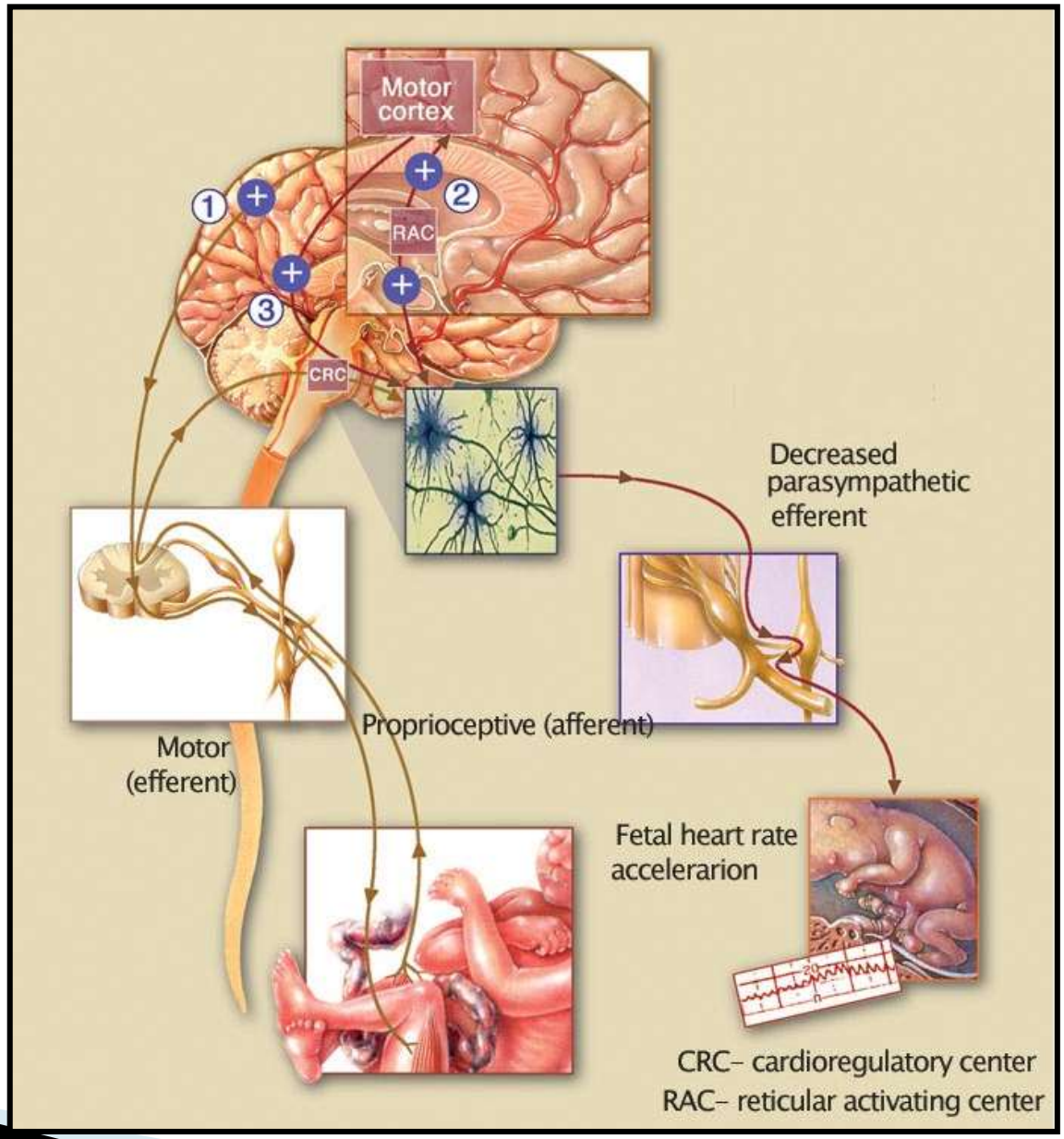


FHR accelerations are HIGHLY predictive of the absence of metabolic acidemia at the time they are observed

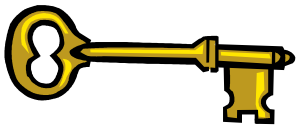
Clark SL Am J Obstet Gynecol 1982; 144:706-8
Clark SL Am J Obstet Gynecol 1984; 148:274-7
Smith CV Am J Obstet Gynecol 1986; 755;726-8
Edersheim TG Am J Obstet Gynecol 1987; 157:1557-60
Ingemarson I Br J Obstet Gynaecol 1989; 96:562-5
Skupski DW Obstet Gynecol 2002; 99:129-34

Acceleration




Motor cortex
RAC
CRC
1
2
3
Decreased parasympathetic efferent
Proprioceptive (afferent)
Motor (efferent)
Fetal heart rate accelerarion
CRC– cardioregulatory center
RAC– reticular activating center

SPEAKING FETAL



Moderate FHR variability is HIGHLY predictive of the absence of metabolic acidemia at the time it is observed

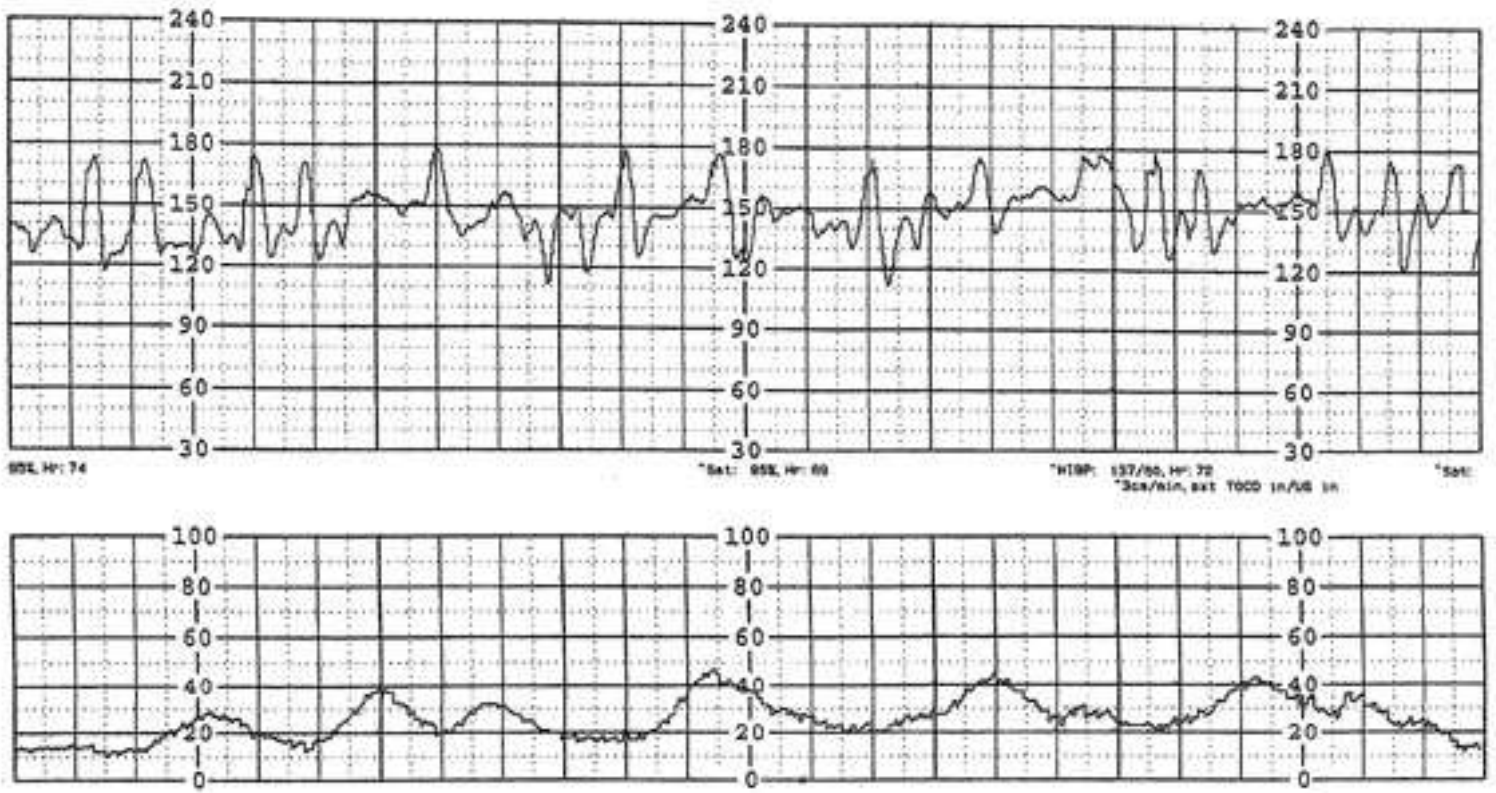
Parer JT J Maternal Fetal Neonatal Med 2006; 19:289-94
Low JA Obstet Gynecol 1999; 93:285-91
Williams KP Am J Obstet Gynecol 2003; 188:820-3
Elimian A Obstet Gynecol 1997; 89:373-6

FHR VARIABILITY

- Fluctuations in the baseline FHR that are irregular in amplitude and frequency
- Fluctuations are visually quantitated as the amplitude of the peak-to-trough in bpm
- Absent; minimal $\leq$ 5 bpm; moderate 6-25 bpm and marked $\geq$ 25 bpm FHR variability

AJOG 1997 : 177 ; OBGYN 2008 : 112

Fetal variability



MINIMAL FHR VARIABILITY

- CNS depressants: Narcotics, Barbiturates, Benzodiazapines, Sedatives, Alcohol
- Parasympatholytics: Phenothiazines, Atropine
- General anesthetics
- Magnesium sulfate
- Fetal tachycardia due to maternal fever or fetal infection
- Preexisting neurological injury
- Fetal acidosis/acidemia

INTRODUCTORY CONVERSATIONAL FETAL

You can ask the fetus 2 questions

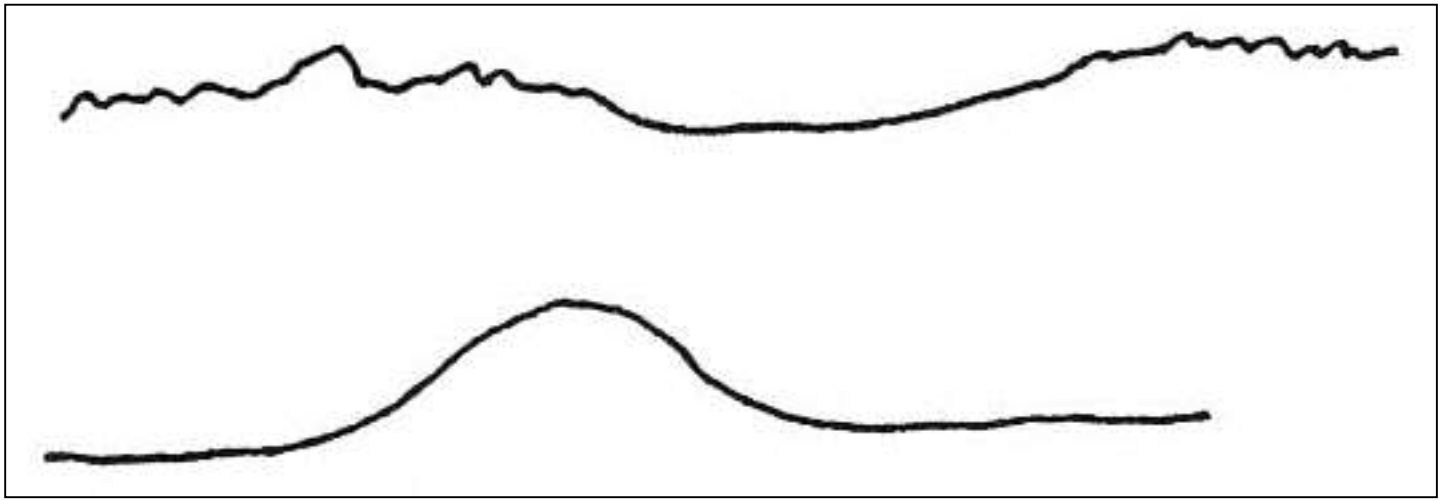
Do you have hypoxia?

Do you have acidemia?

DO YOU HAVE HYPOXIA?

- Late decelerations
- Variable decelerations
- Prolonged decelerations

LATE DECELERATION



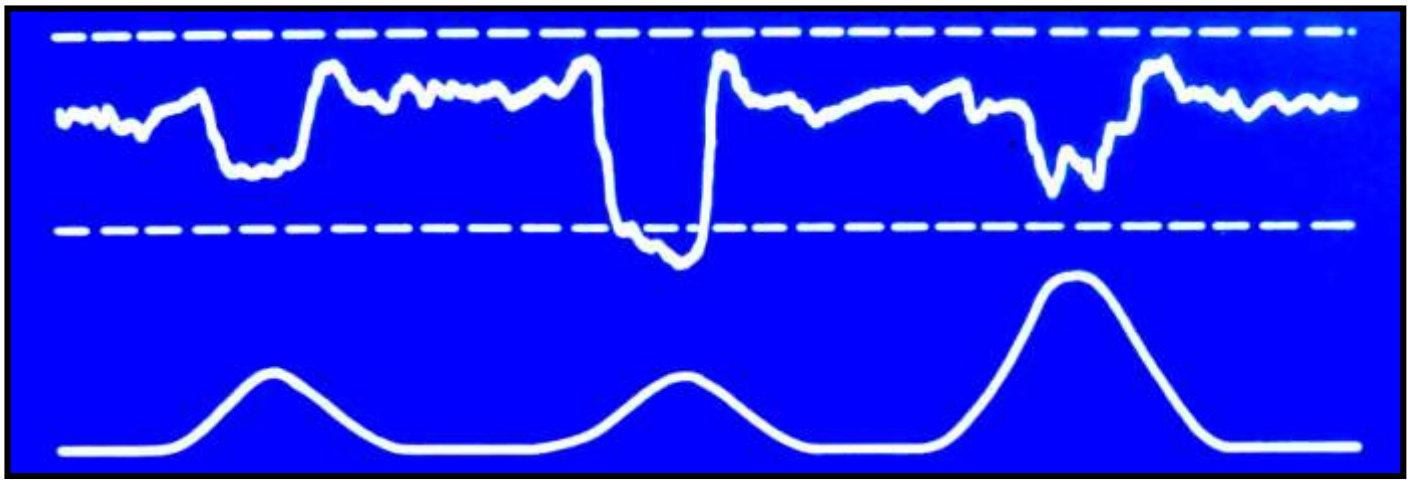
- Gradual (>30 sec onset to nadir) decrease in FHR
- Starts at the peak of the contraction; nadir and return to baseline delayed until after the peak of contraction
- Recurrent: Occur with >50% of contractions in 20 min
- Late decelerations reflect hypoxemia (utero-placental insufficiency)

AJOG 1997 : 177 ; OBGYN 2008 : 112

MANAGEMENT OF LATE DECELERATIONS

- Discontinued oxytocin
- Begin oxygen 5-6 L/min
- Correct maternal hypotension
  - Trendelenberg position
  - Increase IV fluids
  - Vasopressor (ephedrine 15 mg IV)
- Assess maternal oxygenation and acid/base status
- Terbutaline 0.25 mg SQ for in-utero resuscitation

VARIABLE DECELERATIONS



- Abrupt (< 30 sec onset to nadir) decrease in FHR
- Decrease in FHR > 15 bpm, lasts > 15 sec and < 2 minutes
- Inherently vary in shape, duration, depth and relationship to contractions
- Described without additional clarification of atypical features

AJOG 1997 : 177 ; OBGYN 2008 : 112

MANAGEMENT OF VARIABLE DECELERATIONS

- Discontinue oxytocin
- Vaginal exam: assess progress and rule out prolapsed cord
- Begin oxygen 5-6 L/min
- Change maternal positions
- If uterine activity causative consider terbutaline 0.25 mg SQ
- **Amnioinfusion if recurrent**

PROLONGED DECELERATION

Acute interruption of oxygen delivery to the fetus:

- Lungs – maternal apnea
- Heart – maternal bradycardia
- Vasculature – maternal hypotension (supine, epidural, hemorrhage)
- Uterus – rupture, tetanic contraction
- Placenta – abruption
- Cord – compression, prolapse

FHR PATTERNS AND PH VALUES

Group	FHR Patterns	Mean pH + S.D.	Samples
I	No deceleration	7.30 + 0.042	71
	Early deceleration	7.30 + 0.041	16
	Variables (mild)	7.29 + 0.046	42
II	Variables (moderate)	7.26 + 0.044	33
III	Lates (mild)	7.22 + 0.060	27
	Lates (moderate)	7.21 + 0.054	7
IV	Variables (severe)	7.15 + 0.069	10
	Lates (severe)	7.12 + 0.066	10

Kubli et al AJOG 1969

3-Tier FHR Interpretation System

Category I FHR tracings include ALL of the following:

- Baseline FHR 110-160 bpm
- Baseline FHR variability : moderate
- Late or variable decelerations: absent
- Early decelerations: present or absent
- Accelerations: present or absent
- “Normal”; no action required

3-Tier FHR Interpretation System

Category III FHR tracings include either:

- Absent FHR variability and ANY of the following: recurrent late or variable decelerations or bradycardia
- Sinusoidal pattern
- "Abnormal": predictive of abnormal acid-base status and requires prompt resolution or delivery

3-Tier FHR Interpretation System

Category II : all FHR tracings not categorizable as I or III

- Baseline rate: Bradycardia or Tachycardia not accompanied by absent variability
- Variability: Minimal or Marked variability or absent variability without deceleration
- Absence of induced accelerations after FSS

3-Tier FHR Interpretation System

Category II:

- Recurrent variables with minimal or moderate variability
- Recurrent lates with moderate variability
- Prolonged deceleration > 2 but < 10 min
- Variable decelerations with atypical features (overshoots, slow return)

3-Tier FHR Interpretation System

Category II FHR tracings are considered "indeterminate"

- Not predictive of abnormal fetal acid-base status but inadequate evidence to classify as Category I or III
- Requires evaluation and in-utero treatment if appropriate
- Requires continued surveillance and re-evaluation in context of clinical circumstances

Flaws in Tier System

- No solid evidence it is any better
- 85 % of labor strips are Cat II
- No malpractice relief
- Need more data!

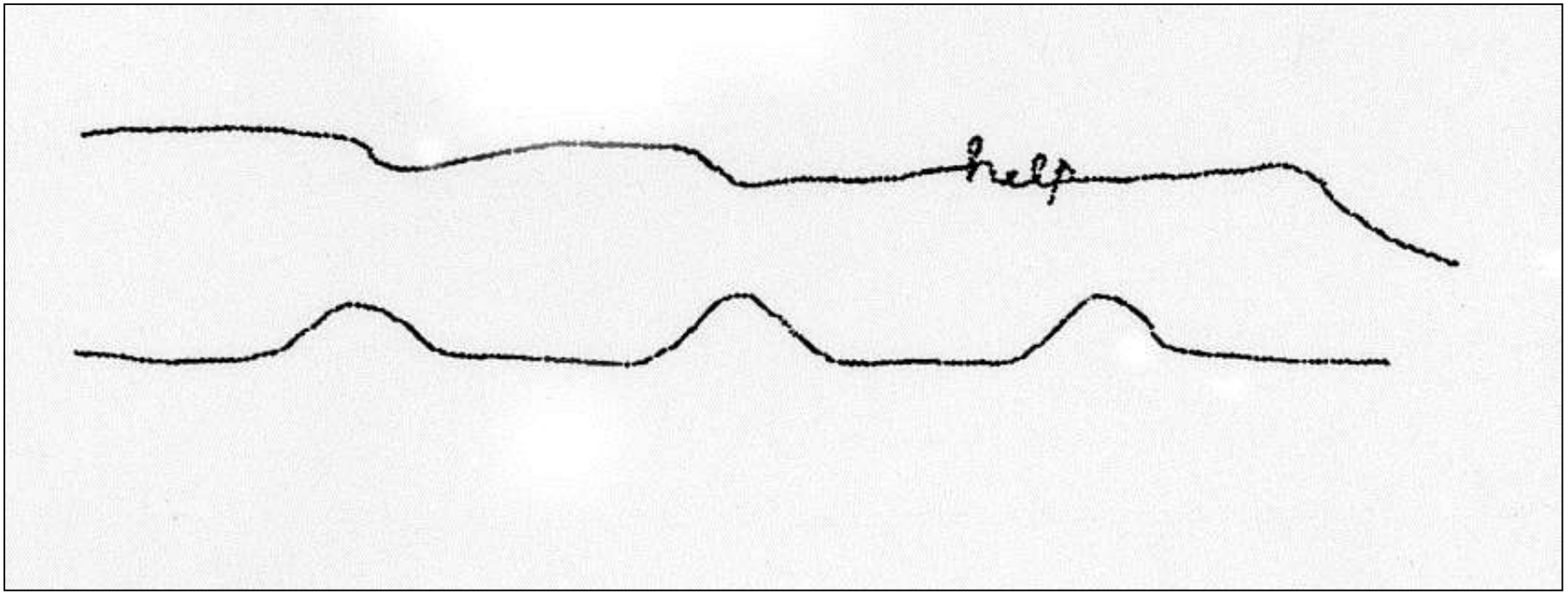
SPEAKING FETAL: NO ADJECTIVES OR ADVERBS

- Avoid imprecise terms
  - Fetus is “alert”
  - Fetus is “doing well”
  - Fetus is “happy”
- Specifically describe FHR changes/patterns
- Describe FHR patterns as reassuring or non-reassuring
- Hypoxia yes/no
- Acidosis yes/no

SPEAKING FETAL

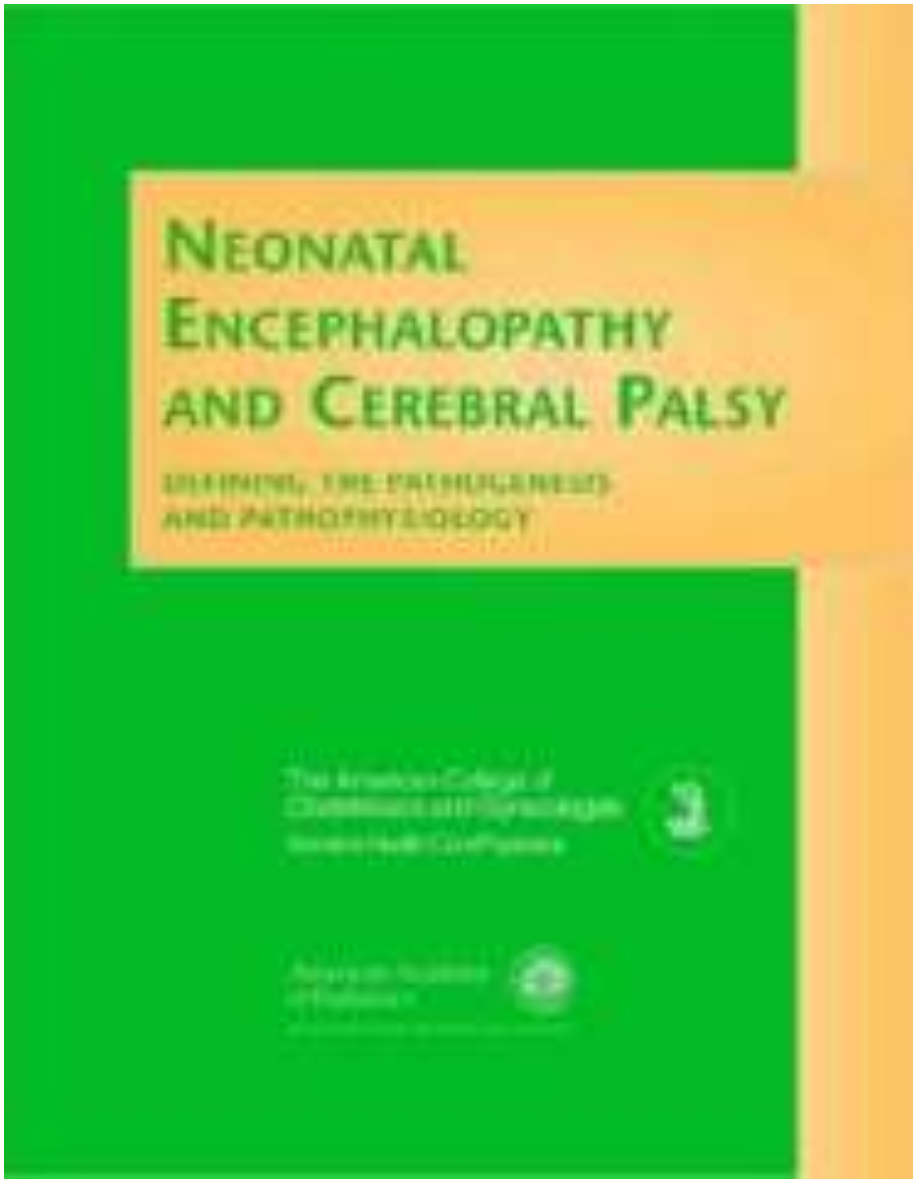
- Fetuses DO NOT LIE
- Fetuses sometimes speak in riddles
- Despite its whining, if the fetus says it's OK, it's OK
- Providers who better understand Fetal will have lower cesarean rates and improved outcomes

SPEAKING FETAL



Courtesy Roger Newman MD

In 2003, ACOG and the American Academy of Pediatrics (AAP) jointly published a monograph summarizing the medical literature regarding the relationship between neonatal encephalopathy and cerebral palsy.



A word about accreditation

- Likely coming soon
- Controversy about how to do it
- Cost
- Data

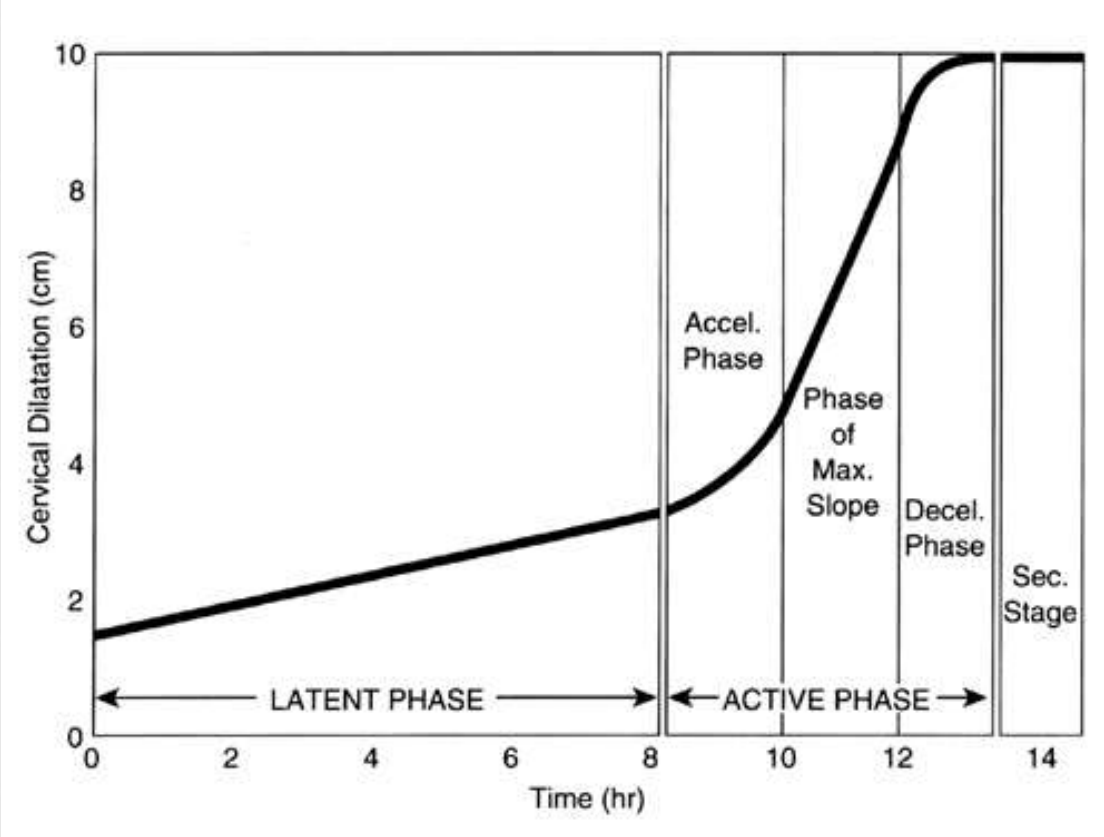
The First Stage of Labor: Guiding Vaginal Birth

Christopher Robinson, MD, MSCR
Associate Professor
Maternal Fetal Medicine
University of South Carolina School of Medicine

Learning Objectives

- Understand recent changes to the traditional Friedman curve
- Review criteria for first stage arrest of labor
- Application of artificial rupture of membranes in the management of the first stage of labor

Friedman Curve



Friedman E: Labor: Clinical Evaluation and Management, 2nd ed. New York, Appleton-Century-Crofts, 1978

Abnormal Labor - Friedman

Latent Phase

Prolonged

- **Nullipara = 20 hrs**
- **Multipara = 14 hrs**

Abnormal Labor - Friedman

Active Phase

- **Protraction**
  - **Nullipara = 1.2 cm/hr**
  - **Multipara = 1.5 cm/hr**
- **Arrest**
  - **Lack of cervical Δ for 2 hours in presence of adequate contractions and dilation of at least 4 cm**

Evidence based care of yesterday is not the same as evidence based care today.

- Significant changes in obstetrical population over past decade
  - Delayed childbearing / Increased maternal age
  - Increased maternal weight / obesity
  - Rising incidence of multiple gestation
  - Increased “intervention”
  - Reduced acceptance of VBAC
  - Litigation exposure

Evolution of Evidence Based L&D

- Consortium on Safe Labor
  - 12 Centers in the United States representing 19 hospitals
  - Friedman Curve followed for over ½ century
  - U.S. population and demographics changed significantly over time.
  - No change in labor rules / guidelines

Consortium on Safe Labor

- Friedman curve may no longer be appropriate for contemporary labor practice.

- New, evidence-based definitions of labor protraction and arrest are needed. Goals:
  - Describe contemporary labor progression in the U.S. population; and
  - Determine when is the more appropriate time to perform a cesarean delivery in women with labor protraction and arrest.

Obstet Gynecol 2010; 116:1281-7.

Contemporary Patterns of Spontaneous Labor With Normal Neonatal Outcomes

Jun Zhang, PhD, MD, Helain J. Landy, MD, D. Ware Branch, MD, Ronald Burkman, MD, Shoshana Haberman, MD, PhD, Kimberly D. Gregory, MD, MPH, Christos G. Hatjis, MD, Mildred M. Ramirez, MD, Jennifer L. Bailit, MD, MPH, Victor H. Gonzalez-Quintero, MD, MPH, Judith U. Hibbard, MD, Matthew K. Hoffman, MD, MPH, Michelle Kominiarek, MD, Lee A. Learman, MD, PhD, Paul Van Veldhuisen, PhD, James Troendle, PhD, and Uma M. Reddy, MD, MPH, for the Consortium on Safe Labor

- Objective: To use contemporary labor data to examine labor patterns in a modern U.S. obstetric population

- Consortium on Safe Labor Centers
  - Multicenter (n=19), retrospective analysis
  - Examined:
    - Normal neonatal outcomes (n=62,415)
    - Vertex singletons w/ spontaneous labor onset
    - Achieved vaginal delivery

Obstet Gynecol 2010; 116:1281-7.

Contemporary Patterns of Spontaneous Labor With Normal Neonatal Outcomes

- Women were grouped by parity.
- Median time and 95% CI were calculated for each dilatory point (defining normal labor)
- Multipara labor curve started at 5 since most presented at this level of dilation.
- Median cervical dilation by parity:
  - 0 = 4 cm
  - 1 = 4.5 cm
  - 2 = 5 cm

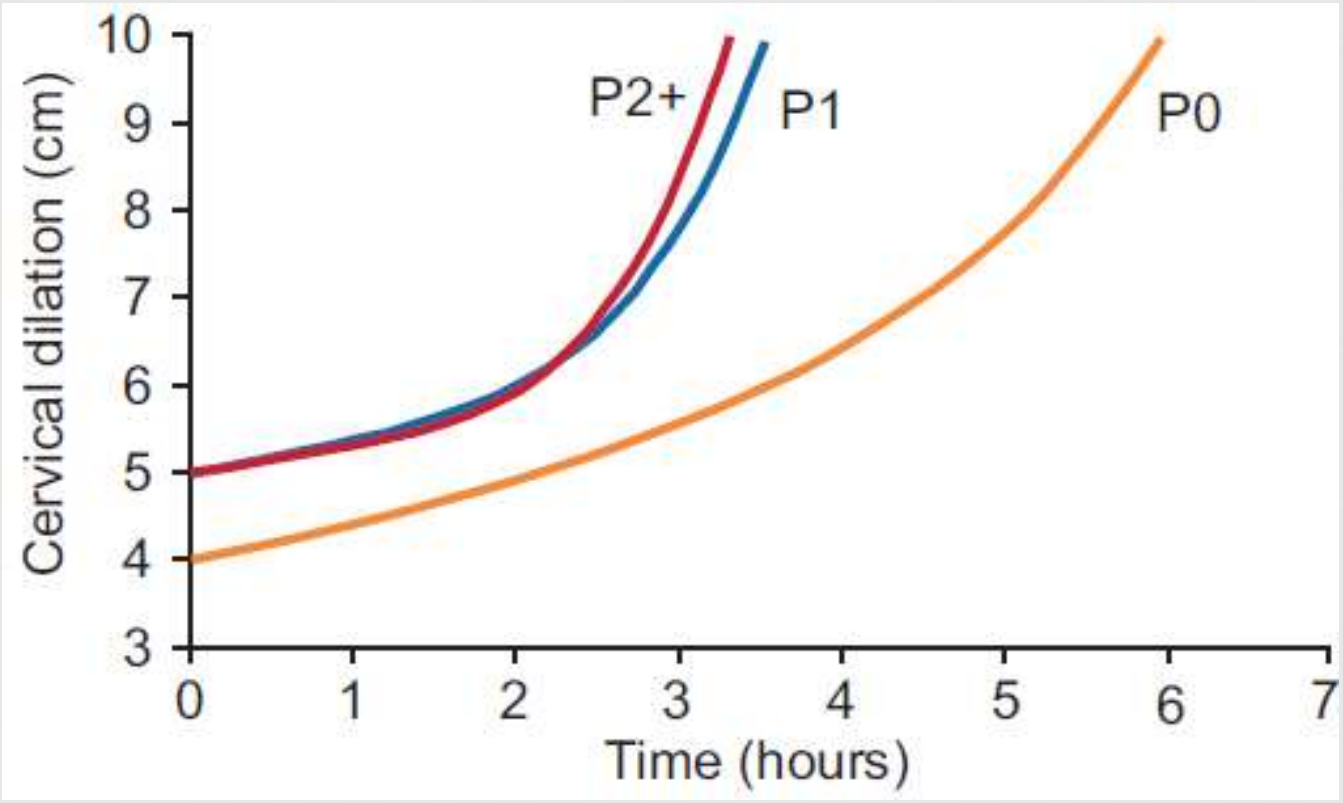
Obstet Gynecol 2010; 116:1281-7.

Contemporary Patterns of Spontaneous Labor With Normal Neonatal Outcomes

- Baseline trends in population studied:
  - Increasing parity → increased maternal age and BMI
  - Oxytocin augmentation was used in 50% of cases.
  - Epidural used in 80% of cases
  - Median number of exams (admit to 10 cm):
    - 5 for nulliparas
    - 4 for multiparas

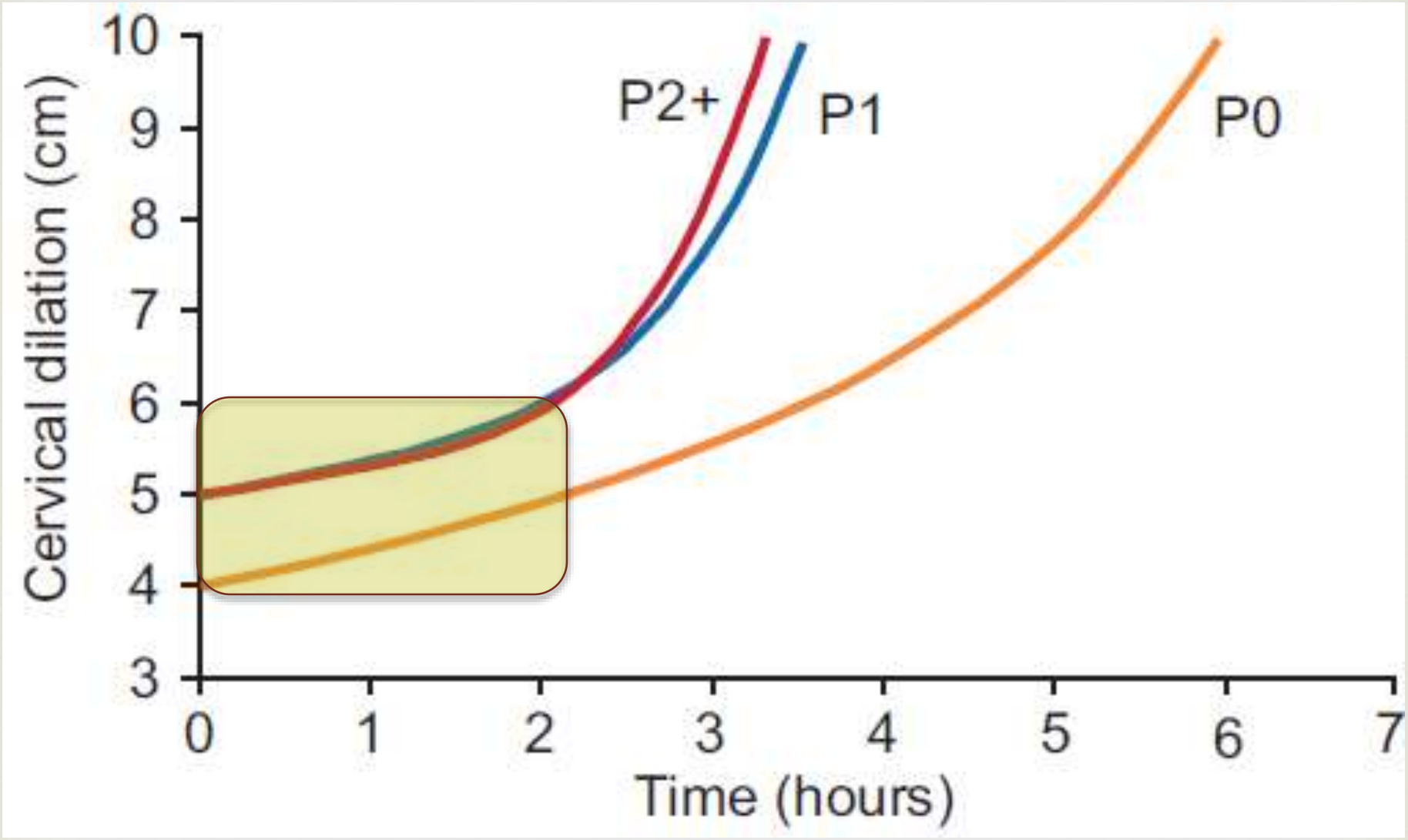
Obstet Gynecol 2010; 116:1281-7.

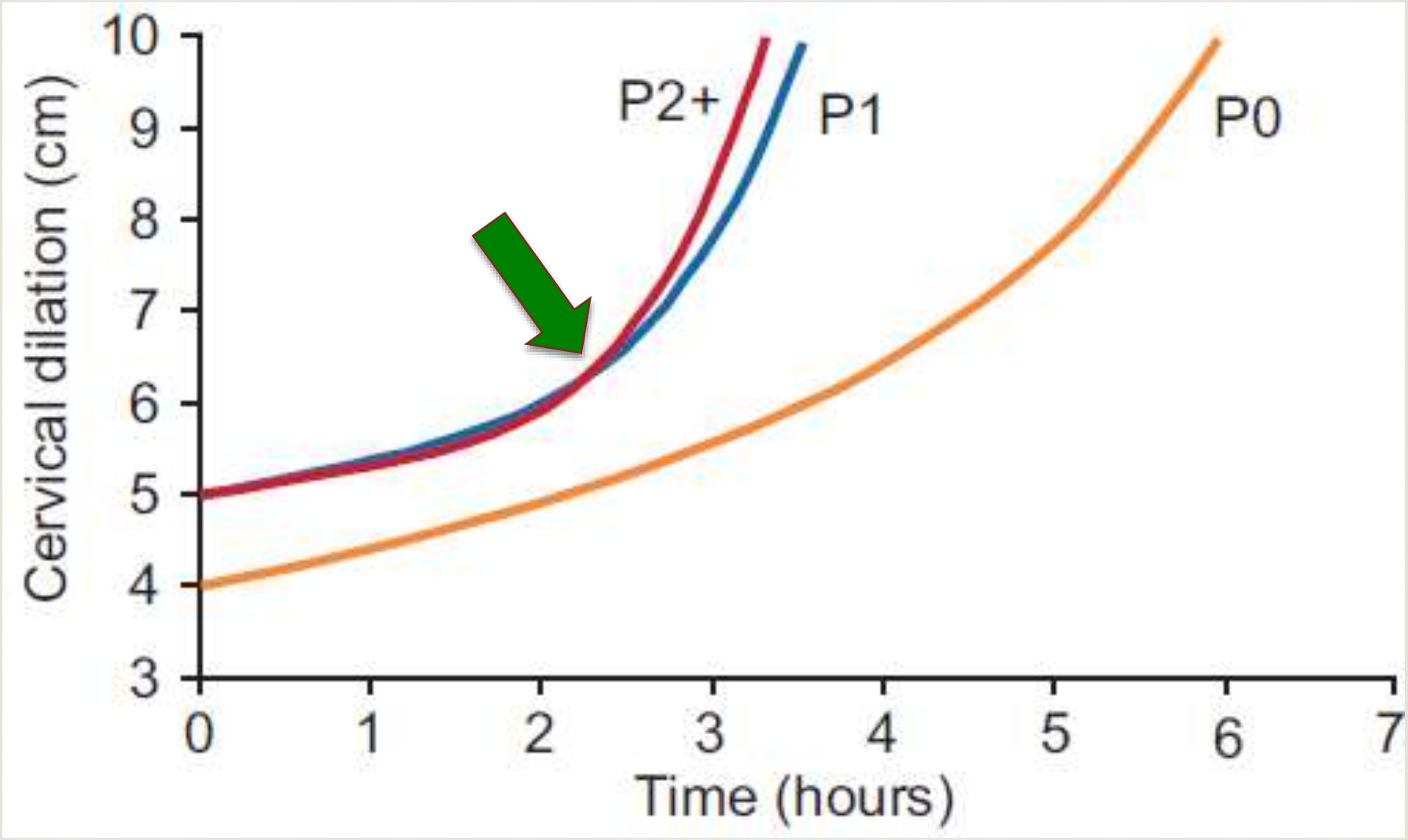
Contemporary Patterns of Spontaneous Labor With Normal Neonatal Outcomes



Average labor curves by parity in singleton term pregnancies with spontaneous onset of labor and vaginal delivery

Obstet Gynecol 2010; 116:1281-7.


Cervical dilation (cm)
10
9
8
7
6
5
4
3
P2+
P1
P0
0
1
2
3
4
5
6
7
Time (hours)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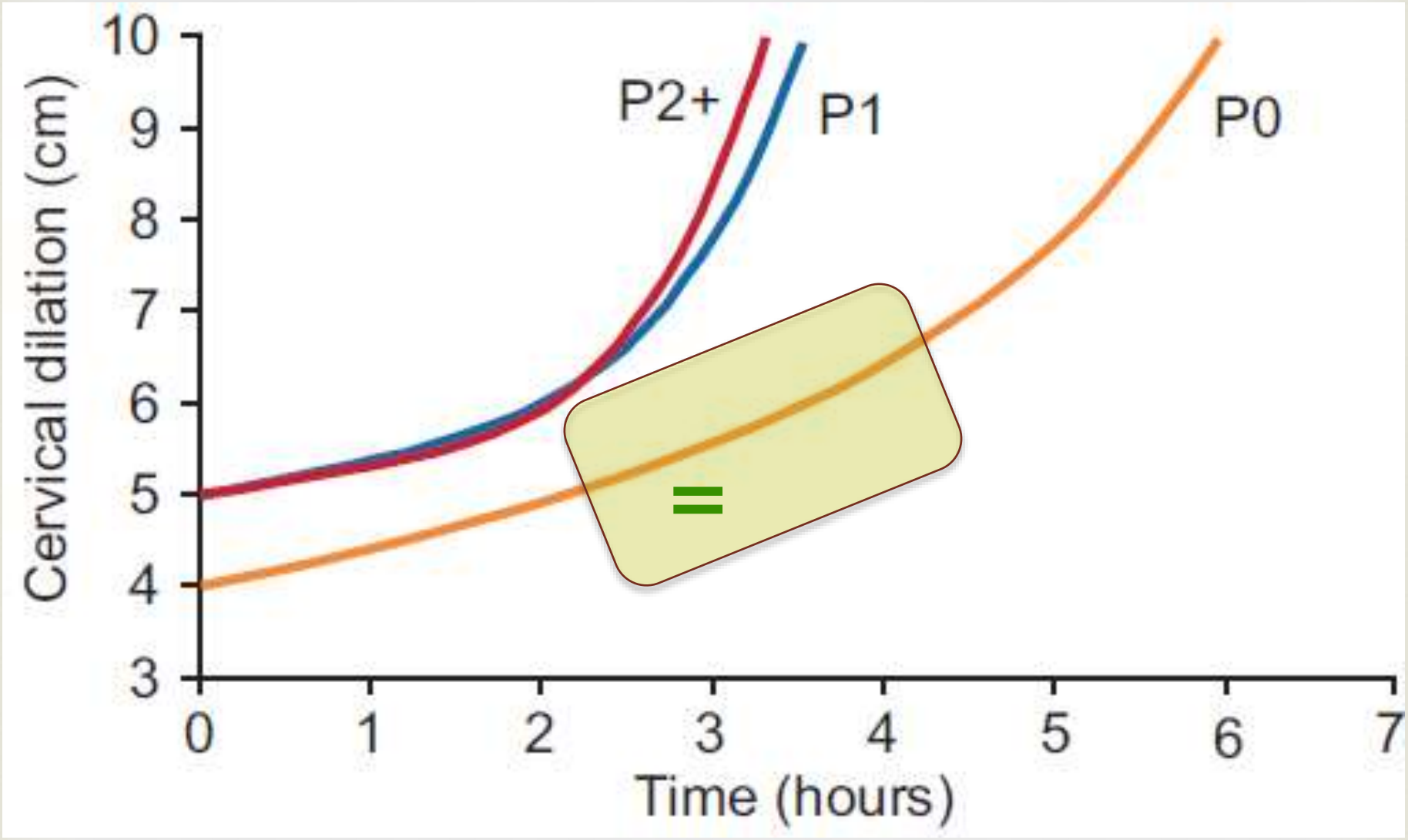
6
7
Time (hours)


Cervical dilation (cm)
10
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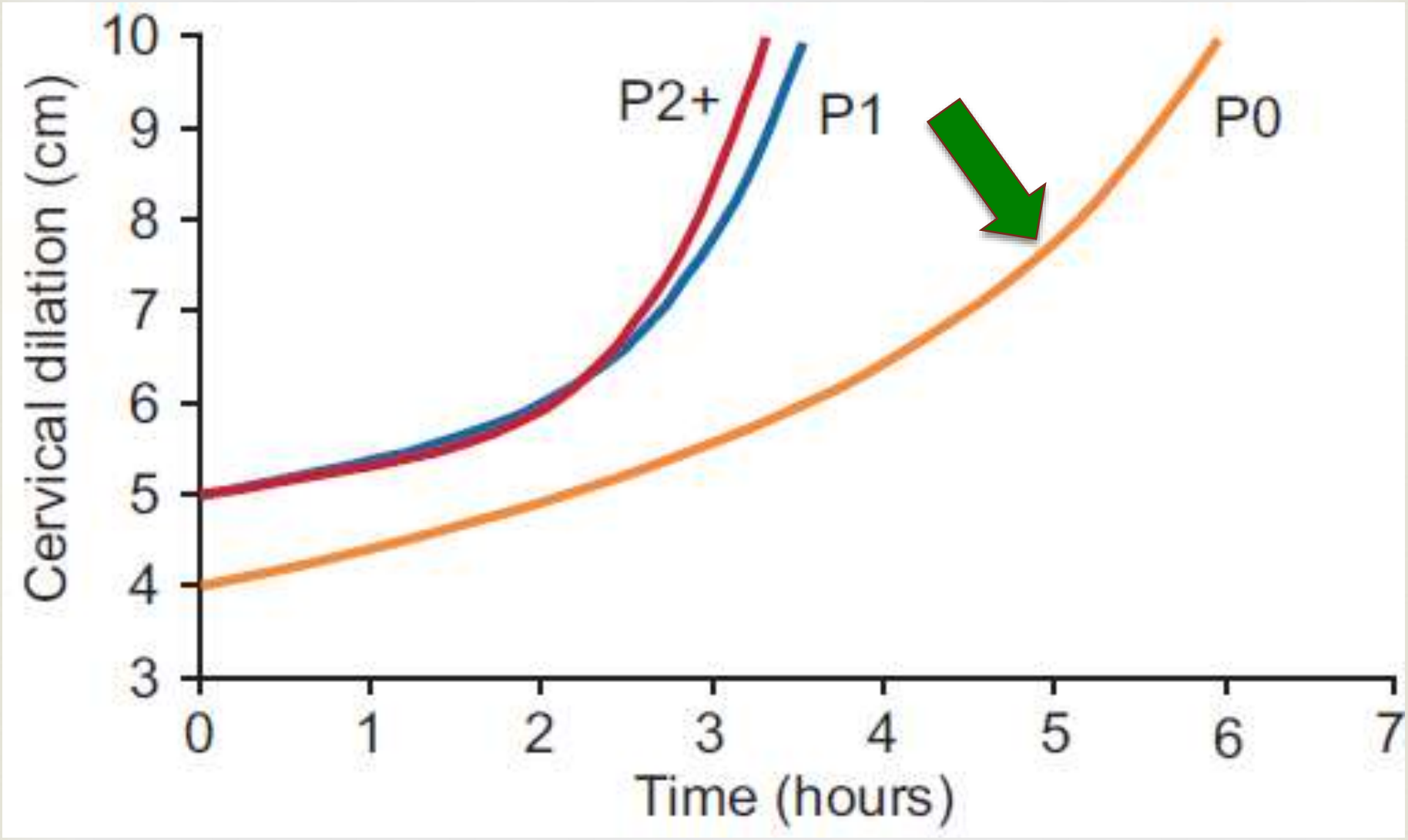
6
7
Time (hours)


Cervical dilation (cm)
10
9
8
7
6
5
4
3
P2+
P1
P0
0
1
2
3
4
5
6
7
Time (hours)

Duration of Labor in Hours by Parity

- Labor may take more than 6 hours to progress from 4 to 5 cm.
- Labor may take more than 3 hours to progress from 5 to 6 cm.

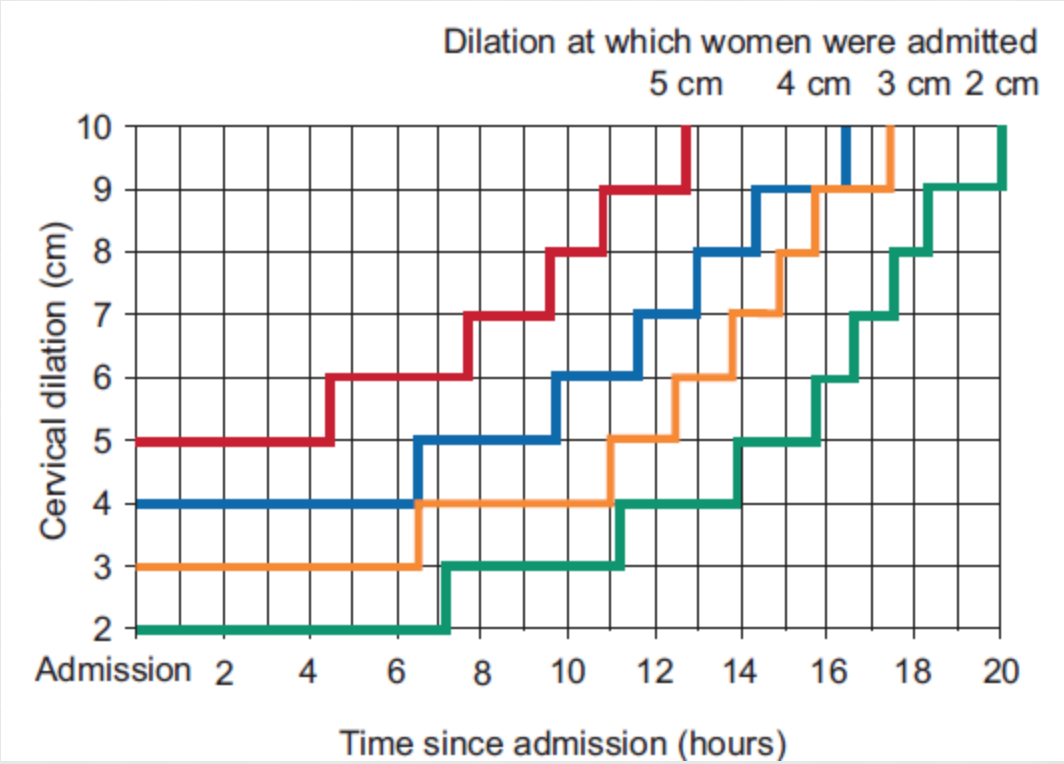
Cervical Dilation (cm)	Parity 0 (n=25,624)	Parity 1 (n=16,755)	Parity 2+ (n=16,219)
3–4	1.8 (8.1)	—	—
4–5	1.3 (6.4)	1.4 (7.3)	1.4 (7.0)
5–6	0.8 (3.2)	0.8 (3.4)	0.8 (3.4)
6–7	0.6 (2.2)	0.5 (1.9)	0.5 (1.8)
7–8	0.5 (1.6)	0.4 (1.3)	0.4 (1.2)
8–9	0.5 (1.4)	0.3 (1.0)	0.3 (0.9)
9–10	0.5 (1.8)	0.3 (0.9)	0.3 (0.8)
Second stage with epidural analgesia	1.1 (3.6)	0.4 (2.0)	0.3 (1.6)
Second stage without epidural analgesia	0.6 (2.8)	0.2 (1.3)	0.1 (1.1)

Data are median (95th percentile).

Obstet Gynecol 2010; 116:1281-7.

Duration of labor in nulliparas by cervical exam at admission – 95%iles

- Normal labor progress is defined by starting point given that labor is not a linear function from 4 cm.
- Any deviation to the right of the 95%ile line is labor arrest given normal uterine activity

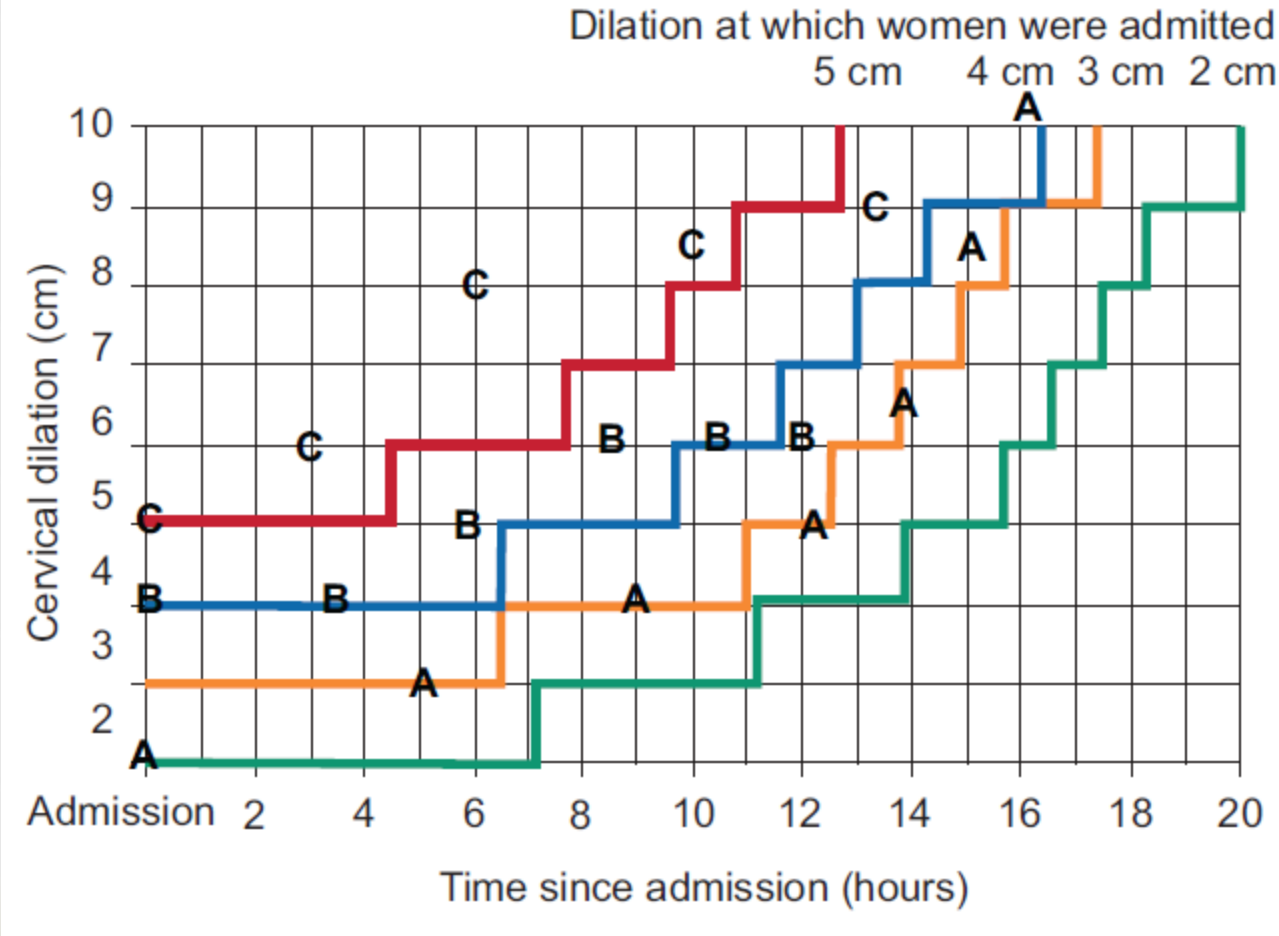


Obstet Gynecol 2010; 116:1281-7.

Labor progression example based on initial cervical exam at admission

Admission:
A – 2 cm
B – 4 cm
C – 5 cm

Labor:
A – normal
B – arrested 6 cm
C – arrested 9 cm



Obstet Gynecol 2010; 116:1281-7.

Implementing Best Practices
"The Safe Prevention of the First Cesarean"

- Slow but progressive labor in the first stage of labor should rarely be an indication for cesarean delivery

- Six centimeters defines the active phase in most laboring women.
  - Active phase standards not applicable prior to 6 cm
  - Implement new Labor Curve definition

What has changed over the past 50 years?

Collaborative Perinatal Project (1959-1966)
N=39,491

Consortium on Safe Labor (2002-2008)
N=98,359

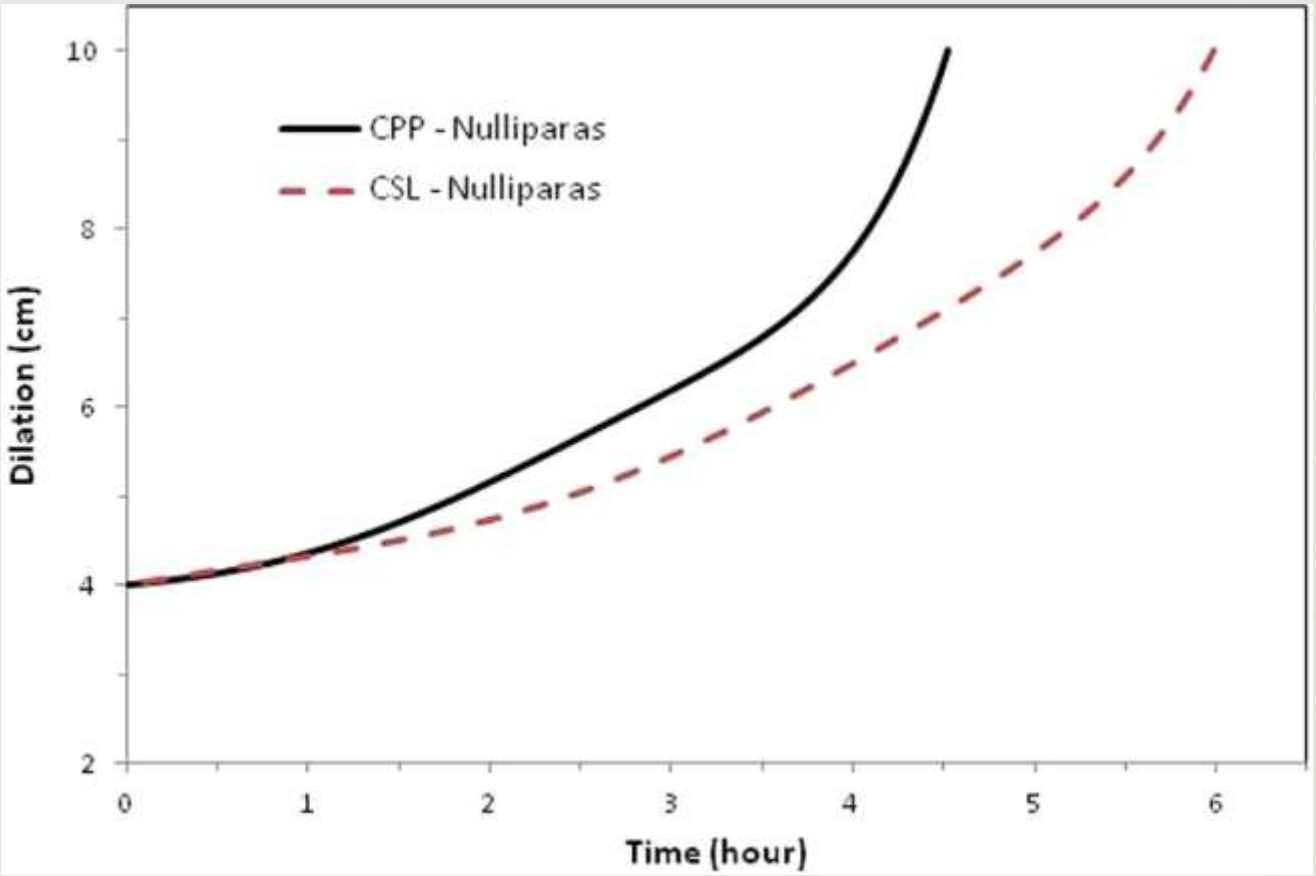
	CPP (1959-1966)	CSL (2002-2008)
Age	24.1 years	26 .8 years
BMI	26.3	29.9
Epidural use	4%	55%
Oxytocin use	12%	31%
Cesarean	3%	12%
Length of first stage Nulliparas Multiparas	 Referent Referent	 +2.6 hours +2.0 hours
Birthweight Nulliparas Multiparas	 Referent Referent	 +113 grams +117 grams

Am J Obstet Gynecol May 2012; 206(5):419.e1-419.e9

Average Labor Curve of Nulliparas

CPP: 1959-66

CSL: 2002-08

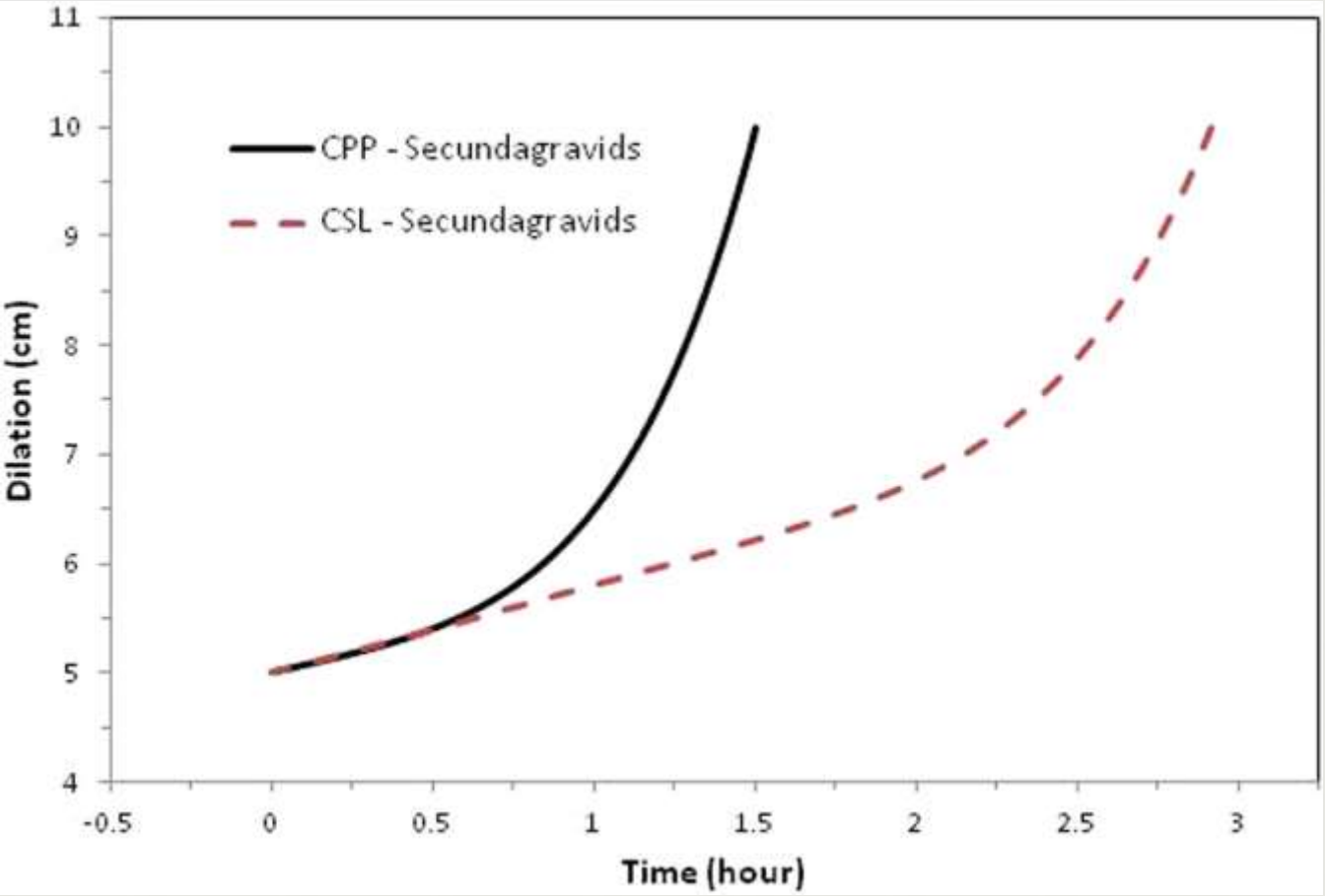


Am J Obstet Gynecol May 2012; 206(5):419.e1-419.e9

Average Labor Curve of Secundagravids (P1)

CPP: 1959-66

CSL: 2002-08

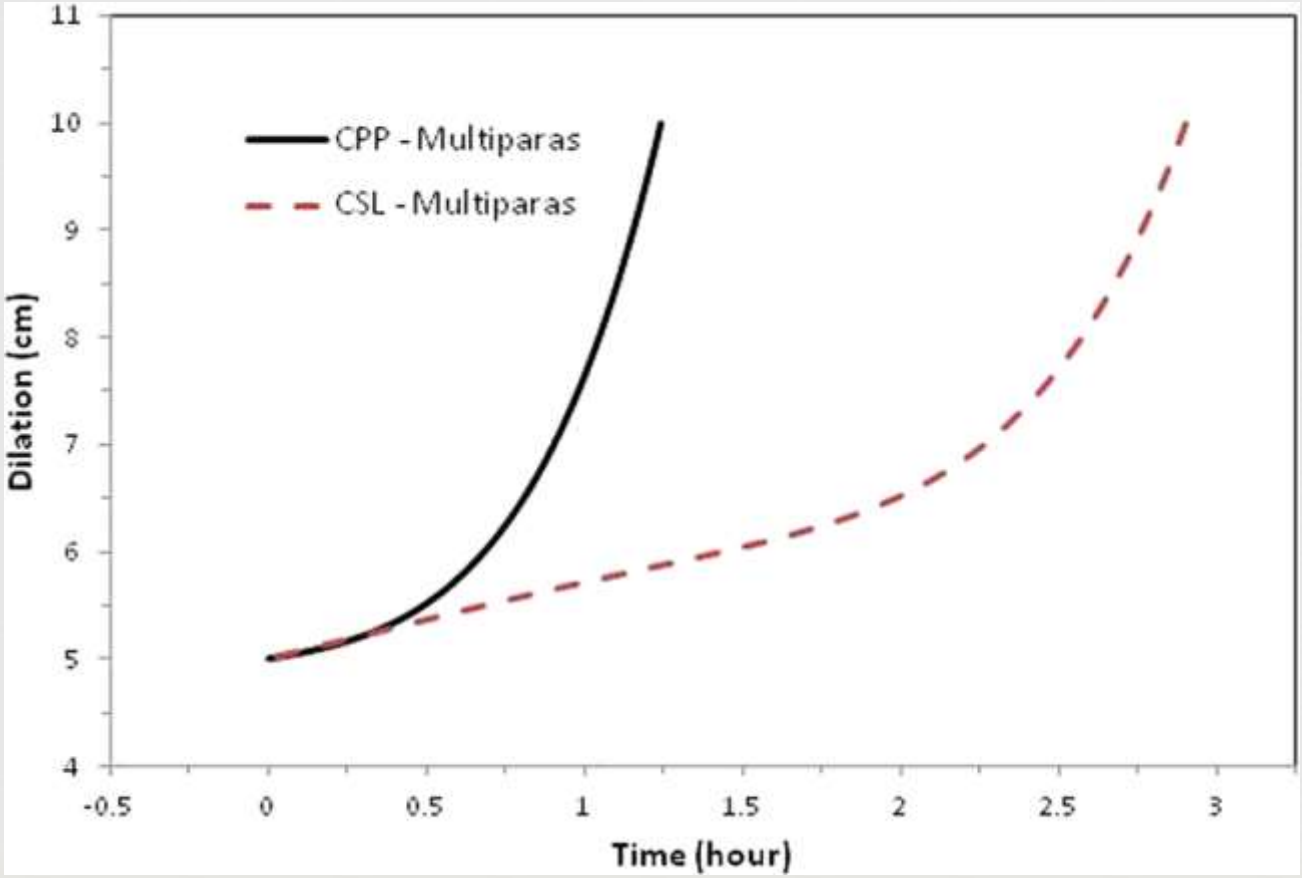


Am J Obstet Gynecol May 2012; 206(5):419.e1-419.e9

Average Labor Curve for Multiparas

CPP: 1959-66

CSL: 2002-08



Am J Obstet Gynecol May 2012; 206(5):419.e1-419.e9

Role of Amniotomy in Labor Management

- Effective in labor augmentation and induction.
- Benefits are seen among both nulliparas and multiparas
- Requirements:
  - Dilation of cervix
  - Engaged fetal vertex – well applied
  - Absence of funic presentation / vasa previa / placenta previa

Amniotomy + Oxytocin for IOL

- Amniotomy alone:
  - No increase in cesarean (RR 0.87 [0.73, 1.05]
  - No increase in chorioamnioitis
  - Duration of labor – no effect
  - No increase in abnormal FHR tracing
- Early amniotomy with early oxytocin reduced duration of first stage of labor (-1.57 hours [-2.14, -1.01)
  - Reduces first stage abnormalities of labor
  - No adverse neonatal effects seen

Cochrane Library 2013: Early amniotomy and early oxytocin for prevention of, or therapy for, delay in first stage spontaneous labour compared with routine care

Safe Prevention of the Primary Cesarean Delivery

- "Membrane rupture and oxytocin administration, except in rare circumstances, should be considered prerequisites to any definition of failed labor induction, and experts have proposed waiting at least 24 hours in the setting of oxytocin and ruptured membranes before declaring an induction failed."

Safe prevention of the primary cesarean delivery. Obstetric Care Consensus No. 1. American College of Obstetricians and Gynecologists. Obstet Gynecol 2014;123:693–711

Defining the Failed IOL

- Failure to generate regular (e.g. every 3 minutes) contractions and cervical change after at least 24 hours of oxytocin administration, with artificial membrane rupture if feasible.

Preventing the First Cesarean Delivery: Summary of a Joint Eunice Kennedy Shriver National Institute of Child Health and Human Development, Society for Maternal-Fetal Medicine, and American College of Obstetricians and Gynecologists Workshop; Obstet Gynecol. Nov 2012; 120(5): 1181–1193.

Defining First Stage Arrest

Spontaneous Labor

- ≥ 6cm dilation with membrane rupture and labor

Induced Labor

- ≥ 6cm dilation with membrane rupture or ≥ 5cm without membrane rupture and labor

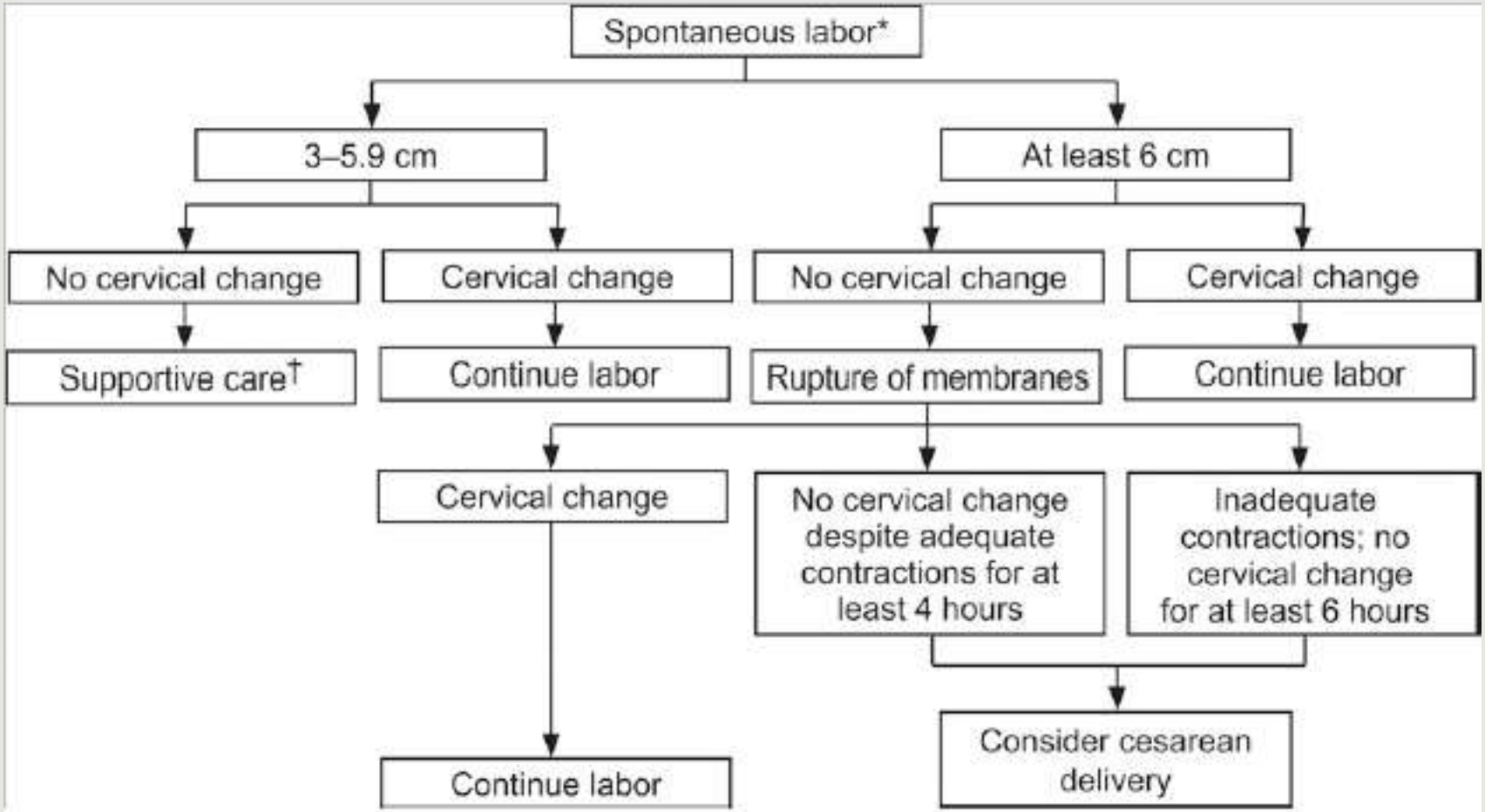
Labor:

≥ 4 hours of adequate contractions (eg >200 Montevideo units), or

≥ 6 hours if contractions inadequate with no cervical change

Obstet Gynecol. Nov 2012; 120(5): 1181–1193.

Algorithm – Spontaneous Labor

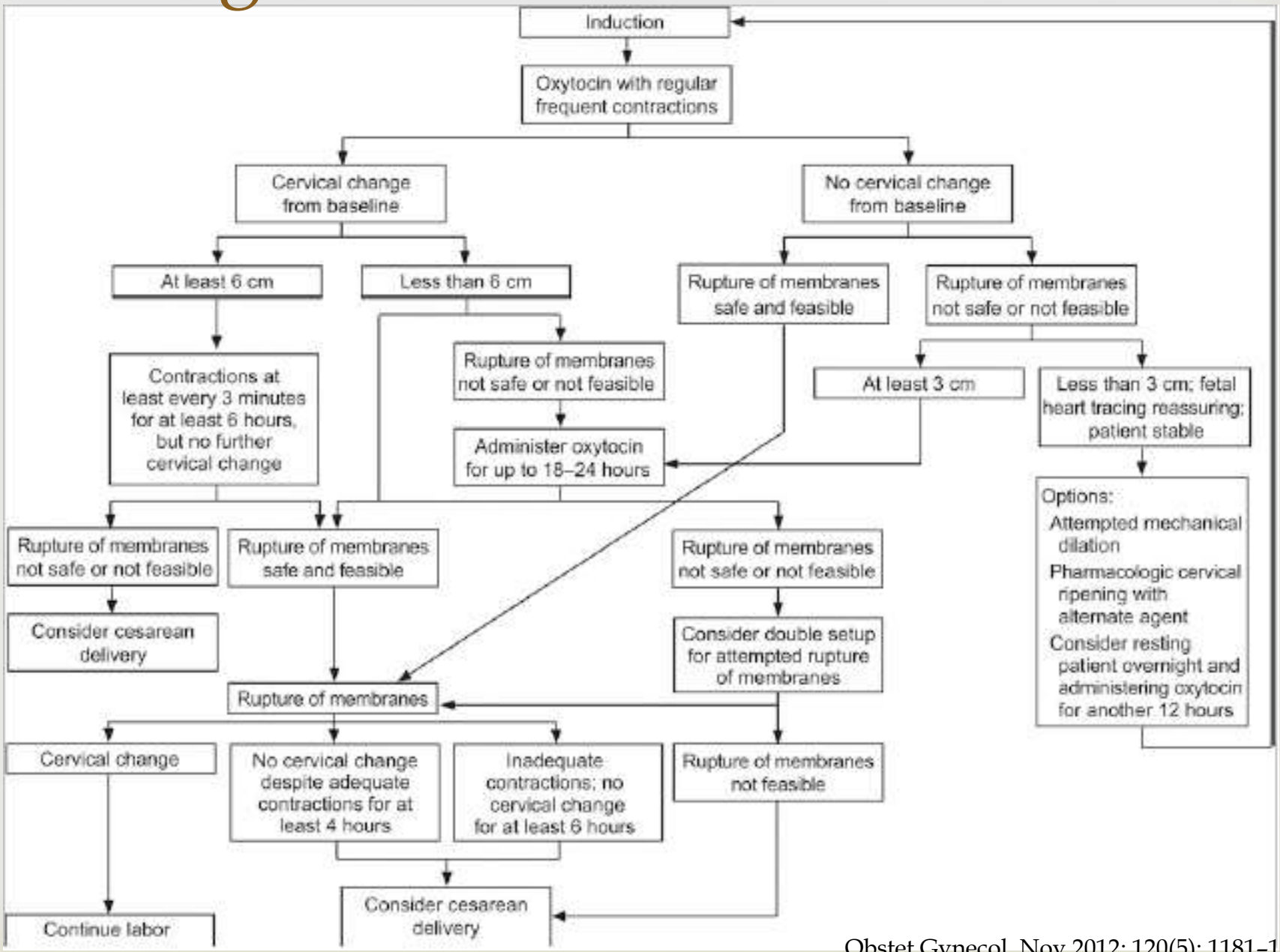


Algorithm for spontaneous labor. *Try not to admit unless at least 3 cm dilated.

†Expectant management; no need for intervention.

Obstet Gynecol. Nov 2012; 120(5): 1181–1193.

Algorithm – Induced Labor



Obstet Gynecol. Nov 2012; 120(5): 1181–1193.

Supporting vaginal birth:

- Utilizing modern labor curves in labor management
- Adequate time allowed for first stage of labor based on modern labor curve.
- 6 cm = the new active phase starting point
- 24 hours of IOL with oxytocin/AROM (if possible)
- Preventing the first cesarean delivery –greatest risk factor for cesarean is a prior history of cesarean

Management of the Second Stage Of Labor

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Division of Maternal-Fetal Medicine
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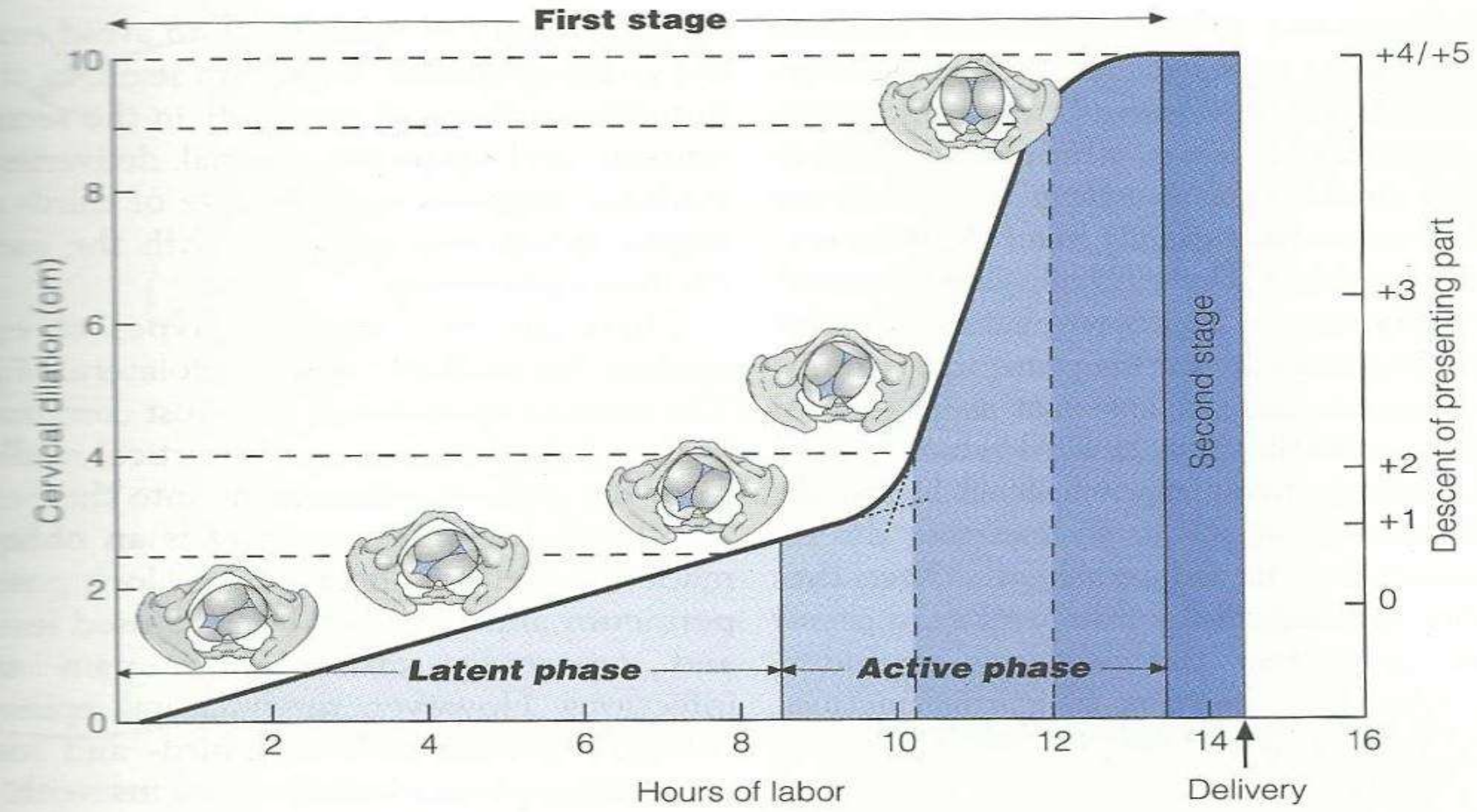
Goals

- Define ***current norms*** for the 2nd stage of labor
- Discuss ***routine care*** that can increase the probability of vaginal delivery
- Discuss factors that may contribute to a ***protracted 2nd stage***
- Discuss ***management options*** in a complicated or protracted 2nd stage
- Discuss the potential resurrection of ***operative obstetrics*** as a means of safely reducing the need for cesarean delivery

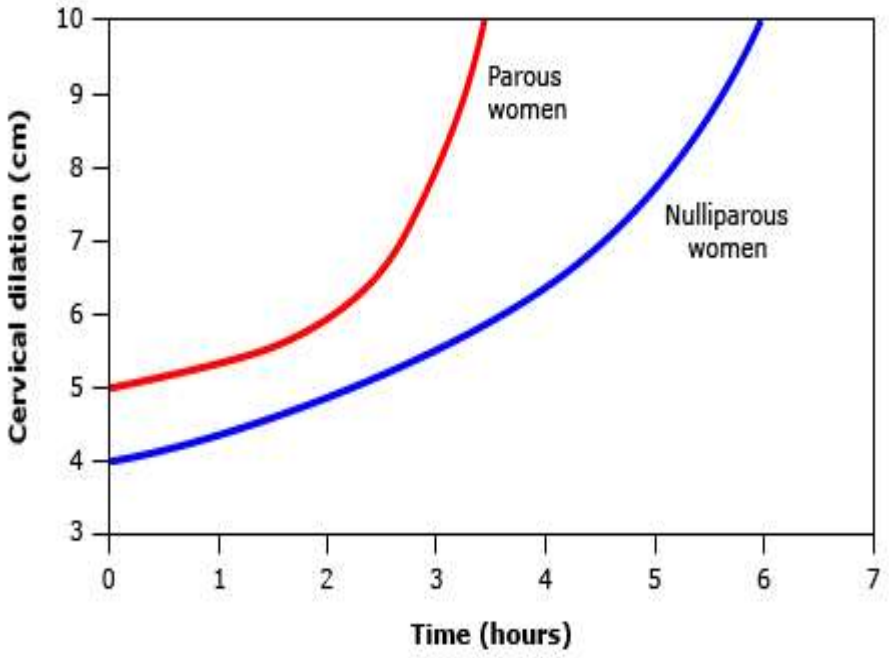


The progress of rotation of OA presentation in the successive stages of labor.

Adapted from: Friedman. Labor: Clinical evaluation and managment, 2nd ed, Appleton, New York 1978.

Contemporary Labor Curves by Parity

Zhang, et al., Obstet Gynecol 2010;116:1281



Average labor curves by parity in single term pregnancies with spontaneous onset of labor, vaginal delivery, and normal neonatal outcomes

Second Stage - Definition

- Time from complete cervical dilation until delivery of the fetus:
  - **Passive Phase** – time from complete cervical dilation to onset of active maternal expulsive efforts
  - **Active Phase** – time from beginning of active maternal expulsive efforts to delivery

Progress of Labor

Zhang, et al., Obstet Gynecol 2010;116:1281

	Parity 0 Median number of hours (95th percentile)	Parity 1 Median number of hours (95th percentile)
Change in cervix		
From 4 cm to 5 cm	1.3 (6.4)	1.4 (7.3)
From 5 cm to 6 cm	0.8 (3.2)	0.8 (3.4)
From 6 cm to 7 cm	0.6 (2.2)	0.5 (1.9)
From 7 cm to 8 cm	0.5 (1.6)	0.4 (1.3)
From 8 cm to 9 cm	0.5 (1.4)	0.3 (1.0)
From 9 cm to 10 cm	0.5 (1.8)	0.3 (0.9)
Duration of second stage		
Second stage with epidural analgesia	1.1 (3.6)	0.4 (2.0)
Second stage without epidural analgesia	0.6 (2.8)	0.2 (1.3)

"Two Hour Rule"

- Previous teaching – decreased risk of maternal morbidity and mortality – recommendation made before widespread use of fetal monitoring and epidural anesthesia
- Current belief – safe to wait with reassuring FHR tracing and evidence of ***descent***
- Prolonged second stage **beyond 4 hours** may increase risk for operative vaginal delivery and maternal trauma

Influences on Progress of Labor

- Parity
- Fetal size
- Fetal position
- Maternal pelvis
- Maternal age, BMI and mental conditioning
- Labor position
- Timing and dosing of epidural
- Membrane status
- Use of oxytocin

Optimizing Routine Care in the 2nd Stage

- Patience
- Positioning - benefits of the upright position for both labor and birth & for 2nd Stage
- Psychosocial, emotional and physical support accompanied by explanation and instruction
- Behaviors by the intrapartum team – confidence in actions as well as empathy and respect for patient
- Pushing - spontaneous pushing techniques rather than Valsalva
- Avoidance of counterproductive and harmful behaviors such as loud counting and hyperflexion of the hips

Support by Intrapartum Team

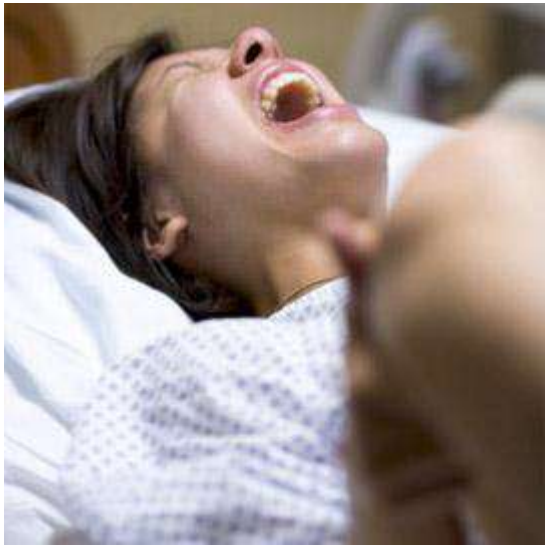
- Can influence labor duration
- Can reduce use of analgesia or anesthesia
- Lower need for operative births
- Increases patient satisfaction with the birth experience.

Benefits of Upright Position

- May increase the pelvic diameter as much as 30%.
- May shorten labor (1st and 2nd stage)
- Has been shown to increase contraction strength and frequency
- Can minimize the intensity of pain
- May decrease the need for pain meds
- May decrease the need for oxytocin
- Accompanied by fewer operative deliveries, perineal lacerations, episiotomies and FHR abnormalities
- Lessens time spent actively pushing
- Lessens maternal fatigue
- May increase the satisfaction of the birth experience

Upright vs. Supine Labor Positions

THIS



Instead of THIS

Active Pushing Phase

- **Timing is everything**
- Most physiologically stressful for the fetus - ↓Maternal Blood Flow to Uterus
- Results in more FHR decelerations
- Can progress to adverse effects on acid-base status of the fetus

Delayed Pushing –"Laboring Down"

- Consider delayed pushing for 2 hrs in nulliparas and 1hr in multiparous
- Beneficial to women *WITH* epidural anesthesia and no urge to push
- Beneficial to women *WITHOUT* anesthesia until they feel the ***spontaneous*** urge to push
- Fewer FHR decelerations
- Less time spent actively bearing down
- Less fatigue, especially in nulliparous women
- Less perineal damage
- Fewer lacerations/episiotomies
- Fewer operative births

.

Risks of "Directed Pushing"

- Increased adverse pelvic floor and perineal outcomes especially when significant edema occurs
- Increased risk of structural and neurogenic injury to pelvic floor and perineum
- Pushing before feeling an urge to do so may force supportive structures, bladder and parts of vaginal wall in ***front*** of fetal head, obstructing descent and increasing risk of urinary incontinence

Diagnostic criteria for abnormal patterns in active labor

Labor pattern	Nullipara	Multipara
First stage		
Duration	24.7 hours	18.8 hours
Protracted dilation	<1.2 cm/h	<1.5 cm/h
Arrested dilation	>2 h	>2 h
Second stage		
Arrest of descent (epidural)	>3 h	>2 h
Arrest of descent (no epidural)	>2 h	>1 h

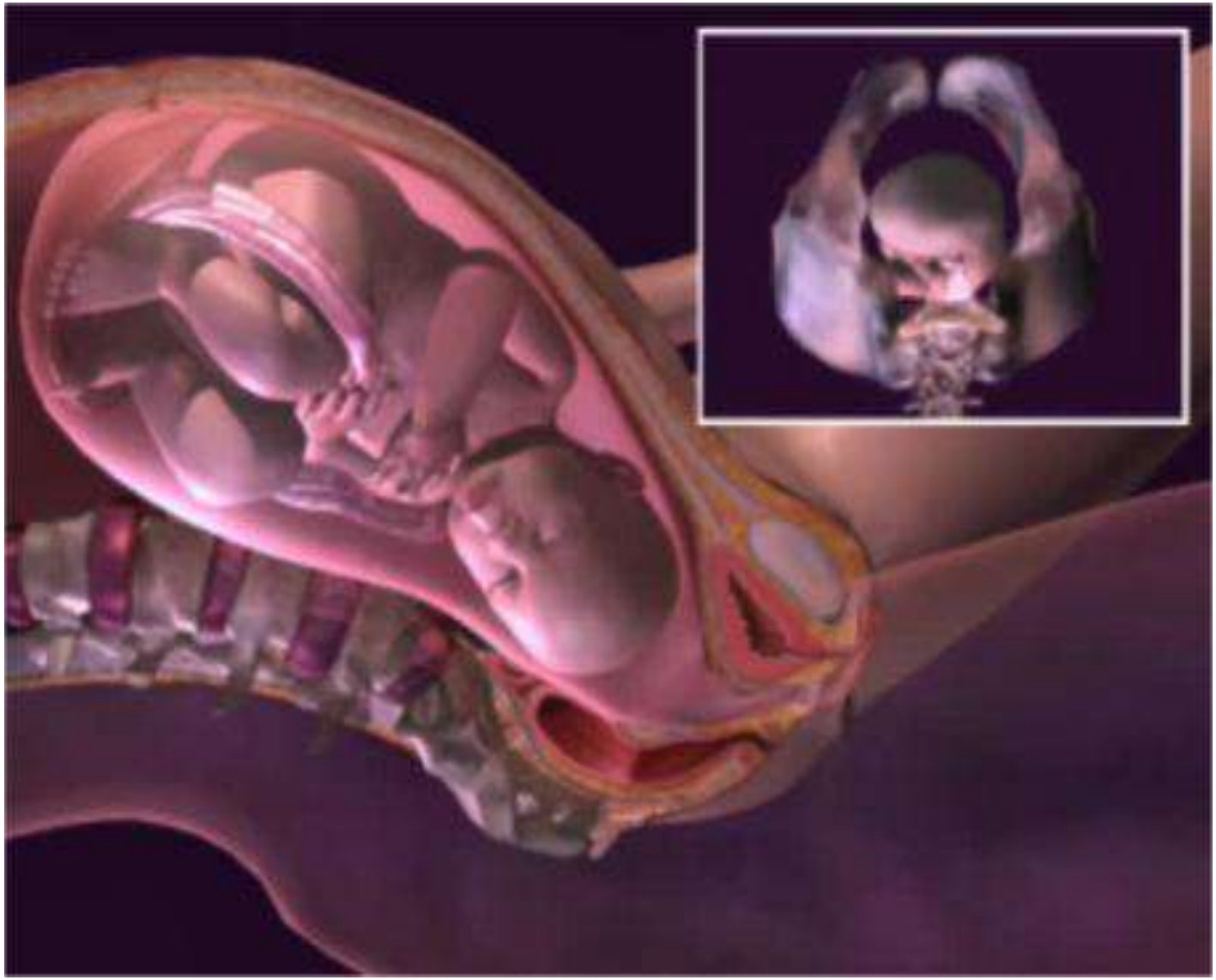
Values represent approximately two standard deviations from the mean.

The 5 P's of Labor

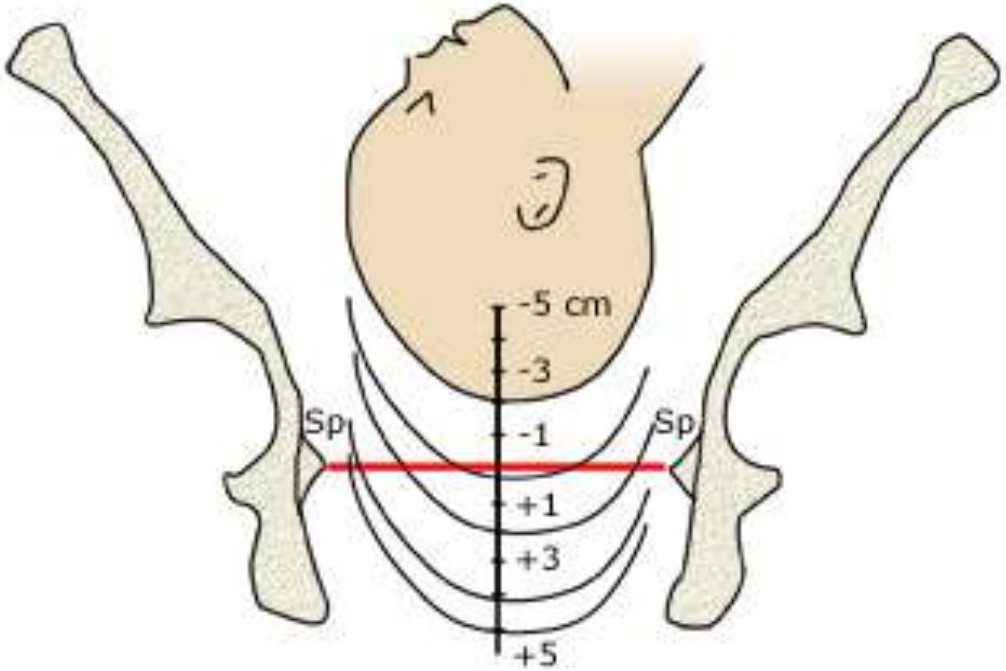
- ***Power*** - Contractions and bearing down
- ***Passenger (Fetus)*** **-** Size of fetal head, fetal presentation, lie, attitude, and position
- ***Passageway*** - Pelvis, cervix, pelvic floor, vagina, and introitus
- ***Positioning Of Mother*** - Open pelvis positions
- ***Psychological Response Of Mother*** - Preparation and support

Fetal Determinants of Descent Through the Birth Canal

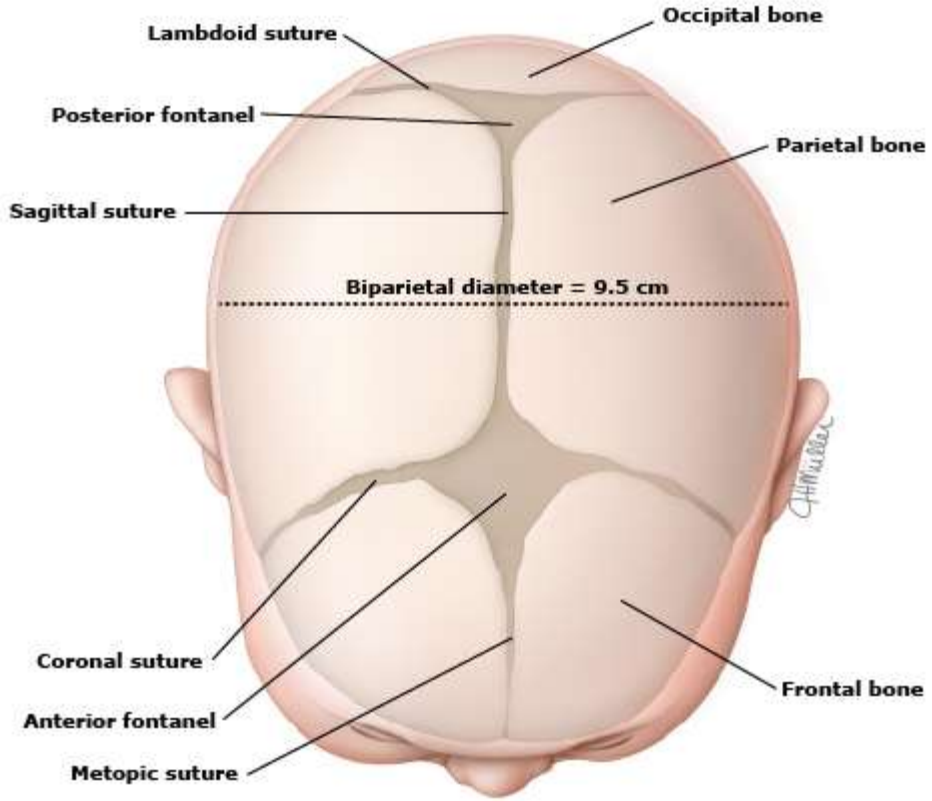
- Size of the fetal head
- Fetal presentation
- Fetal lie
- Fetal attitude
- Fetal position



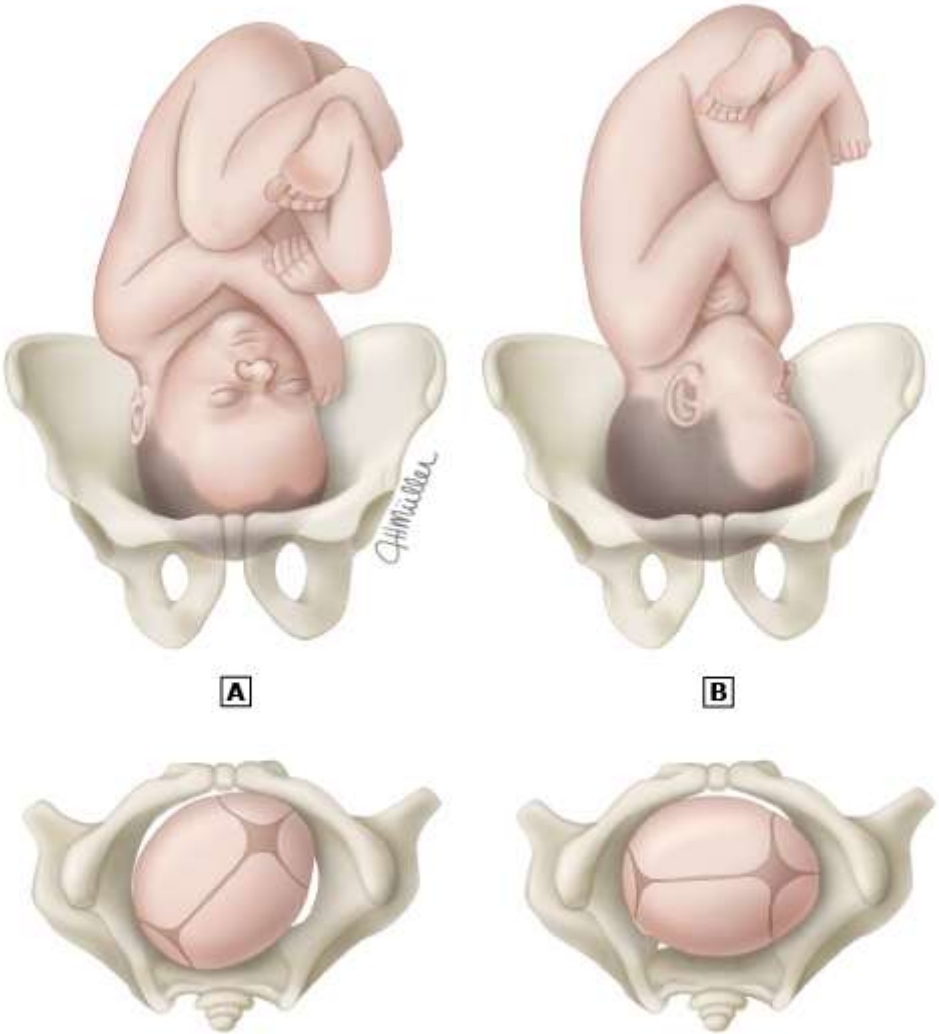
Station



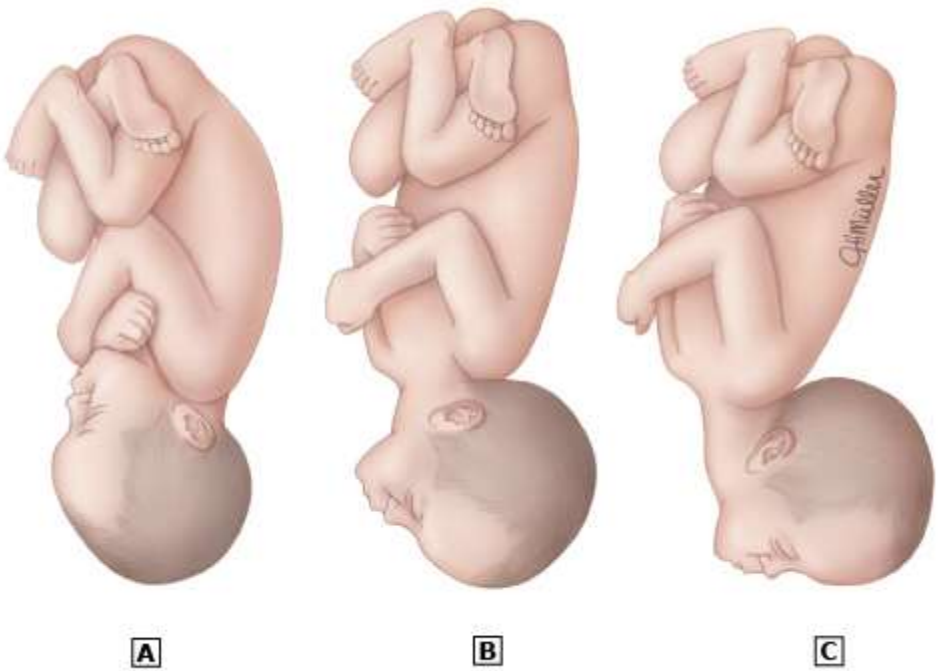
Cranial Landmarks



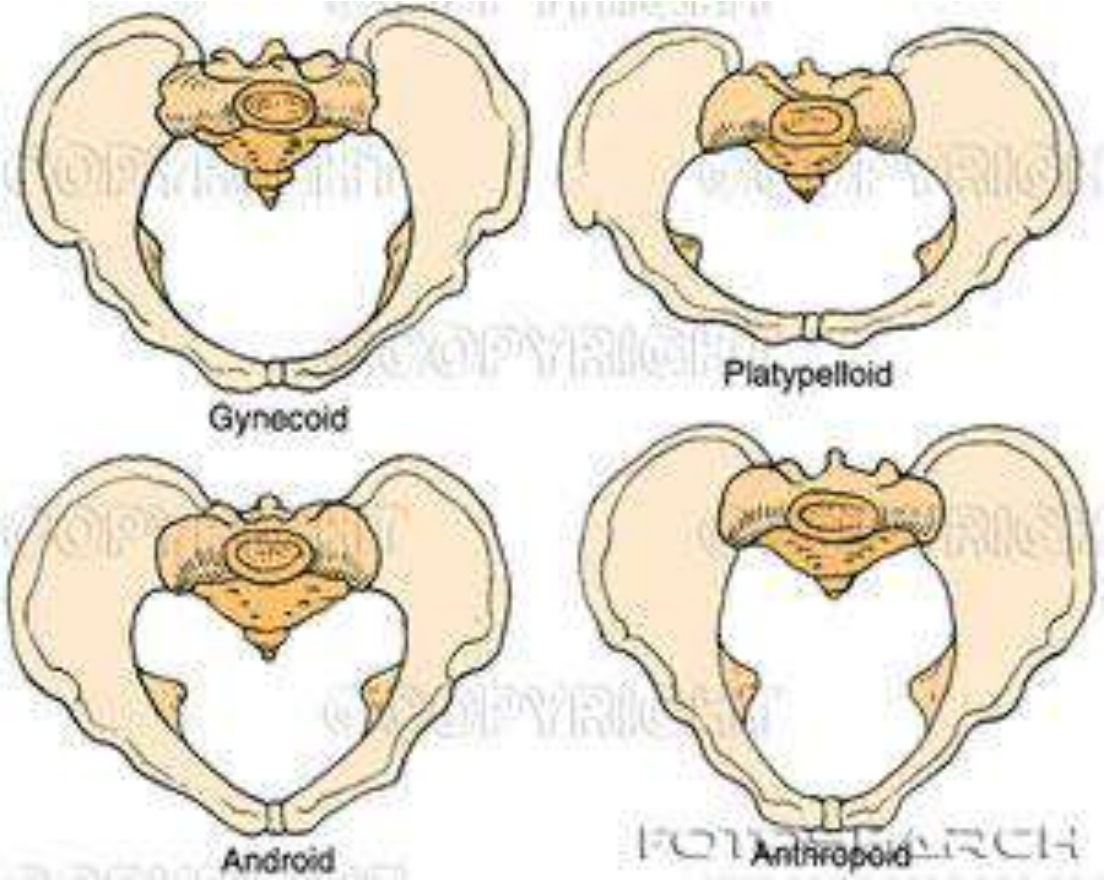
Position



Attitude



Pelvic Shape



Arrest and of Protraction Labor

- Occur in 20% of *ALL* labors and in one study 37% of all *healthy term* nulliparas
- ***Protraction –***
  - ***Nulliparas: 2nd stage > 2 hr (3 hr with epidural)***
  - ***Multiparas: 2nd stage > 1 hr (2 hr with epidural)***
- Arrest – Cervical dilation $\geq$ 6 cm in a patient with ruptured membranes and:
  - No cervical change for $\geq$ 4 hr despite adequate contractions
  - No cervical change for $\geq$ 6 hr with inadequate contractions ad administration of oxytocin

Risk Factors for Protracted Labor

- Older maternal age
- Pregnancy complications
- Nonreassuring fetal heart rate
- Epidural anesthesia
- Macrosomia
- Pelvic contraction
- Occiput posterior position
- Nulliparity
- Short stature (less than 150 cm)
- High station at full dilatation
- Chorioamnionitis
- Postterm pregnancy
- Obesity

MOST COMMON CAUSES TODAY

- Obesity
- Cephalopelvic disproportion
- Occiput posterior presentation
- Epidural anesthesia
- Chorioamnionitis

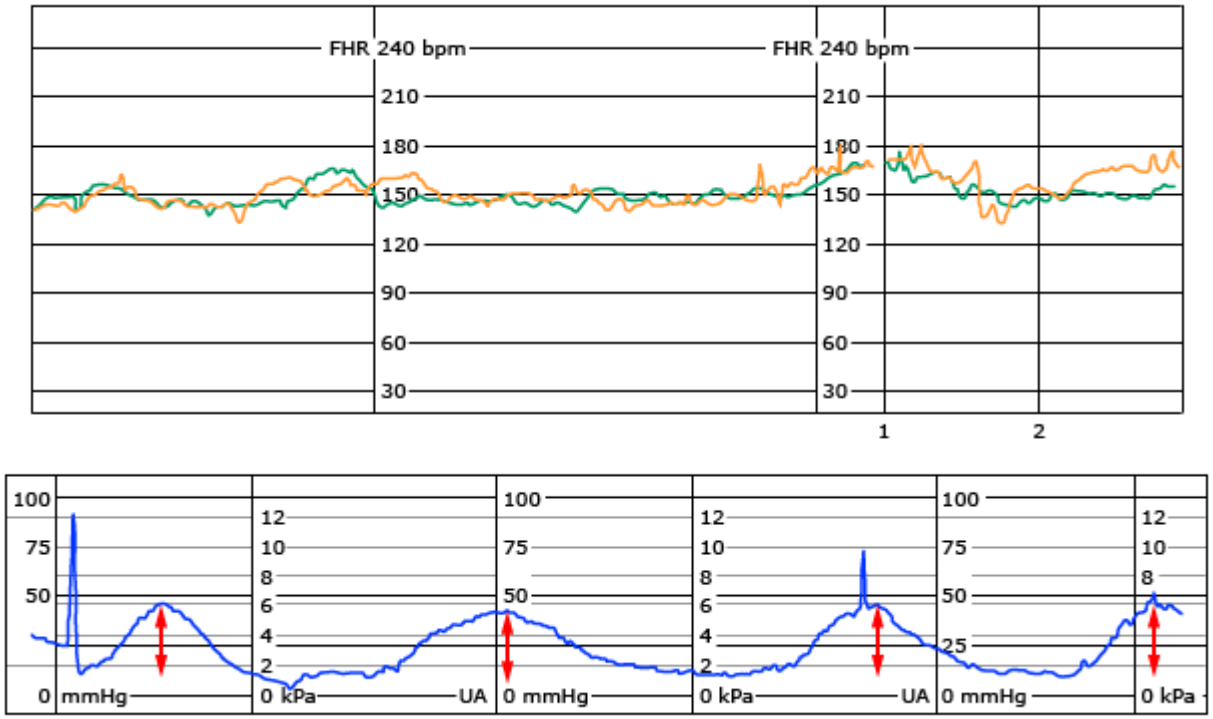
Occiput Posterior (OP) Position

- Strong association between epidural anesthesia and fetal occiput posterior position
- Relaxation of pelvic musculature can prevent normal rotation of the head with descent
- Association between adverse neonatal outcome and persistent OP position

Initial Management of Protracted Fetal Descent

- Evaluate fetal position - If OP change maternal position to promote fetal rotation to OA and consider ***manual rotation***
- Acknowledge progress, encourage patient
- Support spontaneous pushing
- Continue or initiate upright position - sitting, squatting, standing or kneeling
- Discourage supine, semirecumbent or lithotomy positions
- Maintain empty bladder

Assess Adequacy of Labor – Frequency and Strength of Contractions



Montivideo Units (MVUs) calculated by subtracting baseline uterine pressure from peak contraction pressure and summed over 10 minute window

“Adequacy of Labor”

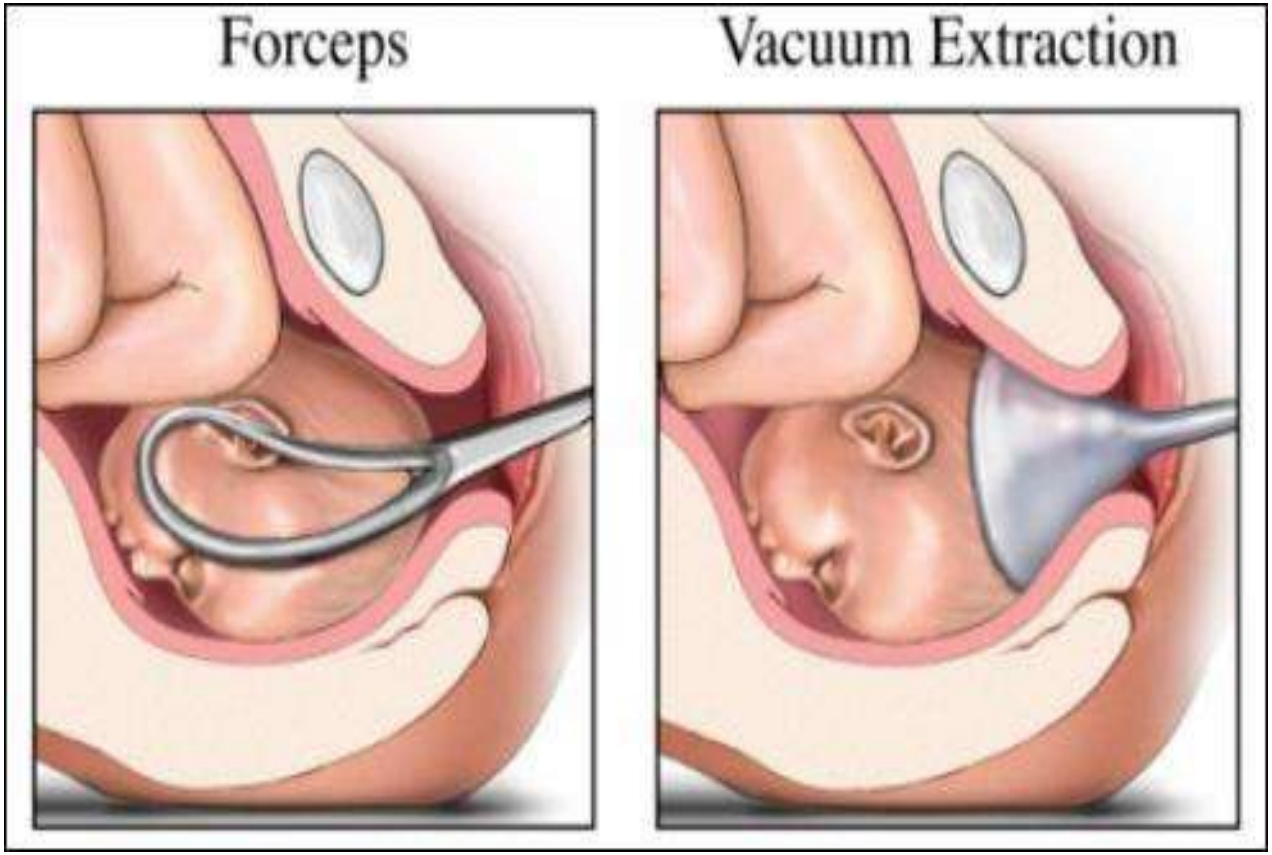
- ***Requires placement of intrauterine pressure catheter***
- Generally 200-250 MVUs are considered “adequate”
- Average MVUs in spontaneous normal labor:
  - 100 MVUs early 1st stage
  - 175 MVUs in advanced 1st stage
  - 250 MVUs in 2nd stage

  Caldeyro-Barcia, et al., Ann NY Acad Sci 1959 75:813
- ***Treat inadequate labor with oxytocin***

Operative Vaginal Delivery – ACOG Position

- "CONSIDER" when:
  - Nullipara has lack of continuing progress for 3 hours with regional anesthesia and 2 hours without
  - Multipara has lack of continuing progress for 2 hours with regional anesthesia and 1 hours without and…
  - Following complete evaluation of progress in labor, maternal and fetal status, contraindications, etc….

Operative Vaginal Delivery



Indications

- Prolonged 2nd stage
- Expeditious delivery for non-reassuring FHR
- Maternal cardiac or neurological disease where pushing contraindicated
- ***BUT, there is no absolute indication***

Current Use of Operative Vaginal Delivery

- Today accounts for only 3.5% of vaginal births in U.S. (forceps/vacuum ratio of ¼)
- Rates range between 1 and 23% in different geographic regions
- ***BUT, success rates approach 99%!!!!!!!!***
- ***Suggests opportunity for reducing primary cesarean section rates if more widely applied***

Reasons for Declining Use Over Past 30 years

- Fear of fetal morbidity
- Fear of maternal morbidity
- Fear of litigation
- Outspoken critics in the OB community
- Decrease in willing educators
- Decrease in resident teaching
- ***Decrease in skilled operators***
- ***Facilities discontinuing availability of forceps***
- ***Facilities unprepared for immediate cesarean section***

Prerequisites for Operative Vaginal Delivery

- ***Experienced provider***
- Cervix fully dilated
- ROM
- Head engaged
- Presentation, position, lie known
- Size estimated and adequate pelvis
- BLADDER EMPTY
- Adequate anesthesia
- Informed consent documented in the medical record
- ***Ability to immediately perform c/section***

Forceps Classification

- **Outlet forceps**- Fetal scalp visible at introitus without separating the labia, skull has reached pelvic floor, OP,ROP or LOP or OA, ROA or LOA. Fetal head is at or near perineum, rotation does not exceed 45
- **Low forceps**- Fetal skull at station +2 cm and not on pelvic floor, rotation 45 or more.
- **Midforceps**- The station is above 2+ cm but head is engaged.
- **High forceps**- Not permitted (not recommended)

ACOG (2000a). Operative vaginal delivery. (Practice Bulletin No 17).

Contraindications

- Fetal demineralizing diseases (e.g. osteogenesis imperfecta)
- Fetal bleeding diatheses (e.g., hemophilia, alloimmune thrombocytopenia)
- Unengaged head - Station < +1
- Severe cephalopelvic disproportion
- Unknown presentation
- Malpresentation with severe hyperextension of the head (e.g., brow or face presentation)
- < 34 weeks if considering vacuum extraction

Relative Contraindications to Use of Obstetric Forceps

- Lack of indication
- Suspected Macrosomia
- Maternal Macrosomia
- Relative Cephalopelvic Disproportion
- Prominent ischial spines and/or suspected android pelvis
- Poor descent with Valsalva

Relative Contraindications to Use of Obstetric Forceps

- Excessive caput or molding
- Overlapping sutures
- Cepalohematoma
- Significant fetal distress
- Correctable hyperextension of fetal head
- Inadequate cooperation or anesthesia
- Inability to proceed with cesarean in timely fashion

Choice of Instruments - Vacuum

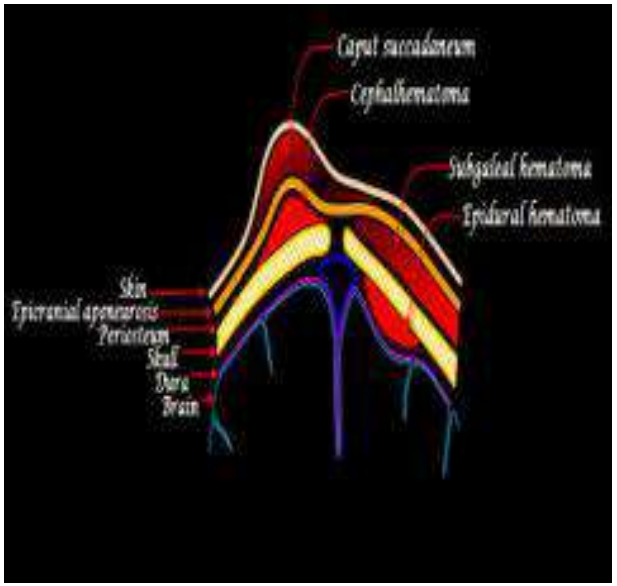
- Easy to apply
- Safer for mother – fewer soft tissue lacerations
- Require less maternal anesthesia
- Minimize compressive force on fetal head
- Lower risk of maternal pain postpartum
- ***Higher risk of cranial and intracranial hemorrhage***
- ***Poor for rotation of the fetal head***
- ***Less likely to be successful than forceps – especially at higher fetal stations or fetal 'malpresentation'***

Vacuum Extraction – General Recommendations

- Do not attempt rotation
- Stop if three pop-offs, no progress, or evidence of fetal scalp trauma, more than 10 min of max pressure on fetal head or 15 min total time
- Pressure should not exceed 500-600 mg HG
- Document station, duration of application, pressure, # of pulls, pop-offs

Neonatal Complications of Vacuum Deliveries

- Intracranial hemorrhage
- Scalp trauma
- Hyperbilirubinemia
- Retinal hemorrhage
- Subgaleal hematoma



Choice of Instruments - Forceps

- Different instruments are available for use depending on fetal size, station, and position
- Can be used to correct asynclitism and for rotation
- Useful at higher fetal stations
- Probably ***safer*** for fetus
- Will not 'pop-off'
- Higher success rates across the board than vacuum
- ***Increased risk for maternal soft tissue and pelvic floor trauma***
- ***Increased risk for shoulder dystocia especially with midpelvic applications***

A Real-Life Experience – A Study

Trofatter KF - unpublished

- Nonrandomized, retrospective chart review
- 100 consecutive patients with ***ARREST*** of labor in ***MIDPELVIS***
- ***All offered c/section vs trial of midforceps***
- Single faculty member
- ***Ultrasound used to confirm fetal position prior to forceps application in ALL cases***
- Use of Luikhart – Kielland forceps

RATIONALE FOR STUDY

- Evaluation of fetal head position in midpelvis can be difficult, especially with molding, caput and asynclitism
- Morbidity to fetus and mother is increased when forceps are poorly applied
- Inability to confirm position of fetal head is an ***absolute contradiction*** to forceps application and (appropriately) discourages attempts at midforceps applications.

To Rotate or Not?

Fetal head position may be a consequence of the maternal pelvis, But…

- Occiput – posterior requires greater AP diameter of head to traverse pelvis;
- May exacerbate hyperextension;
- Often requires greater traction;
- May increase fetal trauma;
- May increase maternal trauma

Maternal Population

- Mean age (yrs): 23.4 $\pm$ 5.8 (range 15 – 42)
- Weight (lbs): 172 $\pm$ 3.8 (range 101 – 304)
- Height (in): 64.6 $\pm$ 3.3 (range 58 – 78)
- Gestational Age (wks): 39 $\pm$ 2.2 (range 30 – 42)

Gestational History

Nulliparous: 63

Multiparous: 36

Previous Deliveries_

Vaginal: 31

Cesarean: 3

Forceps: 1

Primary Indications for Midforceps

- Failure to Progress
  - Persistent Occiput Posterior: 44
  - Persistent Occiput Transverse: 28
  - Prolonged Second Stage: 2
- Fetal heart Rate Decelerations: 17
- Maternal Exhaustion: 1
- Unable to Determine from Record: 8

Luikhart-Keilland Forceps

Luikhart – Keilland Forceps in Midpelvic Applications

Advantages of:

- Design facilitates placement and rotation
- Solid blade disperses pressure over maximum area
- Sliding lock permits correction of asynclitism

Route of Delivery

- Vaginal Forceps *
  - Occiput Anterior: 90
  - Occiput Posterior: 5
  - Occiput Transverse: 0
- Cesarean Section: 5

Note: 65% of deliveries involved a rotation;

Approximately 90% of rotations succeeded

Episiotomies

None	4
2	29
3	30
4	29
Unknown	3
Suprapubic (c/section)	5

NOTE: If this study was done today, an episiotomy would NOT be routinely cut

Delivery / Fetal Complications

Bruises	19	
Facial:	10	
Scalp:	8	
Unknown:	1	
Nuchal Cord	14	
Forceps Mark	10	
Shoulder Dystocia	8	
Cephalohematoma	2	
Facial Nerve Palsy	2	(Transient)
Laceration	1	(Facial)

Be Prepared to Manage Complications

- Emergency cesarean section
- Lacerations: vaginal, cervical, perineal, uterine
- Shoulder dystocia
- Uterine atony
- Bleeding

Potential Benefits

- Reduction in need for cesarean section
- Reduction in significant maternal morbidity
- Shorter hospital stays
- Reduced peripartum costs
- More rapid post – partum recovery than with cesarean section

Summary

- Defined ***current norms*** for the 2nd stage of labor
- Discussed ***routine care*** that can increase the probability of vaginal delivery
- Discussed factors that may contribute to a ***protracted 2nd stage***
- Discussed ***management options*** in a complicated or protracted 2nd stage
- Discussed the potential resurrection of ***operative obstetrics*** as a means of safely reducing the need for cesarean delivery

Shoulder Dystocia

M. Ryan Laye, MD

Medical Group of the Carolinas-Maternal Fetal Medicine

MUSC AHEC Associate Professor-Spartanburg

10/14/2014

"The doctor is in court on Tuesdays and Wednesdays."

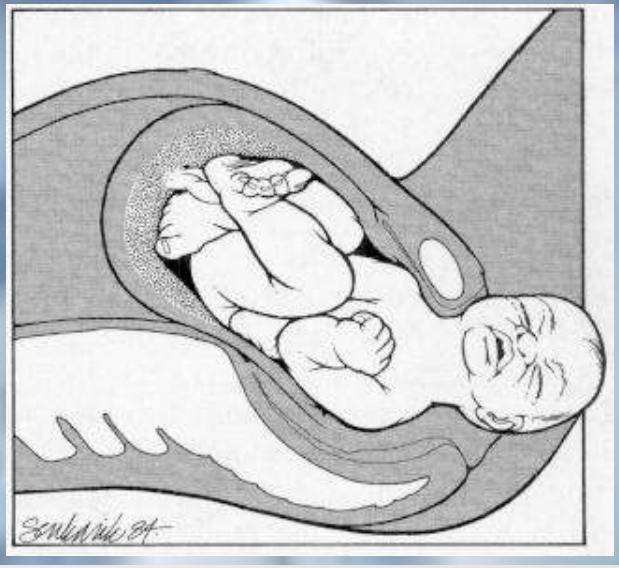
New Yorker Book of Doctor Cartoons, 1993.

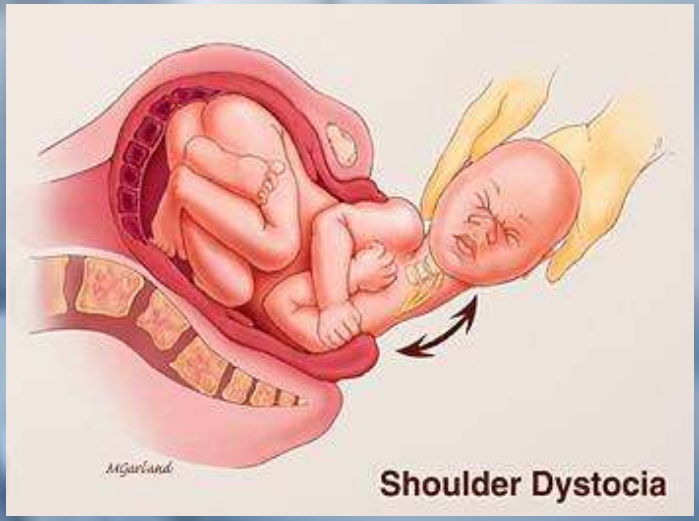
Learning Objectives

- Describe the maneuvers to relieve shoulder dystocia
- Understand the utility of team simulation training in response to shoulder dystocia
- Medicolegal concerns

Shoulder Dystocia

- **Inability to deliver any shoulder**
- **Obstetric emergency in which baby's anterior shoulder is impacted behind the mother's symphysis with the bisacromial diameter in the AP diameter of the pelvic inlet (Bower, Clin Fam Prac 2001)**
- **"Turtle sign"**
- **ACOG Clinical Management Guidelines for Obstetricians-Gynecologists No. 40, Nov 2002**





Shoulder Dystocia (Spong Obstet Gynecol 1995)

- Defined as report by physician or use of ancillary maneuvers to effect delivery
- Prolonged delivery defined as greater than 60 seconds from head-to-body-completion interval
- No delay average wt 3300 g, 11% low 1 minute APGAR
- Delay 11% incidence – wt 4000-4200 g, 34-42% low 1 minute APGAR

Shoulder Dystocia

- Risk factors 100 controls and 100 consecutive cases (Dildy 1999)
  - Birth weight
  - Diabetes mellitus
  - Operative vaginal delivery
- Shoulder dystocia - One factor in 81%, two factors in 32%.
- Control group 27% had one risk factor.

Shoulder Dystocia

- Birth weight > 4000 g (10%) risk 3-13%
- Birth weight > 4500 g (1.5%) risk 14-35%
- Diabetes 6X risk
- Operative delivery occurs in 39-58% of shoulder dystocia
  - Bofill vacuum 4.7%, forceps 1.9%

Risk Factors

- Gestational age - postdates RR 1.3
- Male gender
  - Infants > 4500 g 70% male
- Excessive weight and weight gain
  - >300 lbs macrosomia 30% vs 11%
- Labor abnormalities

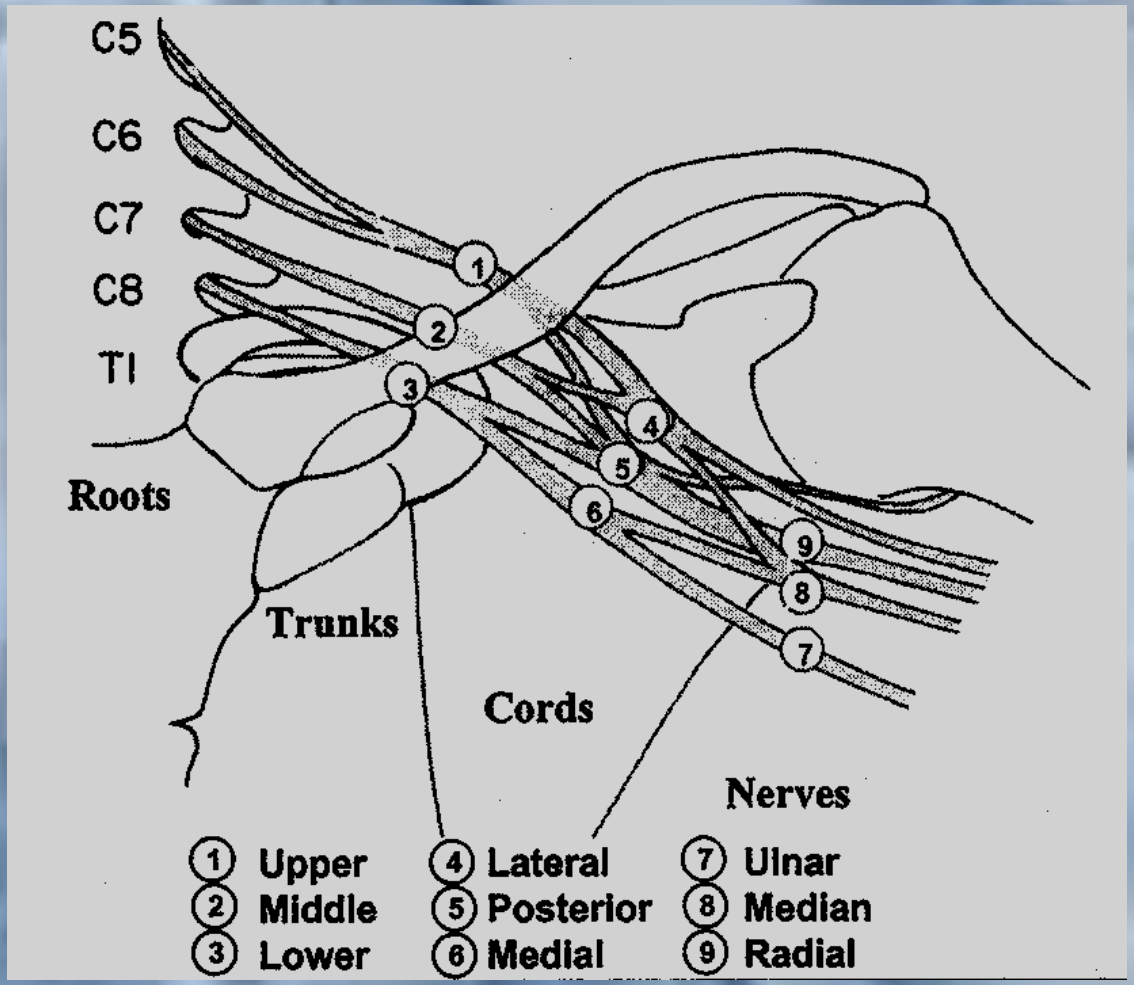
Brachial Plexus Injury

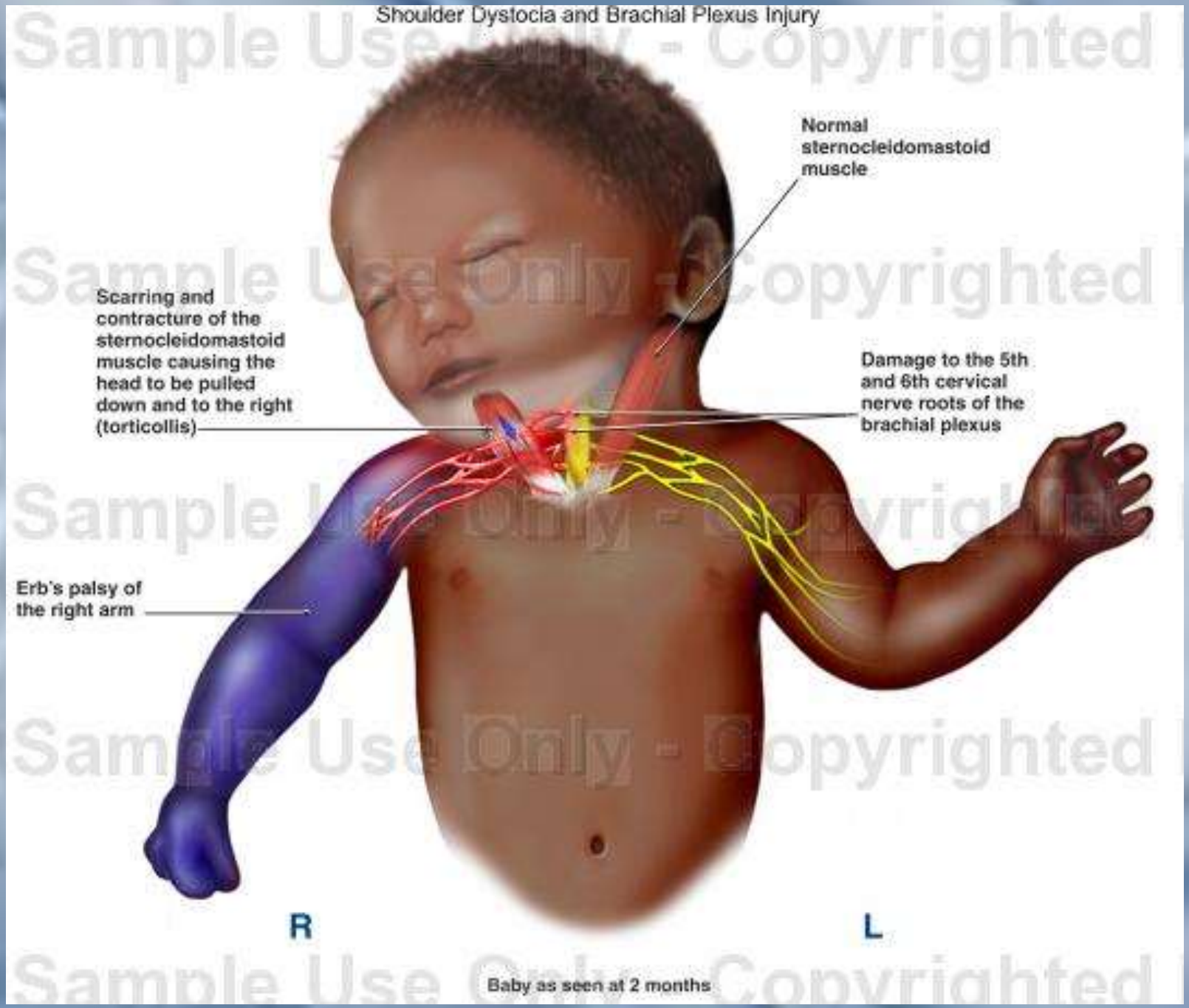
- Incidence 0.1 – 0.2%
- Occurs in 10% of deliveries complicated by shoulder dystocia
- Injury occurs in 18% with wt > 4000g and 26% with wt > 4500 g

Brachial Plexus Injury

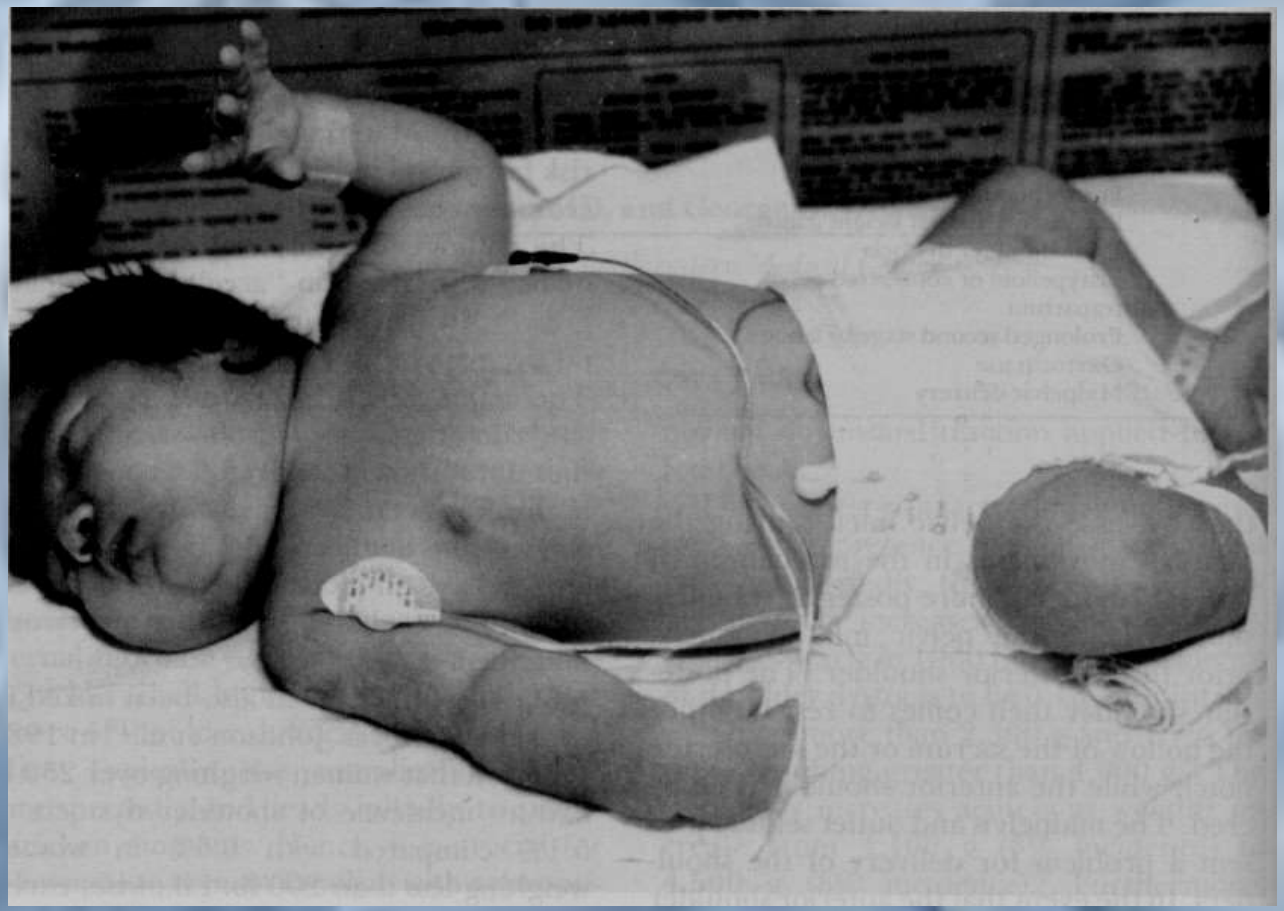
- Excessive lateral traction stretches nerve roots
- Erb-Duchenne palsy upper roots (C5-C6), paralysis of shoulder and upper arm
- Klumpke palsy (3%) lower roots (C7-T1) involvement of hand
- Horner syndrome (T1-T3)

Brachial Plexus





Erbs Palsy



Brachial Plexus Injury

- Electromyography
  - Motor amplitudes decline in 2-4 days but up to one week
  - Sensory amplitudes decline in 5-6 days but up to 10 days
  - Studies within 3 weeks may underestimate injury
- 75-81% brachial plexus injuries completely resolve in the first month
- Spontaneous recovery in 92% usually complete by 12 months

Brachial Plexus Injury

- Gilbert -1611 cases 47% did not involve shoulder dystocia, 60 cases after Cesarean
- Gehrman – Persistent after one year
  - No shoulder dystocia – 41.2%
  - Shoulder dystocia – 8.7%
- Walle – 170 cases one third are injury to the posterior arm
- Electromyographic studies may help with the timing of the injury

Forces (Allen AJOG 1994)

- 47 Newtons (0.22 lbs) for normal delivery, 69 N for difficult delivery, and 100 N for shoulder dystocia
- Pressure from uterine and expulsive efforts were 4-9 X that of clinician applied forces (Gonik AJOG 2000)
- Neck bending forces applied downward but also upward direction
- Greater rate of application of force associated with more injury

Shoulder Dystocia

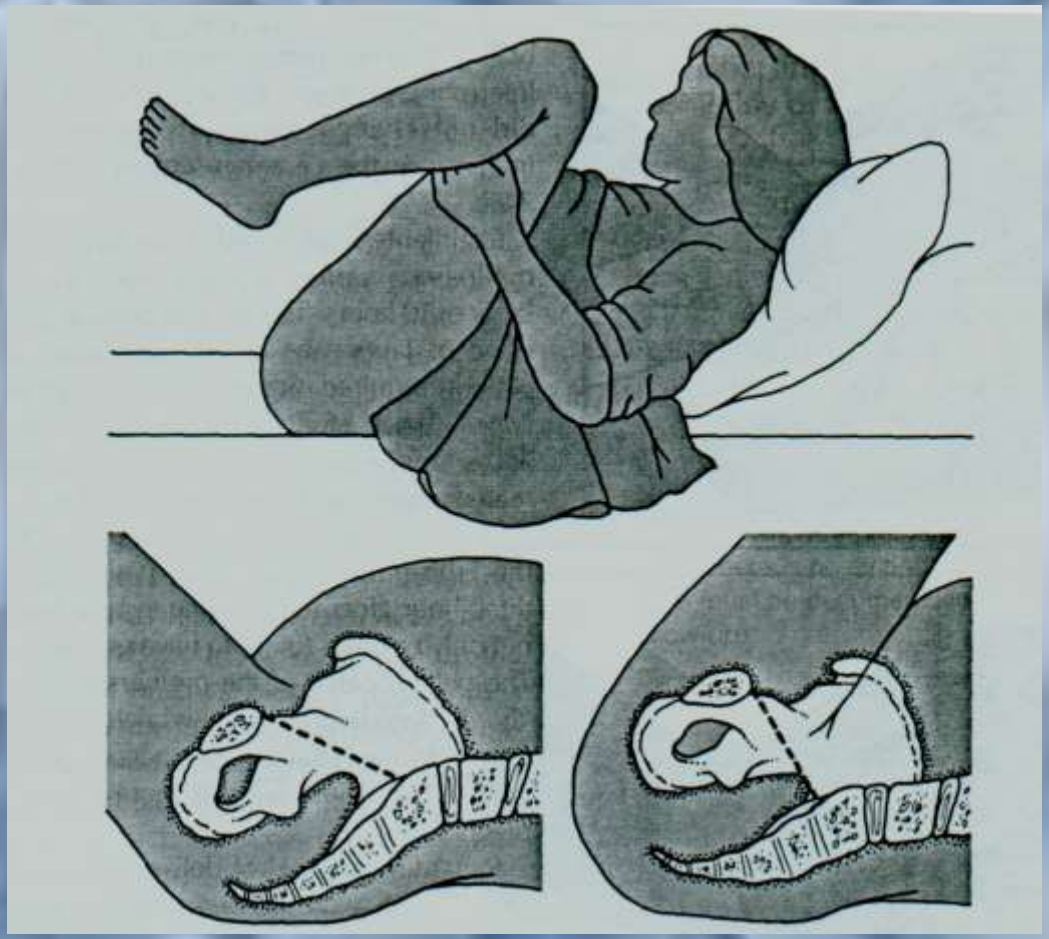
- Wood (1973) drop in pH of 0.04 for each minute after delivery of fetal head (0.2 pH for 5 min)
- Jennett (AJOG 1992) 54% of brachial plexus injury not associated with shoulder dystocia

McRoberts Maneuver

- Flexing patient's hips against abdomen
- Cephalad rotation of symphysis and straightening of lumbar vertebrae free impacted anterior shoulder
- Places plane of greatest pelvic dimension perpendicular to horizontal force less force required (Gonik)

McRoberts Maneuver

McRoberts Maneuver

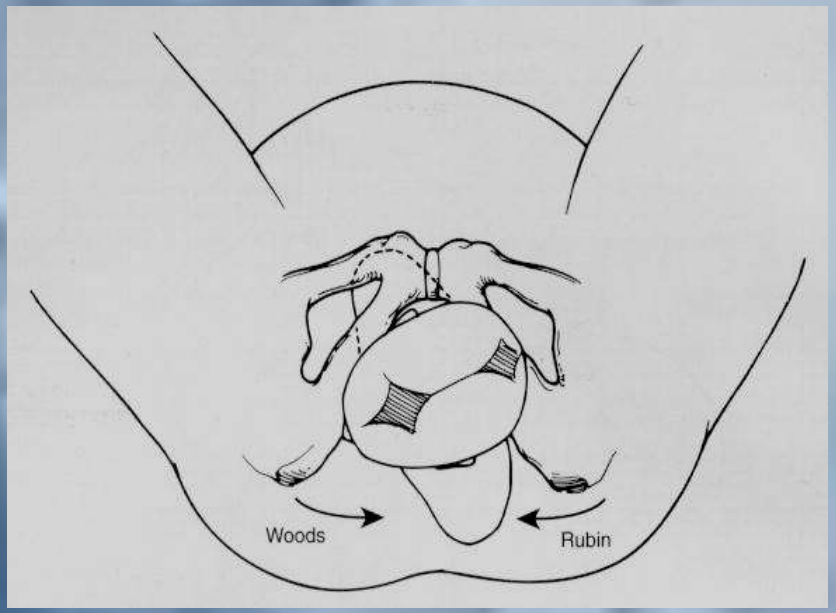


Suprapubic Pressure

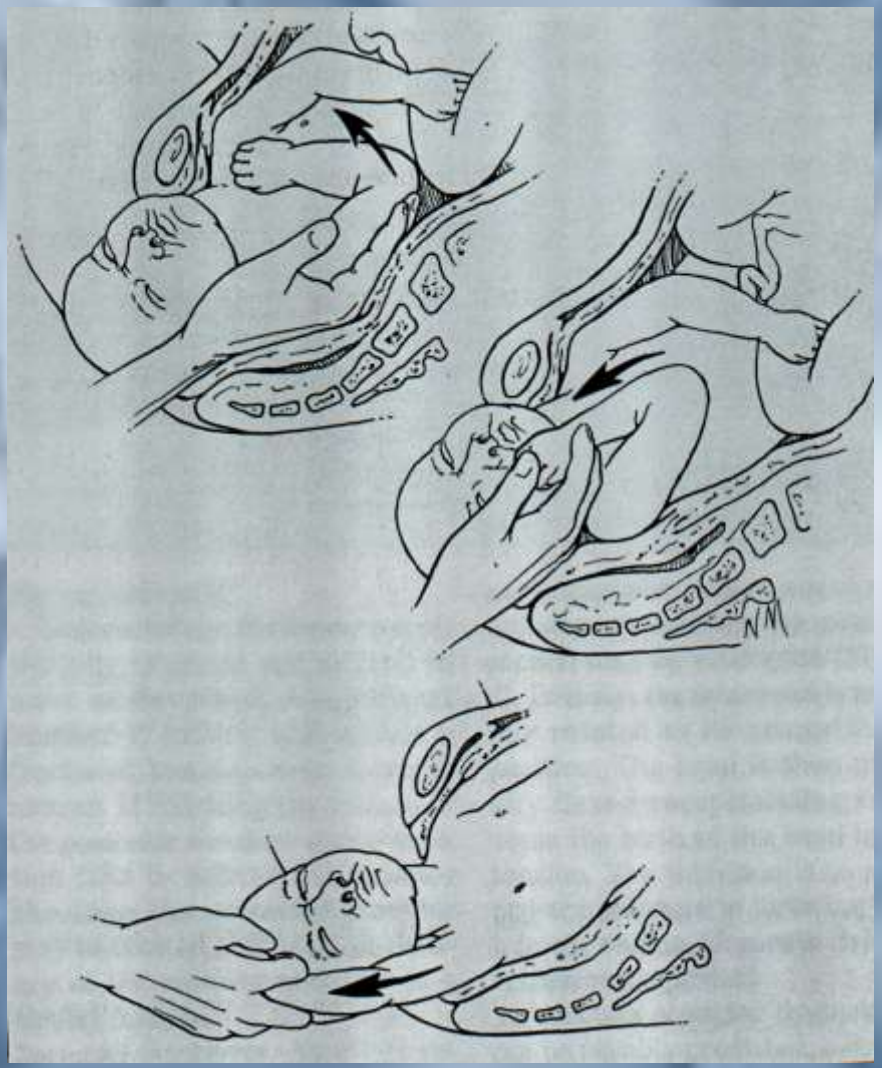
- Directed posteriorly to push anterior shoulder below the symphysis
- Directed laterally to push shoulders toward fetal chest and decrease the shoulder-shoulder distance
- Fundal pressure, Gross (AJOG 1987) reported 77% complication rate

Rotational Maneuvers

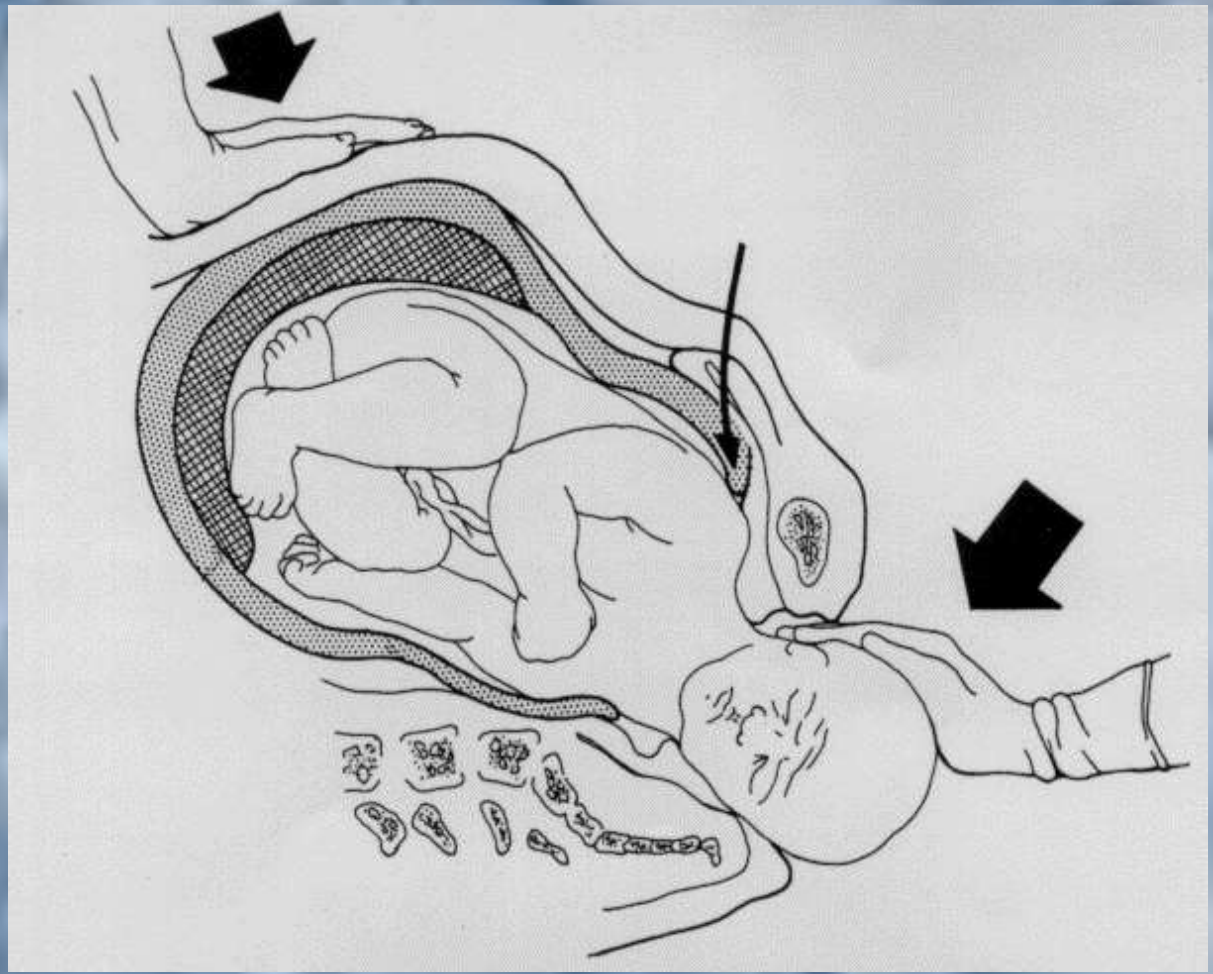
- **Woods screw 1943 - Pressure on anterior surface of the posterior shoulder**
- **Rubin – Pressure placed on posterior surface of posterior shoulder**



Delivery of Posterior Arm



Hibbard Maneuver



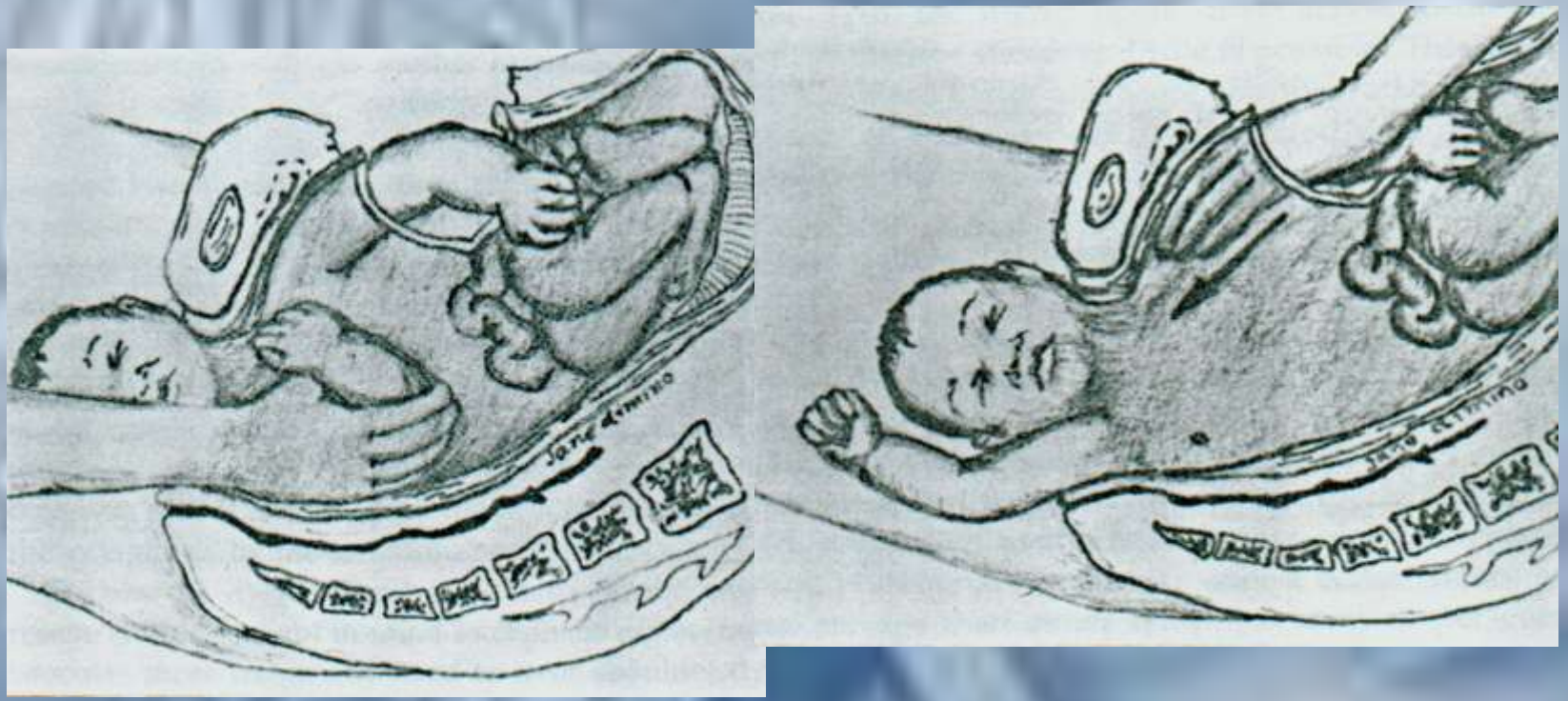
Zavanelli Maneuver

- Cephalic replacement
- Sandberg review of 12 years 92% success
- 70% only mild pressure needed
- Uterine relaxants may help
- Intubation possible if head outside vagina
- Complications: uterine rupture (5/103) and postpartum sepsis

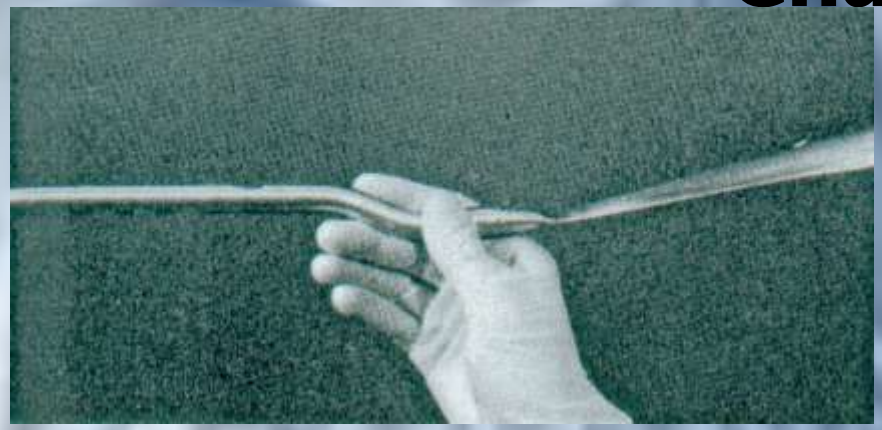
Other Procedures

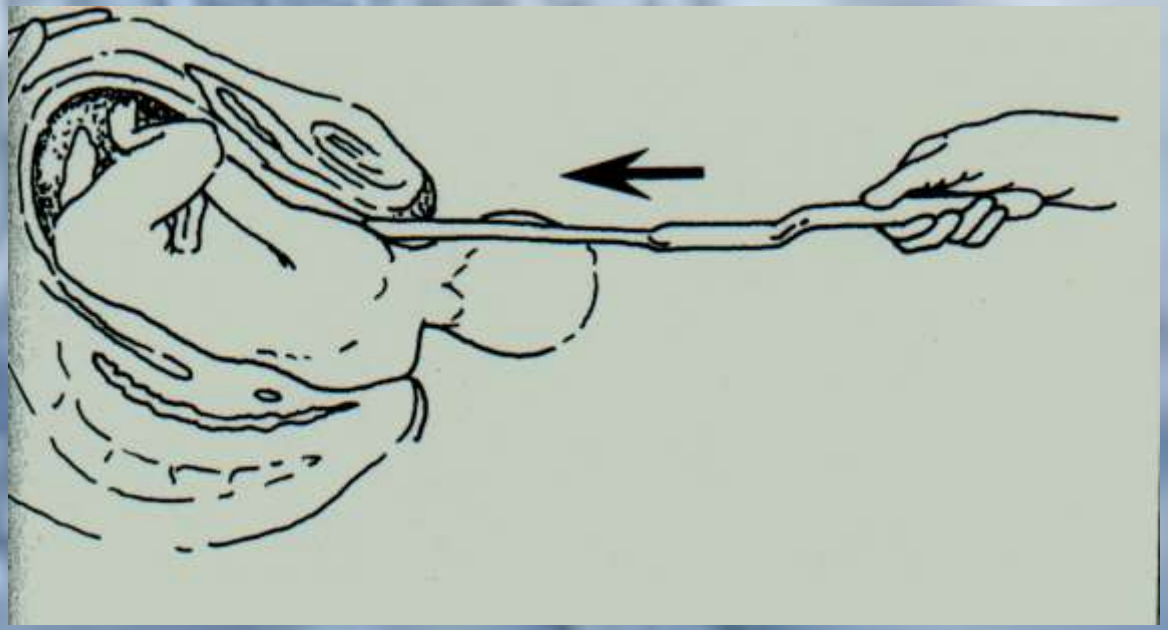
- Fracture of clavicle, cleidotomy for fetal demise
- Symphysiotomy
  - Lateral displacement of urethra with Foley in place
  - Lateral support of lower extremities
  - Partial dissection of symphysis
- Abdominal rescue
  - Disimpaction and release of anterior shoulder

Abdominal Rescue
(O'Leary, Cuva Obstet Gynecol 1992)



Obstetric Shoehorn (WM Chavis)





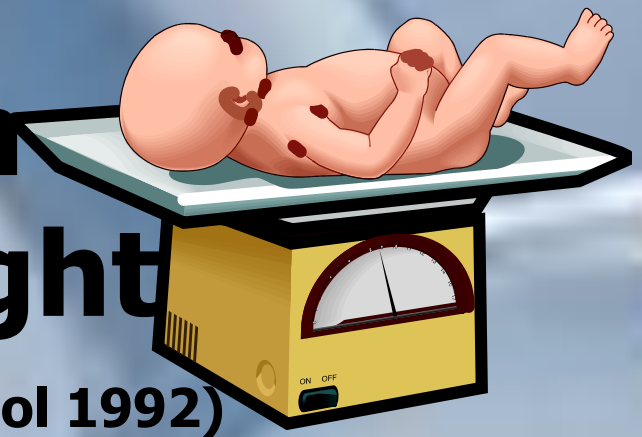
All-Fours Maneuver

- Gaskin Maneuver
- Different from knee-chest position
- Mechanism
  - Shift in fetal position
  - Possible increase in pelvic dimensions

Recurrence Risk

- Recurrence risk 1.1 %, (Baskett, 1995)
- Recurrence risk 33% when complicated by gest. diabetes and wt > 4000 g (Al-Qattan, Ann Plast Surg 1996)
- Ginsberg (AJOG 2000) 16.7% recurrence - fetal wt and maternal parity influence but prior occurrence is best predictor (OR 10.98)
- Cesarean delivery reduces the risk of brachial plexus injury by 80-95%

Estimation Fetal Weight



- **Maternal (Chauhan Obstet Gynecol 1992)**
  - **70% maternal estimates within 10%**
- **67% Clinical estimates within 10%**
- **Ultrasound 60% sensitivity and 90% specificity for the detection of macrosomia**
  - **Hadlock's formula has error of 13% with macrosomic fetus compared to 8% with nonmacrosomic fetus**

Prophylactic Cesarean
O'Reilly-Green Clin Obset Gynecol 2000

- Nondiabetic
  - 4500 g - 3,695 C-sections prevent 1 perm. brachial plexus injury, $8.7 million
  - 4000 g - 2,345 C-sections prevent 1 brachial plexus injury at $4.9 million
- Diabetic
  - 4500 g – 443 C-sections prevent 1 perm. bracial plexus injury, $930,000
  - 4000g – 489 C-sections prevent 1 brachial plexus injury $880,000

Maternal Complications

- Postpartum hemorrhage
- Temporary incontinence and pubic symphysis traumatic diastasis from syphysiotomy
- Anal sphincter tear with pudendal nerve damage
- Zavanellli maneuver – ruptured uterus, lower segment lacerations, sepsis

HELPER Mnemonic
(Rosen, Emergency Medicine 1998)

Help	Ob/Gyn, Neonatal, Anesthesia
Episiotomy	
Legs flexed	McRoberts
Pressure	Suprapubic pressure, shoulder pressure
Enter vagina	Rubin's or Wood's m.
Remove posterior arm	

OBG MANAGEMENT

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UPDATE ON TECHNOLOGY

Subtotal vs total hysterectomy

Estradiol gel: A new option in HRT

Key trial: Delayed delivery for FGR

Topical lidocaine for vulvar vestibulitis

Sexual dysfunction: The challenge of treatment

Cutting the medicolegal risk of shoulder dystocia

Clip-and-save documentation form, page 91

EDITORIAL

It's time to target a new cesarean delivery rate

BY ROBERT L. BARBIERI, MD
EDITOR-IN-CHIEF

SEXUAL DYSFUNCTION Volume 16/Issue 9 • September 2004

Documentation Suggestions

- Narrative, preferably dictated, note summarizing series of events and interventions
- Document approximate time interval between delivery of fetal head and body
- Include times for calls for assistance and when other providers arrived
- Describe resuscitation efforts and who attended to newborn
- Make sure umbilical cord gases are in the medical record

A multicenter assessment of 1,177 cases of shoulder dystocia: lessons learned.

- Chauhan SP, Laye MR, Lutgendorf M, McBurney JW, Keiser SD, Magann EF, Morrison JC. Am J Perinatol. 2014 May;31(5):401-6. doi: 10.1055/s-0033-1350056. Epub 2013 Jul 24

Comments

- With over 1,000 Shoulder Dystocia
  - No Zavanelli Maneuver
  - No Symphysiotomy
  - No Fundal pressure
  - No Hypoxic Ischemic Encephalopathy
  - No Perinatal Mortality
- With over 45,000 Births
  - Only 3 Litigations, with 1 Settlement
  - Not a Single Case of Professional Liability Proceeding to Trial for BPI
- Incidence of frightening complications may be misplaced or exaggerated

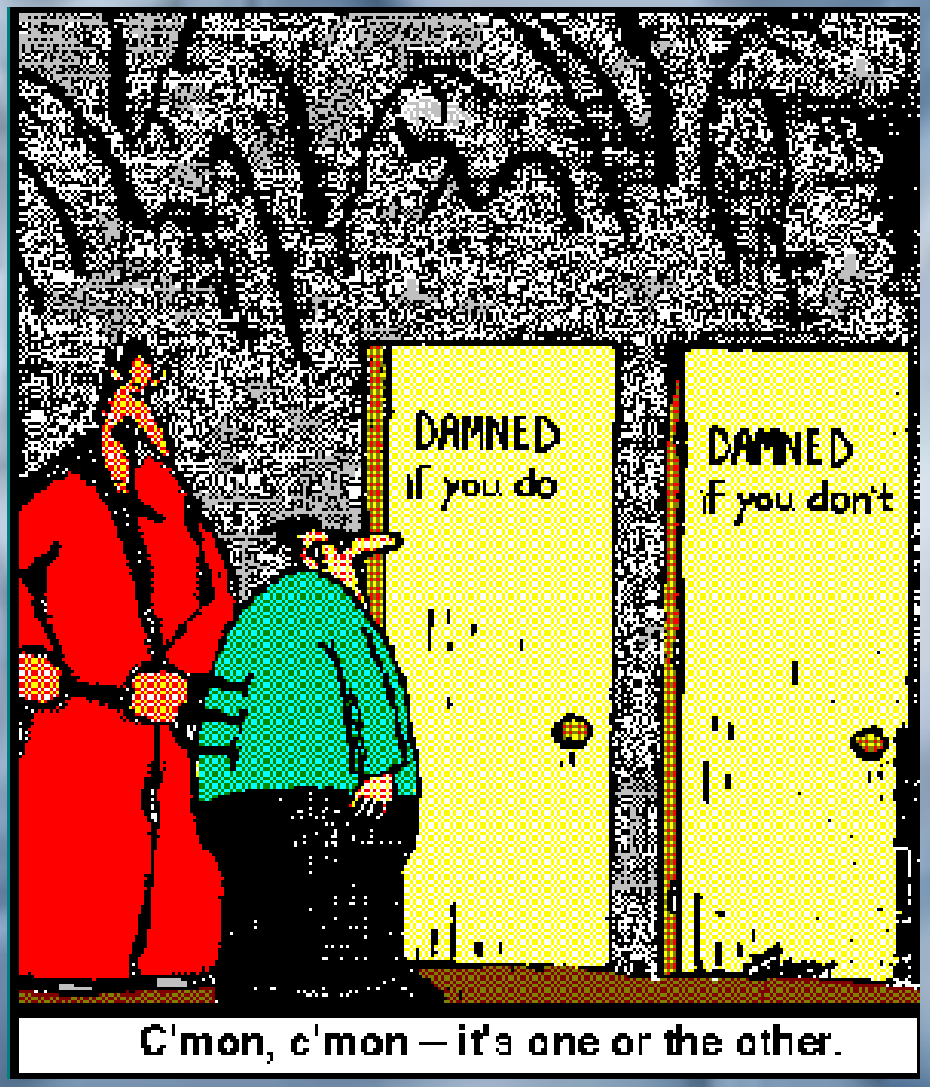
Comments

- Risk Factors for Dystocia & BPI Have Varied:
  - Maternal Obesity & Second Stage < 20 min
  - Maternal Height, Weight, GA, Parity, Birthweight
  - Occiput Posterior Position, Vacuum Assisted Delivery, Birthweight > 4,000 g
  - Labor Acceleration with Oxytocin
- Others, Including Our Earlier Report, Found Intrapartum & Antepartum Risk Factors Can Not Identify Newborn That Will Have BPI & Dystocia
- Thus, Ascertaining Risk Factors for Dystocia & BPI is Hampered by Sample Size, Risks Examined, Population Studied

Conclusions

- Shoulder Dystocia is NOT a Nightmare
  - Resolved With Well Known Maneuvers
  - Likelihood of Permanent Injury is Low
  - Likelihood of Litigation is Uncommon
- Rate of BPI is Decreasing!
- With Simulation Training, it May be Possible to Decrease the Morbidity & Litigation Further

Conclusion


DAMNED
if you do
DAMNED
if you don't
C'mon, c'mon — it's one or the other.

Questions?

2014 SC BOI Symposium

Thursday, November 6, 2014

8:30am-4:15pm

Columbia Mariott

To register online, visit

www.scdhhs.gov/boi

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