Learning Objectives

• After this presentation the participant should be able to...
  • Describe the main arguments made for the performance of an elective cesarean delivery.
  • Understand the problem of fecal incontinence after vaginal childbirth.
  • Recite the statistics regarding intrapartum fetal asphyxia.
Reasons for *elective cesarean* (Cesarean without a recognized indication.)

- Convenience.
- Fear of the pain of labor.
- To avoid the possibility of damage to the fetus.
  - Injuries during spontaneous or operative vaginal delivery.
  - Injuries secondary to shoulder dystocia.
  - Asphyxia.
- To avoid the possibility of short or long-term damage to the mother.
  - Pelvic floor damage with subsequent morbidity.
Drawbacks to elective Cesarean.

- Complications of surgery:
  - Bleeding; possible transfusions.
  - Damage to bowel or bladder.
  - Risk of infections
    - Incisional infection.
    - Endomyometritis.
  - Thromboembolic phenomena.
  - Uterine scar and adhesions may complicate future deliveries.
  - Maternal mortality 6/100,000 for cesarean delivery.
  - Increased risk of placenta previa/accreta (OR = 2.6)
- Anesthesia complications.
- Will insurance or Medicaid pay for an elective cesarean?
Cesarean delivery in Latin America.

- In *private hospitals* the rate of cesarean delivery is very high.
  - Greater than 40%…
    - Argentina
    - Brazil
    - Paraguay
  - Greater than 50%…
    - Chile
    - Colombia
    - Mexico

Debate on *elective cesarean*

- **Commentary**
  - **Pro:** All women should have a choice (Showalter, Griffin).
  - **Con:** Increase in cesarean sections may reflect medical control not women’s choice (Castro).
    - Unnecessary cesareans may represent a form of violence against women.
  - **Con:** Health has become secondary to a sexually attractive body (Bastian).
    - Childbirth is now controlled by a surgical specialty.
Debate on elective cesarean

• Should doctors perform an elective cesarean on request?
  • Yes, as long as the woman is fully informed. (Sara Patterson-Brown).
  • Maternal choice alone should not determine method of delivery. (Amu, Rajendran, Bolagi)
American discussion.

- **Con:** Commentary: A blatant misuse of power? RK DeMott Birth 2000;27:264-5.
A recent survey of female obstetricians in Britain found that 31% would prefer *elective cesarean* to minimize long-term sequelae of vaginal delivery such as urinary and anal incontinence.

Survey of London obstetricians.  
(Al-Mufti, et al.)

• 31% of female obstetricians requested *elective cesarean* for themselves.
• Of these women…
  • 100% feared urinary or fecal incontinence.
  • 80% had fear of perineal damage from vaginal delivery.
  • 58% were concerned regarding long term effect of vaginal delivery on sexual function.
  • 39% cited fear of damage to the baby.
  • 27% desired electively timed delivery.
Fetal Asphyxia

• Definition by World Federation of Neurology Group:
  • A condition of impaired gas exchange leading, if it persists, to progressive hypoxemia and hypercapnia.

• A better clinical definition:
  • Fetal asphyxia is a condition of impaired blood gas exchange leading to progressive hypoxemia and hypercapnea with a significant metabolic acidosis.
**Asphyxia (ACOG)**

- Save the term “asphyxia” for damaging acidemia, hypoxia, and metabolic acidosis.
  - Neonate with hypoxia proximate to delivery severe enough to produce encephalopathy will show...
    - Profound metabolic or mixed acidemia with pH < 7.0.
    - Persistent Apgar 0-3 for longer than 5 min.
    - Neurologic sequelae (seizures, coma, hypotonia,) and other dysfunction (cardiovascular, GI, hematologic, pulmonary, or renal).
Is it possible to have fetal asphyxial brain damage?

- Fetal asphyxia as a cause of brain damage has been a concern since the 19th century (Little, 1862).
- The first confirmation came in a guinea pig study (Windle & Becker, 1942).
- Other studies have supported the possibility of asphyxial brain damage in fetal monkeys and lambs.
Lab models of fetal asphyxia.

- Asphyxia has been produced in laboratory animals by...
  - Maternal hypoxemia.
  - Reduced uteroplacental blood flow.
  - Umbilical cord occlusion.
  - Cerebral ischemia has also been produced by carotid artery occlusion.
Fetal Monkeys (total asphyxia)

• First study (Ranck & Windle, 1959) demonstrated neuropathology in the brainstem, basal ganglia, and thalamus when newborn monkeys did not breathe for 11-15 minutes.

• Other studies: Brain damage developed in monkeys with metabolic acidosis and hypotension 2° to asphyxia (Windle 1968, 1969).

• Exposure >12min caused severe neuronal damage in brainstem, basal ganglia, thalamus, cerebral cortex, white matter, cerebellum, spinal cord.
Fetal Monkeys, (partial asphyxia)

- Total asphyxia is very rare in humans.
- Myers (1969, 72, 75) studied fetal monkeys exposed to *prolonged partial asphyxia* and noted the majority were normal, a small number had brain damage, and others died.
- Brain damage occurred with severe metabolic acidosis and hypotension.
- Brain damage mostly in cerebral cortex, with lesser amounts in white matter, basal ganglia, thalamus, and brainstem.
Fetal cardiovascular compensation.

- Initial response to asphyxial insult: increased arterial BP.
- Redistribution of blood flow: less to lungs, kidneys, intestines; more to brain, heart, adrenals.
- Cerebral oxygen metabolism is sustained by increased brain blood flow and increased oxygen extraction.
Cardiovascular decompensation.

- When $O_2$ saturation is sustained below 30% a progressive metabolic acidosis will develop.
- Severe acidosis (BE $<-16$) is associated with hypotension due to decreased cardiac output or failure of peripheral resistance.
- Fetuses have differing compensatory responses to asphyxial insults.
What is the threshold of metabolic acidosis for fetal morbidity?

- All studies have noted neonatal complications with severe acidosis (pH < 7.0).
- No evidence that an isolated respiratory acidosis (pCO2 > 75mmHg) has any effect.
- Moderate or severe newborn complications occurred in 10% of newborns with an UA BE of (-)12-16 and in 40% of newborns with UA BE of < -16.
What is the incidence of fetal neurologic injury from labor?

- About 10% of cases of cerebral palsy may be attributable to events in labor. (Nelson & Ellenberg. NEJM 1986;315:81-6.)
- Tools to detect fetal hypoxia: Electronic fetal heart rate monitoring and fetal pulse oximetry.
- So, performing elective cesareans for the reason of avoiding an asphyxial insult is not tenable.
Should we perform *elective cesarean* to protect the pelvic floor and prevent later incontinence?
Fecal incontinence

- Definition: The involuntary loss of flatus, liquid, or solid feces.
- A socially debilitating symptom.
- Until recently fecal incontinence was an unrecognized complication of childbirth.
- FI is much more common in women with childbirth the major reason for this discrepancy.
Prevalence of fecal incontinence.

• Koh et al., in a community-based study, reported FI in 4.2% of women <85y and in 16.9% >85y. (Koh et al, Age Ageing 1992;21:211-5)

• MacArthur surveyed 1667 women post delivery and noted 4% of women reported new symptoms of FI. Only 14% had consulted a physician. (MacArthur et al, Br J Obstet Gynecol 1997;104:46-50).

• Ryhammer et al, 242 women post delivery and 5% developed symptoms of FI. (Dis Colon Rectum 1995;38:1206-9)

• Zetterstrom et al, 349 primiparous women, 1% had frank FI at 9mos post delivery and 26% had loss of flatal control. (Br J Obstet Gynecol 1999;106:324-30)
Risk factors for fecal incontinence.

- Increasing maternal age (>30y).
- Prolonged second stage of labor.
- Instrumental delivery.
- Clinically apparent anal sphincter injury at delivery.

- MacArthur et al., 1997;
- Zetterstrom et al., 1999;
FI three months after delivery.

  - Prevalance of FI was 9.6% with 4.2% stating it was more often than “rarely.”
  - For primparas…
    - Forceps del (OR 1.94, p = 0.001) (N= 654, 8% by forceps).
    - Vacuum delivery (OR 1.26, p = 0.352) (N = 329, 4% by vac).
    - Older maternal age.
    - Asian ethnic origin.
  - Cesarean del was protective (OR 0.58, p = 0.038).
Etiology of fecal incontinence.

The most common cause is the mechanical disruption of the anal sphincter muscles.

The internal anal sphincter accounts for 75% of the resting anal tone. It may extend more than 1 cm above the external sphincter. DeLancey et al., Obstet Gynecol 1997;90:924-7.
Etiology of fecal incontinence.

• Deen et al. evaluated 46 women with symptoms of fecal incontinence and identified 40/46 (87%) had sphincter defects by endo-anal sono.
  • Deen et al., Gut 1993;34:685-88.

• Sultan et al. identified anal sphincter defects in 9/10 women with symptoms of fecal incontinence.
  • Sultan et al., NEJM 1993;329:1905-11.
Anal sphincter injury.

- Rieger performed endo-anal sono on 50 women 5 weeks post delivery.
  - Sphincter defects in 15/37 (41%) vaginal del.
  - No sphincter defects in 13 women del by C/S.
  - Rieger et al., Scan J Gastroenterol 1998;33:950-5.

- Sultan et al, endo-anal sono on 79 primiparas 6 weeks post delivery.
  - Sphincter defects in 28/79 (35%) vaginal del.
  - Only 9/28 (32%) with sphincter defects had symptoms.
  - No sphincter defects in women delivered by cesarean.
  - Sultan et al., NEJM 1993;329:1905-11.
Obstetric anal sphincter lacerations.

- Frequency was 5.85%.
- Dominant risk factors:
  - Primiparity
  - Birthweight > 4000g.
  - Race (Increased in Indian and Filipina)
  - Episiotomy (less 3rd degree, more 4th degree lacerations).
  - Operative vaginal delivery \(\{\text{Vac (OR 2.3) > Forceps (OR 1.45)}\}\)
    - Forceps 153,446 (20% had anal sphincter lacerations)
    - Vacuum 277,702 (34.9% had anal sphincter lacerations)
- Episiotomy and OpVagDel are the most modifiable of the risk factors.
3\textsuperscript{rd} and 4\textsuperscript{th} degree lacerations

- Data from a \textit{randomized} trial of forceps and vacuum.
- With logistic regression 3\textsuperscript{rd} and 4\textsuperscript{th} degree lacerations were associated with...
  - No previous vaginal delivery ($p = 0.0002$).
  - Malposition of the fetal head ($p = 0.004$).
  - Forceps use ($p = 0.001$).
  - Episiotomy ($p = 0.0001$).
  - Increasing fetal weight ($p = 0.0007$).
  - Time ($p = 0.0001$).
Risks of repeat severe (3\textsuperscript{rd} or 4\textsuperscript{th} degree) laceration.

- In first vaginal delivery 774/4015 (19.3\%) women sustained a 3\textsuperscript{rd} or 4\textsuperscript{th} degree laceration.
- Overall, with subsequent vaginal delivery, 58/735 (7.9\%) sustained a recurrent 3\textsuperscript{rd} or 4\textsuperscript{th} deg laceration.
- When episiotomy and instrumental delivery was used in a second vaginal delivery 52/449 (11.6\%) of women with previous severe laceration had recurrent 3\textsuperscript{rd} or 4\textsuperscript{th} deg laceration.

Denervation injury to pelvic muscles.

Compression and stretching during labor can injure the nerves of the pelvic floor.

Branches of the pudendal nerve (from S$_2$ to S$_4$) innervate both the urethral and anal sphincters. It is most vulnerable to injury as it passes through the greater sciatic foramen and into Alcock’s canal at the level of the ischial spines.
The lateral connective tissue attachments of the vagina and rectum are particularly vulnerable to stretch injury. (Handa et al., Obstet Gynecol 1996;88:470-8.)

Patients with genuine stress incontinence have been shown to have abnormal conduction in the perineal branch of the pudendal nerve (Snooks et al., Br J Urol 1985;57:422-6). Denervation of the levator ani has been noted in 50% of women with symptomatic pelvic organ prolapse (Scharf et al., Int J Obstet Gynecol 1976;14:2-4).
During the second stage of labor pelvic pressures may reach 240mmHg (Rempen et al., J Perinat Med 1991;19:199-206). Increased pudendal terminal motor latency has been noted in 42% of women 2 days after vag del but in none after cesarean delivery (Snooks et al., Br. J Surg 1990;72:515-17).

A peripheral nerve will sustain irreversible damage when subjected to 80mmHg pressure over 8 hours. 20–30mmHg will stop microvascular blood flow and 80mmHg will stop all blood flow.
Denervation injury and the second stage of labor.

- "Passive" second stage - no pushing.
- "Active" second stage - with pushing.

Among primigravid women, denervation injury was associated with an active second stage of > 1 hour.

- Denervation injury was not associated with a prolongation of the passive second stage.
  
Risks of a subsequent delivery.

• Faltin et al. studied 87 women with endo-anal sono 3mos after first del; 58% opvagdel; flatus incontinence, 26%; 46 (53%) with sphincter defects.
  • 11% external sphincter only, 13% internal sphincter only, 29% both ext and int defects.
• In patients with a sphincter defect and a subsequent vaginal delivery the risk of anal incontinence was 2.4 (CI 0.8 –7.5).
Repair of fourth degree obstetric laceration.

Closure of the rectal mucosa and perirectal fascia with continuous suture.

The textbooks almost never mention the internal anal sphincter. Remember, it can extend cephalad to the external anal sphincter.
Even with the best of repairs, endo-anal sonography may demonstrate defects of the sphincters.

An overlapping technique may be better than bringing the muscles of the external anal sphincter into direct opposition.

Repair of fourth degree obstetric laceration.
Repair of fourth degree obstetric laceration.

The bulbocavernosus muscles are sutured together in the midline to rebuild the perineal body. The mucosa is then closed.
How can the obstetrician decrease the chances of muscular and neurologic pelvic floor damage during labor?

- Diminish exposure to identified risk factors.
  - Minimize episiotomy.
  - Use operative vaginal delivery (especially forceps) only for indicated cases.
  - Be careful when delivering fetuses in OP and OT presentations.
- Lengthen the “passive” second stage and shorten the “active” second stage, when safe.
Is elective cesarean warranted?

• Possibly, if the patient had a previous severe (3rd or 4th degree) laceration, had problems, and is unwilling to undertake the risk of recurrence.

• Yes, if the patient already has significant pelvic floor symptoms.

• Otherwise, probably not.
Thank You