

Nine Obstetric Anesthesia Cases

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Cases to discuss

- Anesthesia for non-obstetric surgery in the pregnant patient.
- Fetal bradycardia after neuraxial block.
- Neurological deficit after neuraxial block.
- Post dural puncture headache.

Cases to discuss

- Anesthetic pharmacology relevant to obstetrics: volatile anesthetic vapors, long-acting neuromuscular blocking drugs, nitroglycerin.
- Anaphylaxis during C-section.

Case 1: Pregnant patient (35 wks ega) with femur fracture / cold foot

- 31 yo G1P0 35 weeks ega, MVA, isolated right femur Fx with cold right foot, swollen thigh. For ORIF Fx and vascular repair. Pt wants epidural, to “protect the baby,” worried that “anesthesia will hurt the baby.”
- How does Anesthesia proceed?

Pregnant patients mistakenly worry about anesthesia drugs *per se*, not uterine perfusion.

- General anesthesia is probably best in major trauma because:
 - Will best protect mother and baby.
 - Lack of sympathectomy in case of blood loss.
 - Useful suppression of uterine contractility.
 - Duration is flexible.
 - If other injuries declare themselves (intra-abdominal) they can be addressed.
 - GA will not harm the baby, but hypotension and aortocaval compression can.
 - Compatible with heparinization for vascular repair.

Major trauma in pregnant patient.

- Adequate IV access and warmed IV fluids, blood available, arterial line if possible.
- Intraop fetal HR monitoring if technically feasible— “like any other organ.”
- Oxygen delivery to placenta is key factor, requiring LUD, BP maintenance, adequate Hct, oxygenation-- all guided by FHR.

Case 2: Pregnant patient (22 wks ega) with femur fracture / cold foot

- 31 yo G1P0 22weeks ega, MVA, isolated right femur Fx with cold right foot, swollen thigh. For ORIF Fx and vascular repair. Pt wants epidural, to “protect the baby.”
- Does anything change with ega 22 weeks? No. Intraop fetal monitoring still guides management (LUD, transfusion, etc) despite non-viability of fetus.

Anesthesia for non-obstetric surgery in pregnant patient:

- Key idea is: optimize placental oxygen delivery via appropriate LUD, BP, Hct, oxygenation.
- All our drugs are “safe” for baby.
- Volatile, inhaled agents (sevoflurane, desflurane) suppress uterine contractility.

GA and sedatives will abolish FHR variability □ don't be fooled into a CS!

- FHR variability will disappear with GA. This is normal and not an indication of “fetal distress.”
- FHR should stay high, however.
- There are many case reports of unnecessary CS during GA for loss of FHR variability.

Case 3: Fetal bradycardia after CSE

- 27 yo G1PO, 40 wks ega, transferred from Birth Center for epidural due to severe pain. 6 cm dilation, everything normal.
- Easy CSE □complete, rapid pain relief. Grateful patient. Proud anesthesiologist. Modest decrease in BP.

Case 3: Fetal bradycardia after CSE

- 10 minutes after pain relief, nurse says, “OK, dear, please turn over onto your left side. Baby isn’t too happy right now and we’re going to put a little oxygen on you for baby.”
- What is going on?

Subarachnoid fentanyl can cause uterine hyperactivity:

380 Regional Anesthesia Vol. 22 No. 4 July-August 1997

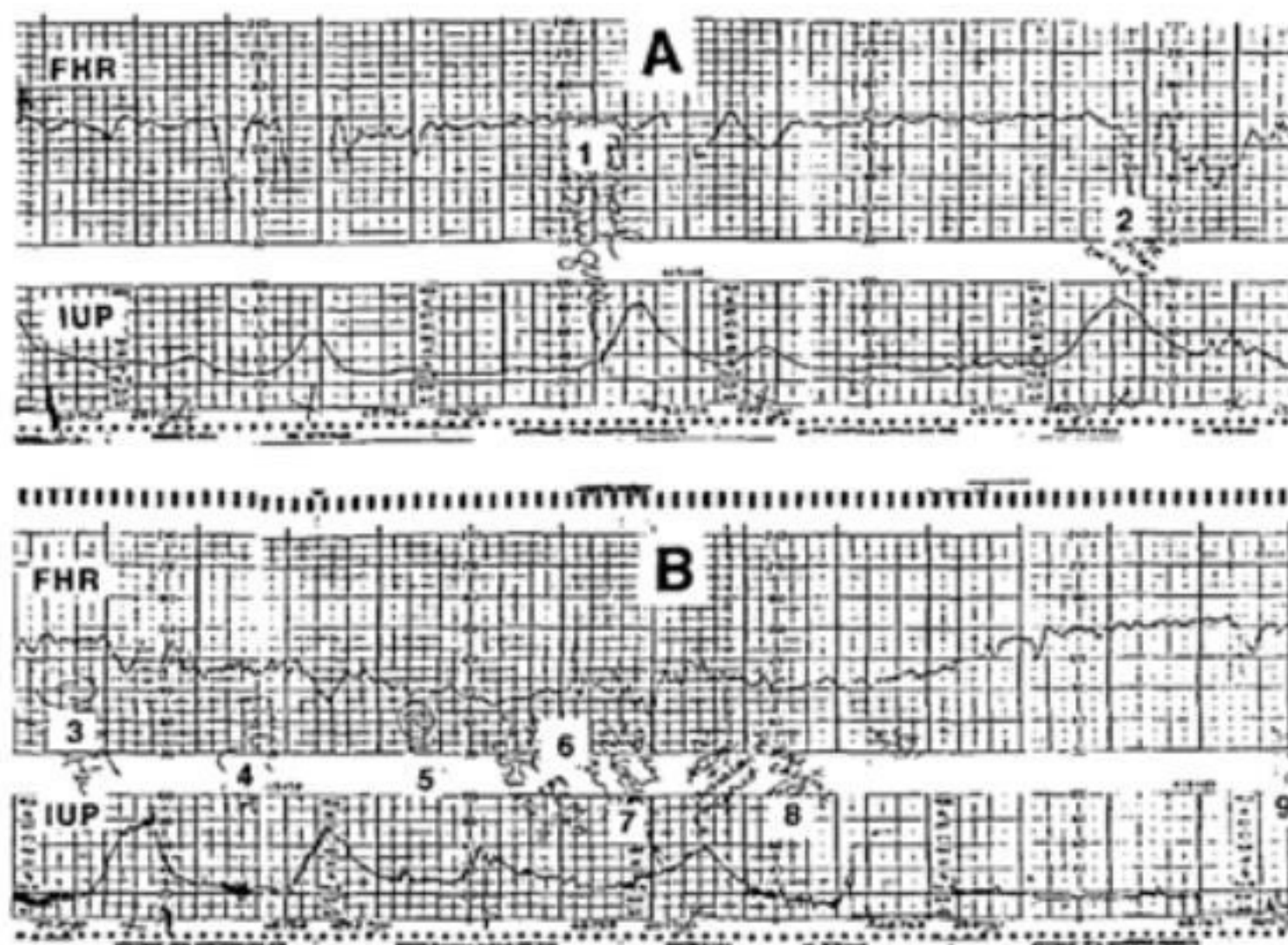


Fig. 1. Fetal heart rate (FHR) and intrauterine pressure (IUP) monitor tracings. Each box is 10 seconds, and the slightly darker vertical lines are at 1-minute intervals. Panel B immediately follows panel A chronologically. Actual clock time is found in small numbers every 10 minutes (3:40, 3:50, and 4:00 p.m.) The events noted are (1) subarachnoid fentanyl 25 μ g was administered to the patient in the sitting position; (2) patient placed supine (with left uterine displacement); (3) patient turned to left lateral position; (4) blood pressure 130/62 by automated cuff; (5) patient turned to right side; (6) vaginal examination; (7) terbutaline 0.25 mg given intravenously; (8) knee chest position; (9) left lateral position. The numbers designating the events are placed so as to obstruct as little as possible of the tracings and comments.

Subarachnoid fentanyl can cause uterine hyperactivity:

Table 1. Intrauterine Pressure Before and After Subarachnoid Fentanyl

Measurement	15 Minutes Prior to Fentanyl Administration	15 Minutes Following Fentanyl Administration
Total number of uterine contractions	3	6
Contraction intervals (min)	5.5, 3.0, 3.5	3.5, 1.0, 2.5, 1.5, 1.5, 2.5
Total duration of all contraction (min)	5.33	9.17
Mean duration of contraction (min)	1.78	1.53
% time of contraction in the 15-minute interval	35.5%	61.1%

Case 3: Fetal bradycardia after CSE

- FHR stays down, despite LUD and O2.
- First year OB resident says to nurse, “I think we should go back for a section.”
- What should be done?

Case 3: Fetal bradycardia after CSE

- Two possibilities:
 - 1) Hypotension, aortocaval compression and uteroplacental insufficiency (very common).
 - 2) Hypertonic uterus due to rapid pain relief (less common).

Case 3: Fetal bradycardia after CSE

- Hypotension Rx is: Stop oxytocin, LUD, pressors, O2 and fluids.
- Hypertonus Rx is: Stop oxytocin, give uterine relaxant (terbutaline SC or nitroglycerin SL or IV).
- Differentiate by *palpating uterus*.

Fetal bradycardia due to intrathecal opioids for labour analgesia: a systematic review

Chahé Mardirosoff^{a,*}, Lionel Dumont^b, Michel Boulvain^c, Martin R. Tramèr^b

Objective To evaluate fetal and maternal adverse effects of intrathecal opioid analgesia during labour.

Data sources A systematic search was performed, in Medline, Embase, the Cochrane Library, bibliographies, and personal contact with authors, in any language, up to February 2001.

Study selection Full reports on randomised comparisons of any analgesia with intrathecal opioid (experimental group) with any non-intrathecal opioid regimen (control group) during labour.

Data extraction Dichotomous data from 24 trials (3513 women).

Results With intrathecal opioids, there was a significant increase in the risk of fetal bradycardia: odds ratio 1.8 (95% confidence interval 1.0 to 3.1), number-needed-to-harm 28. The risk of caesarean section due to fetal heart rate abnormalities was similar (6.0% *versus* 7.8%). The incidence of pruritus was significantly higher with intrathecal opioids: relative risk 29.6 (95% CI 13.6 to 64.6), number-needed-to-harm 1.7.

Conclusions Intrathecal opioids for labour increase the risk of fetal bradycardia and maternal pruritus. The risk of subsequent caesarean section is not increased.

Elevation of Uterine Basal Tone and Fetal Heart Rate Abnormalities After Labor Analgesia

A Randomized Controlled Trial

Karen Cristine Abrão, MD, PhD, Rossana Pulcineli Vieira Francisco, MD, PhD, Seizo Miyadahira, MD, PhD, Domingos Dias Cicarelli, MD, PhD, and Marcelo Zugaib, MD, PhD

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CONCLUSION: Combined spinal–epidural analgesia is associated with a significantly greater incidence of FHR abnormalities related to uterine hypertonus compared with epidural analgesia. The faster the pain relief after analgesia, the higher the probability of uterine hypertonus and FHR changes.

Case 3: Fetal bradycardia after CSE.

Think of uterine hypertonus! Don't rush to CS. "Intrauterine resuscitation."

Consider stopping oxytocin before CSE for severe pain.

Consider empirical treatment of both hypotension and hypertonus since it may not be obvious what is happening. Ephedrine better than phenylephrine, since it is a beta agonist?

Fetal bradycardia /uterine hypertonus can happen after regular epidural, too, but less often because of slow onset.

Case 4– Positional headache after “epidural”.

- 0230: 30 yo G2P1 at term for routine labor epidural. Difficult placement, but no “gush” of CSF. Unable to pass catheter at L3-4. Successful attempt, with difficulty, at L2-3.
- Initial “epidural” doses work “faster than my epidural last time”. Epidural infusion started at normal rate at 0300.

Case 4– Positional headache after “epidural”.

- 0430: Anesthesia resident called for low BP. Gives vasopressor. Checks level of anesthesia: C5 to ice. Patient has good hand grip but can barely move legs. “Epidural” infusion stopped.
- 0700: Patient is complete and has severe pain again. Small dose of LA □ complete pain relief. Delivers OK at 0800.

Case 4– Positional headache after “epidural”.

- 0900: Patient sits up after delivery□ classic PDPH. Treated conservatively. HA gone by morning. Pt DC'd.
- Calls anesthesiologist the following AM (48 h after delivery) C/O positional HA. Denies fever, malaise, anorexia, vomiting. Comes in and gets epidural blood patch. Complete relief.

Case 4– Positional headache after “epidural”.

- HA recurs next AM (72 h after delivery). Managed “by phone”. Patient hesitant to receive second EBP.
- Patient gets narcotic-containing pain pills □ they help.
- HA slowly resolves over next two days.

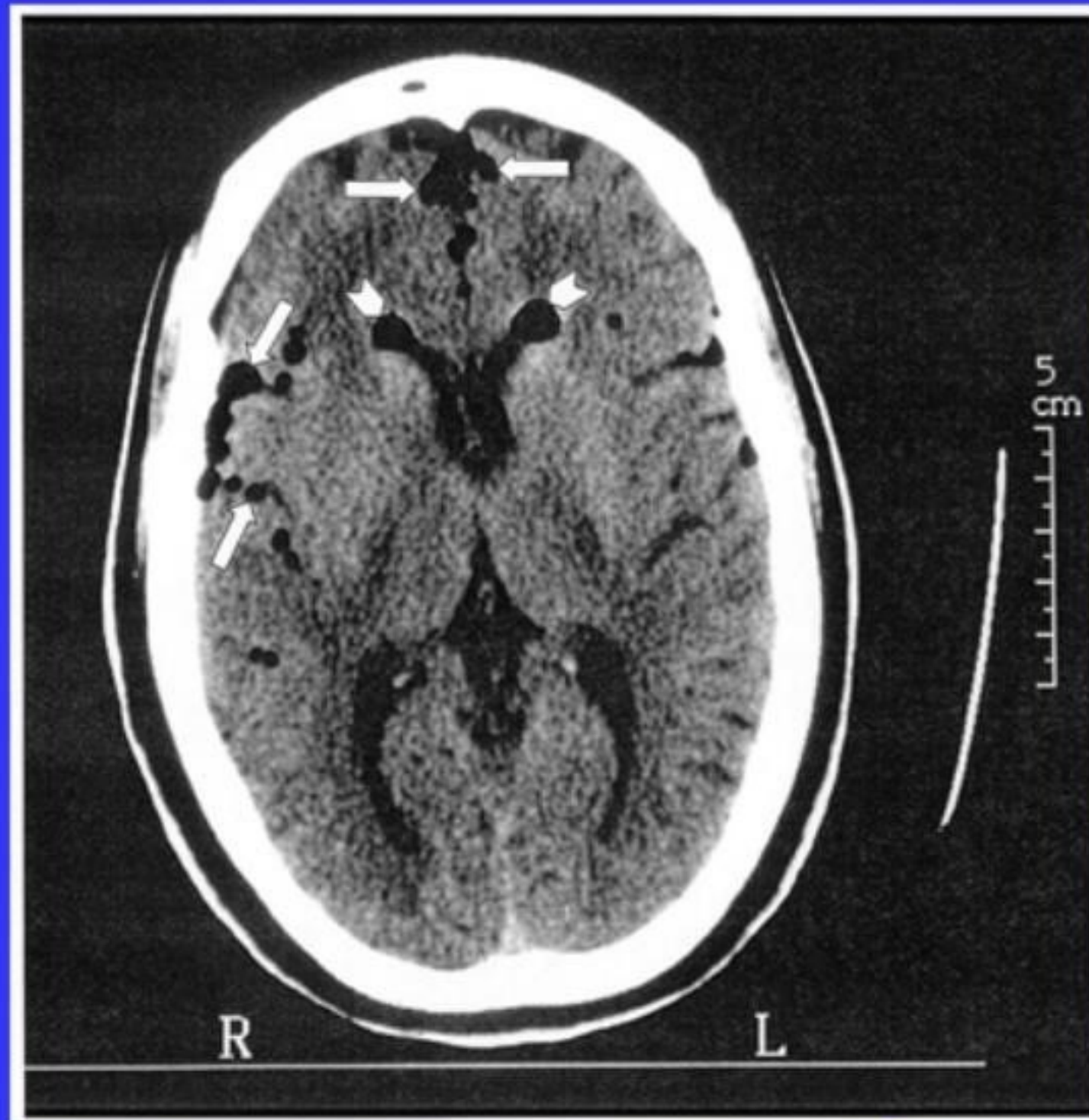
Post dural puncture headache (PDPH), “spinal headache”.

- PDPH is frontal-occipital, interscapular, nuchal, postural, symmetrical.
- PDPH d/t small spinal needle takes 24 hours to develop.

Post dural puncture headache (PDPH), “spinal headache”.

- PDPH due to large epidural needle can occur a few hours after dural puncture.
- Immediate postural HA can be d/t pneumocephalus (air gets into CSF and touches brain surface, because of use of “loss of resistance to air” technique for epidural).
- Most practitioners use LOR to saline, not air.

Figure 1. Axial computerized tomography image of the skull at the level of the lateral ventricles.

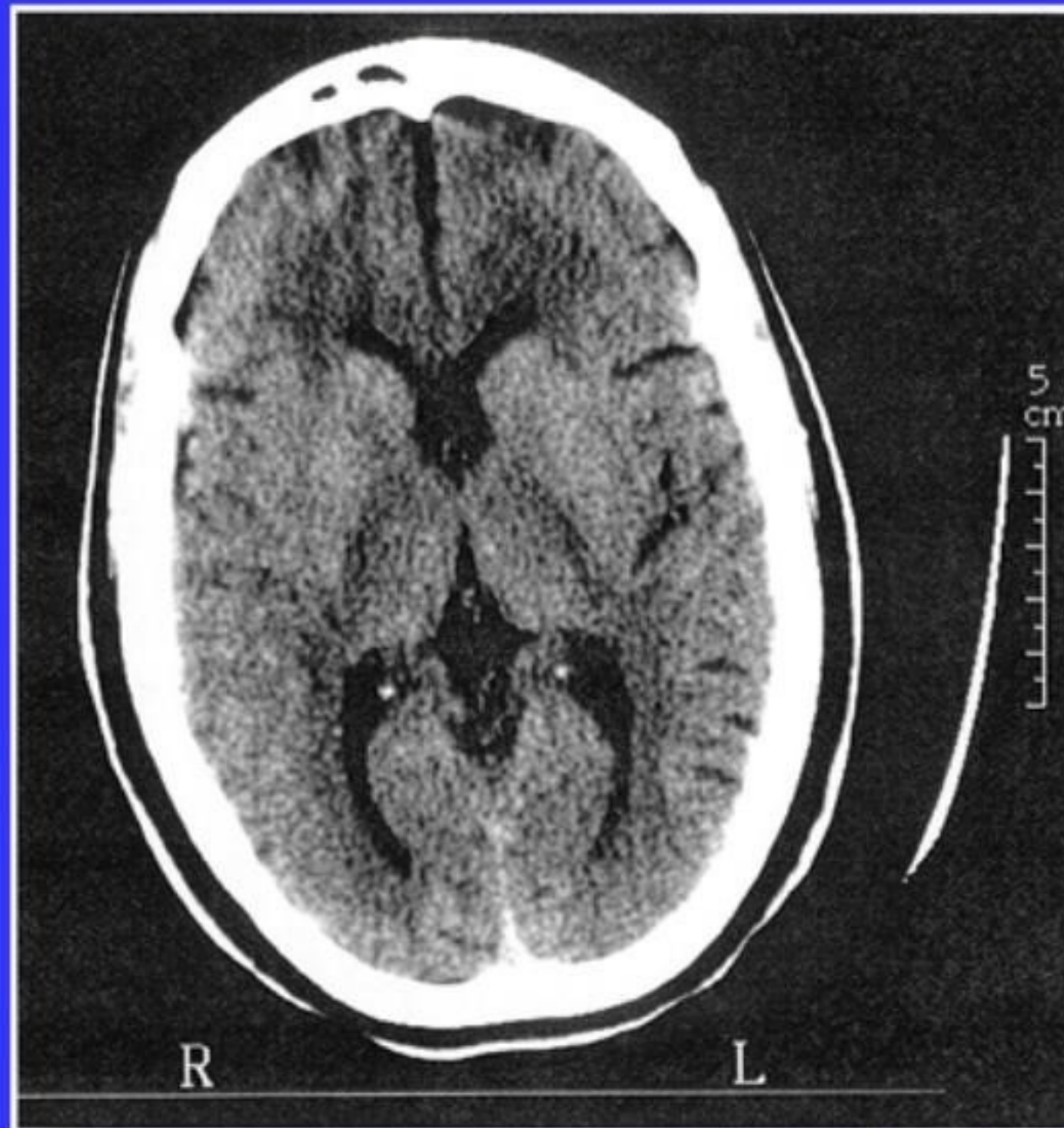


Subarachnoid
air causing
headache not
relieved by
EBP.

Somri M et al. *Anesth Analg* 2003;96:1809-1812

ANESTHESIA & ANALGESIA

Figure 2. Follow-up axial computerized tomography image of the skull at the same level as in Figure 1, performed on the same patient a week later.



Somri M et al. *Anesth Analg* 2003;96:1809-1812

ANESTHESIA & ANALGESIA

Recognize headaches that are “beyond routine”

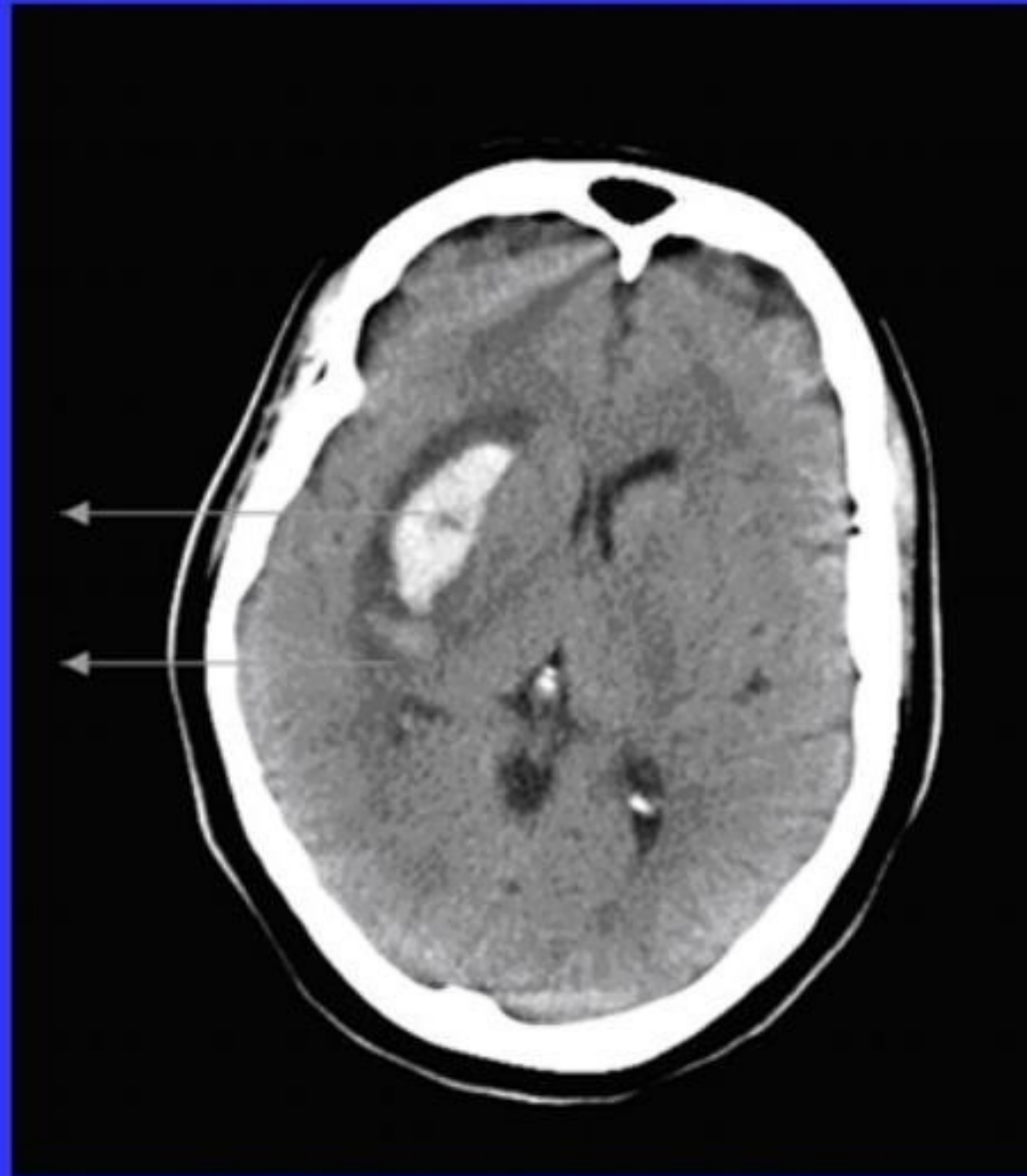
- “Routine” PDPH is not associated with fever, lateralizing signs, lower back pain or tenderness, mental changes, nausea or vomiting.
- Traction on cranial nerves can cause diplopia (6th nerve) or muffled hearing (8th nerve), but these changes are rare.

Consider other causes of headache

- Pneumocephalus– caused by dural puncture but not corrected by EBP
- Tension headache, migraine.
- Hypertension with pre-eclampsia
- Meningitis, intracranial bleed, intracranial thrombosis, tumor, etc.

CT scan with contrast taken after intracerebral haemorrhage, showing new intracerebral bleeding (top arrow) in the globus pallidus/putamen area and an older bleeding site (bottom arrow).

This
patient got
an
epidural
blood
patch!



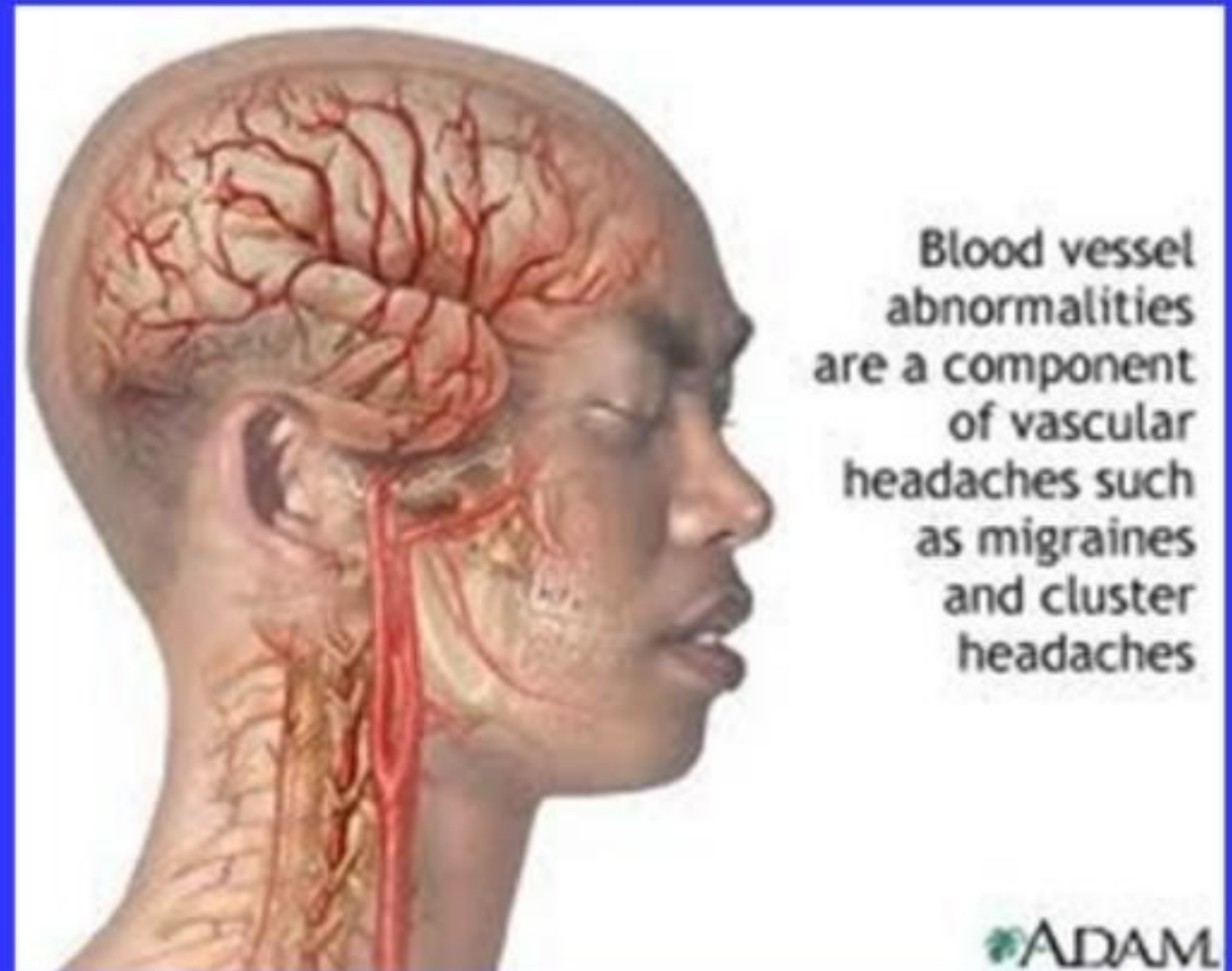
Bleeker C P et al. Br. J. Anaesth. 2004;93:461-464

Current theory of PDPH is that loss of CSF in the lumbar region causes displacement of CSF from inside the skull to the lumbar region when patient sits up. Intracranial CSF volume decreases and intracranial blood vessels dilate to fill up the space.

Vasodilation of intracranial vessels causes headache.

This would explain why caffeine (a vasoconstrictor) sometimes helps in PDPH.

This would also explain effectiveness of methylergonovine and sumatriptan (Imitrex), a treatment for migraine.



Treatment of PDPH:

- Traditional and conservative (and worthless?): fluids, caffeine, oral analgesics.
- Epidural blood patch *after at least 24 hours of HA.*
- “Emerging” therapies? Intrathecal catheter, methylergonovine, sumatriptan?

Epidural blood patch

Do not do it in first 24 hours of HA.

Involves time and inconvenience for the patient. Think how best to serve the patient's needs.

Avoid ER? But consider alternative Dx.
Admission to L&D Triage for patient convenience?

Epidural blood patch

Is only 60-80% effective.

Involves risk of second dural puncture.

Involves risk of infection, hematoma, back discomfort, leg symptoms.

Do not promise a cure.

Epidural blood patch (EBP)

- A second EBP can be performed, but proper time interval not known. Neuroimaging required before a third EBP.
- Non-EBP therapy of dural puncture is not good. Practices vary widely.
- Need for good studies to evaluate “emerging therapies.”

Intrathecal catheter approach to PDPH:

- Recognized dural puncture (gush of fluid) □ place “epidural” catheter intrathecally □ use for labor analgesia.
- Leave IT catheter in place for 24 hours □ mechanically plugs the hole and encourages inflammation which helps to seal the dural hole after removal.

IT catheter x 24 hours:

- Possible reduction in PDPH rate.
- Infection risk— no showers until catheter removed!
- Injection risk-- physically tie catheter in knots and cover with tape— no injections! Inform nursing and anesthesia staff.

Methylergonovine

- Vasoconstrictor
- OBs know the drug
- Anecdotal support for efficacy in PDPH.

Case 5: Weak leg after delivery

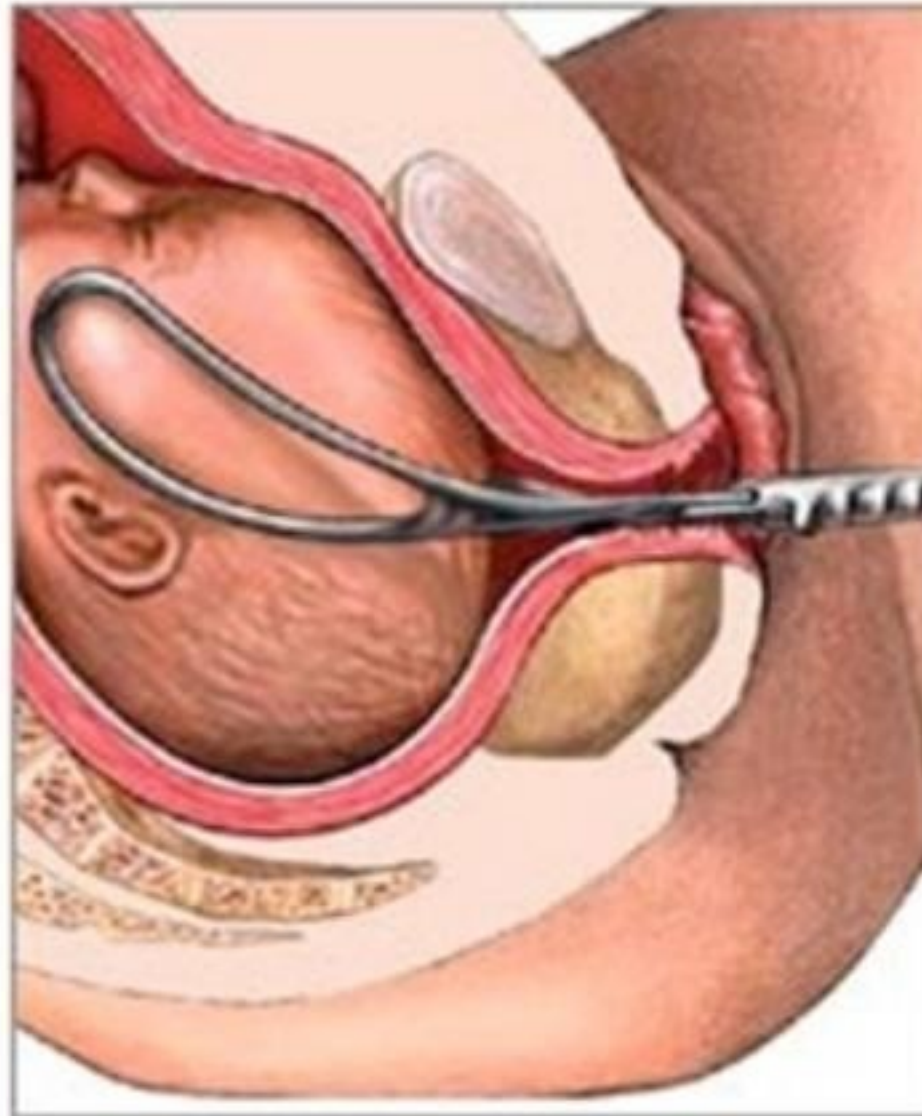
- 32 yo G1P0 GDM, difficult vaginal delivery, prolonged pushing, good epidural analgesia, finally FAVD.
- Next day, patient notes persistent numbness of right anterior thigh and is unable to bear weight on her right leg— it buckles when she puts weight on it.

Most post-epidural neurological deficits
are not due to the epidural!

- Most deficits are mild, transient and due to nerve stretch due to positioning of numb legs.
- Second most common etiology is nerve damage from fetal head.
- Common peroneal nerve can be compressed by stirrups at fibula.

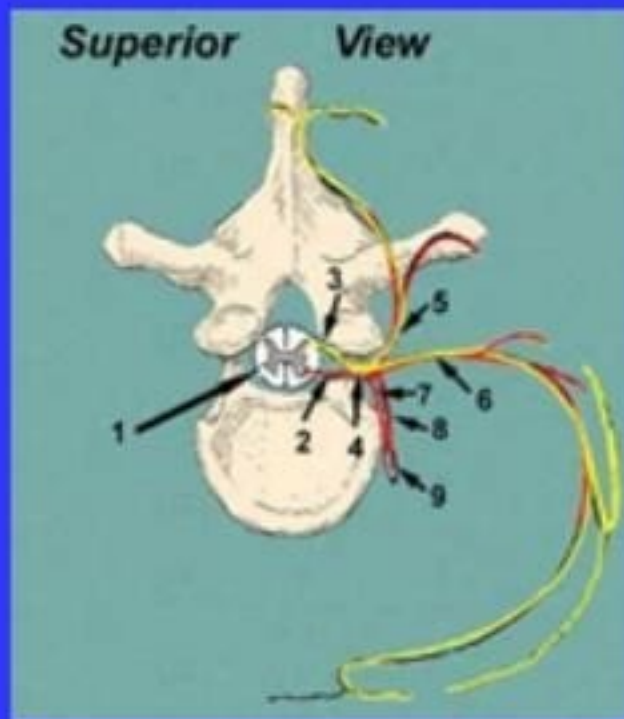
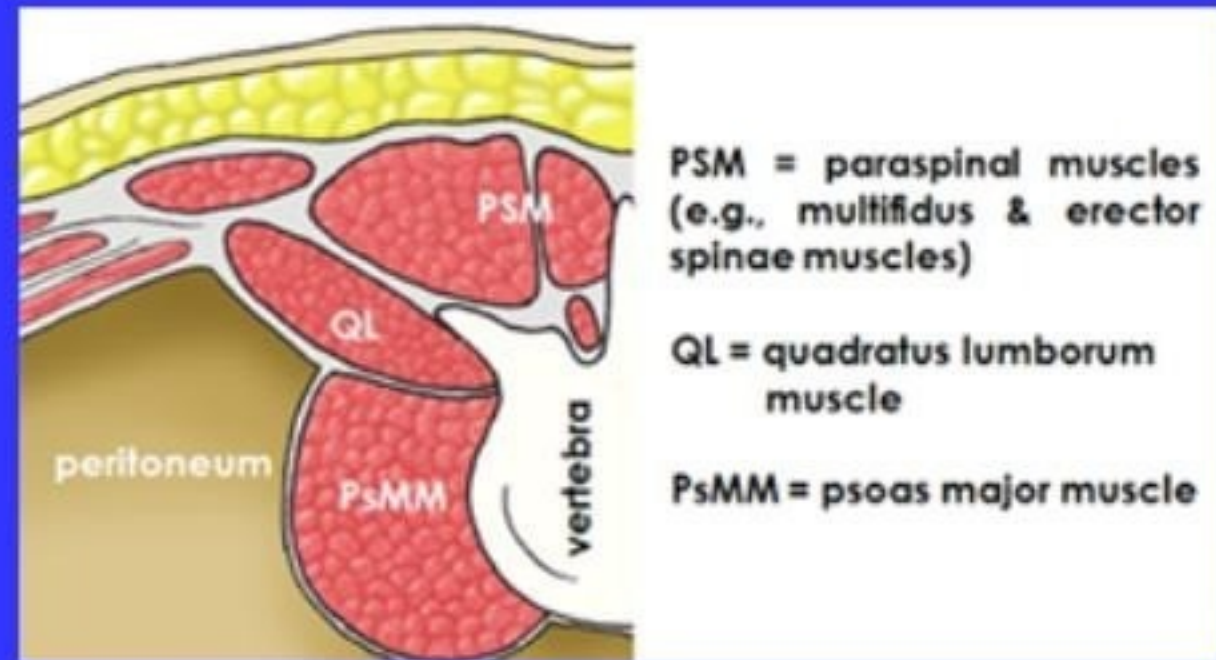
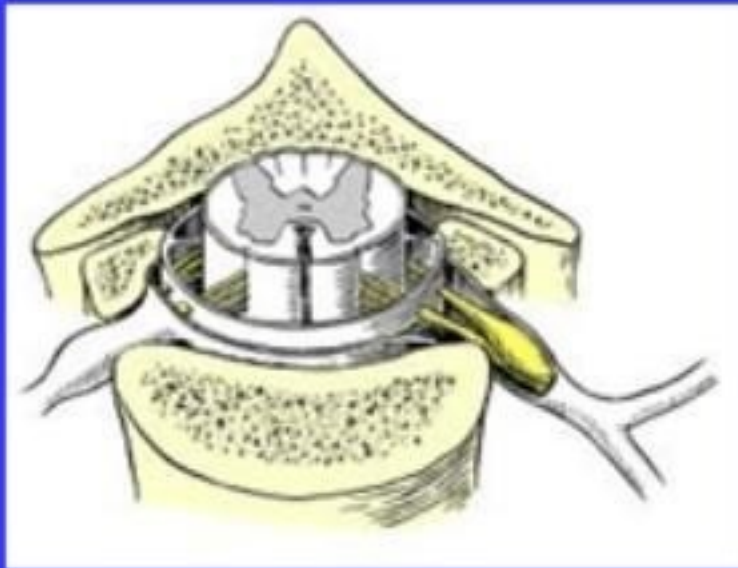
OP presentation and use of forceps increase chance for damage to lumbar and sacral nerves.

Forceps-assisted birth



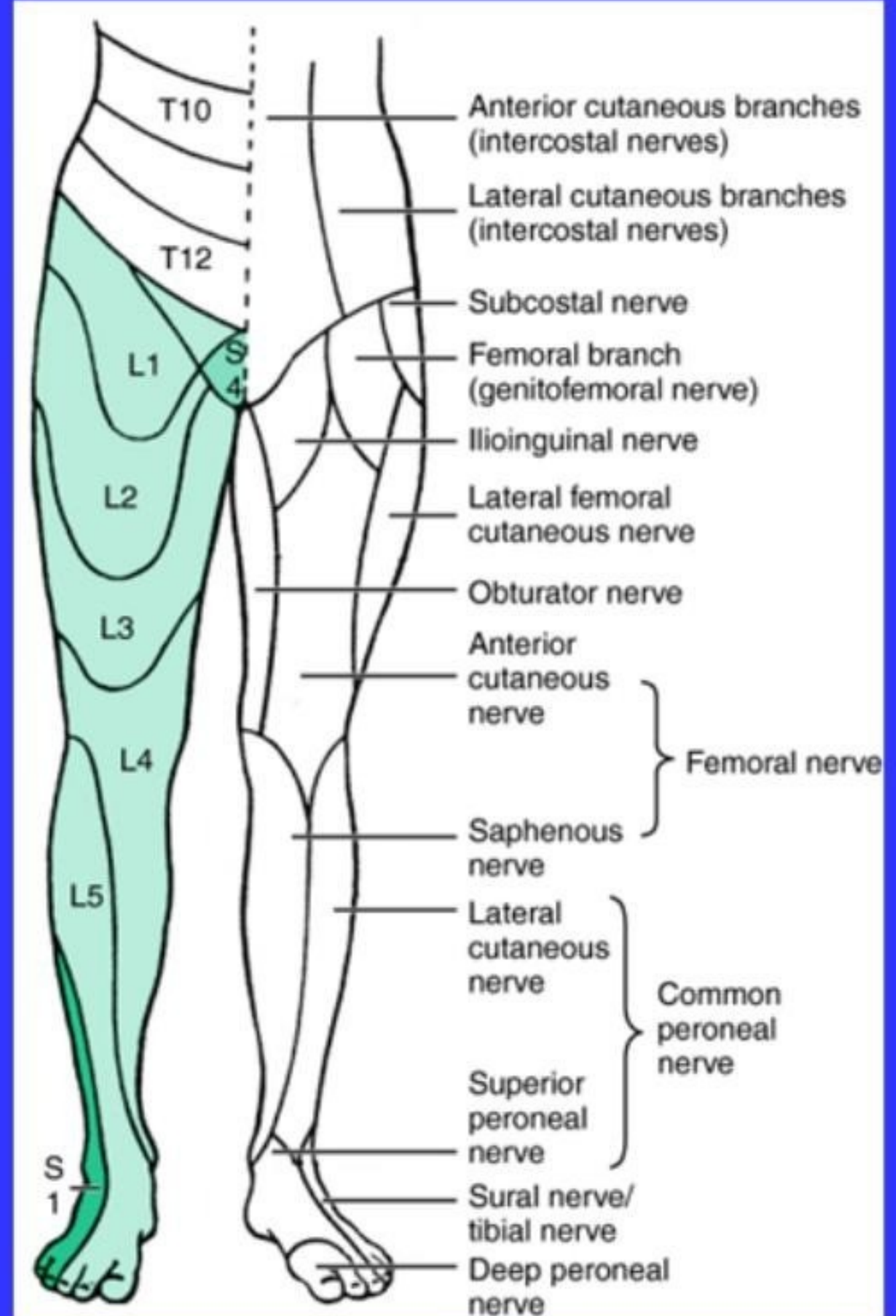
Is distribution of deficit compatible with segmental *root* damage or with *peripheral nerve* damage?

- Damage to nerve within the spinal canal (e.g. by epidural needle or toxic epidural medication) will affect ventral and dorsal *rami*. *What are the rami, again?*
- Dorsal rami go to the paraspinous muscles.



EMG of paraspinal muscles can differentiate root lesions (caused by neuraxial block) from peripheral nerve lesions (caused by stretch or pressure).

“Segmental” spinal root lesions will have a different distribution than peripheral nerve lesions.



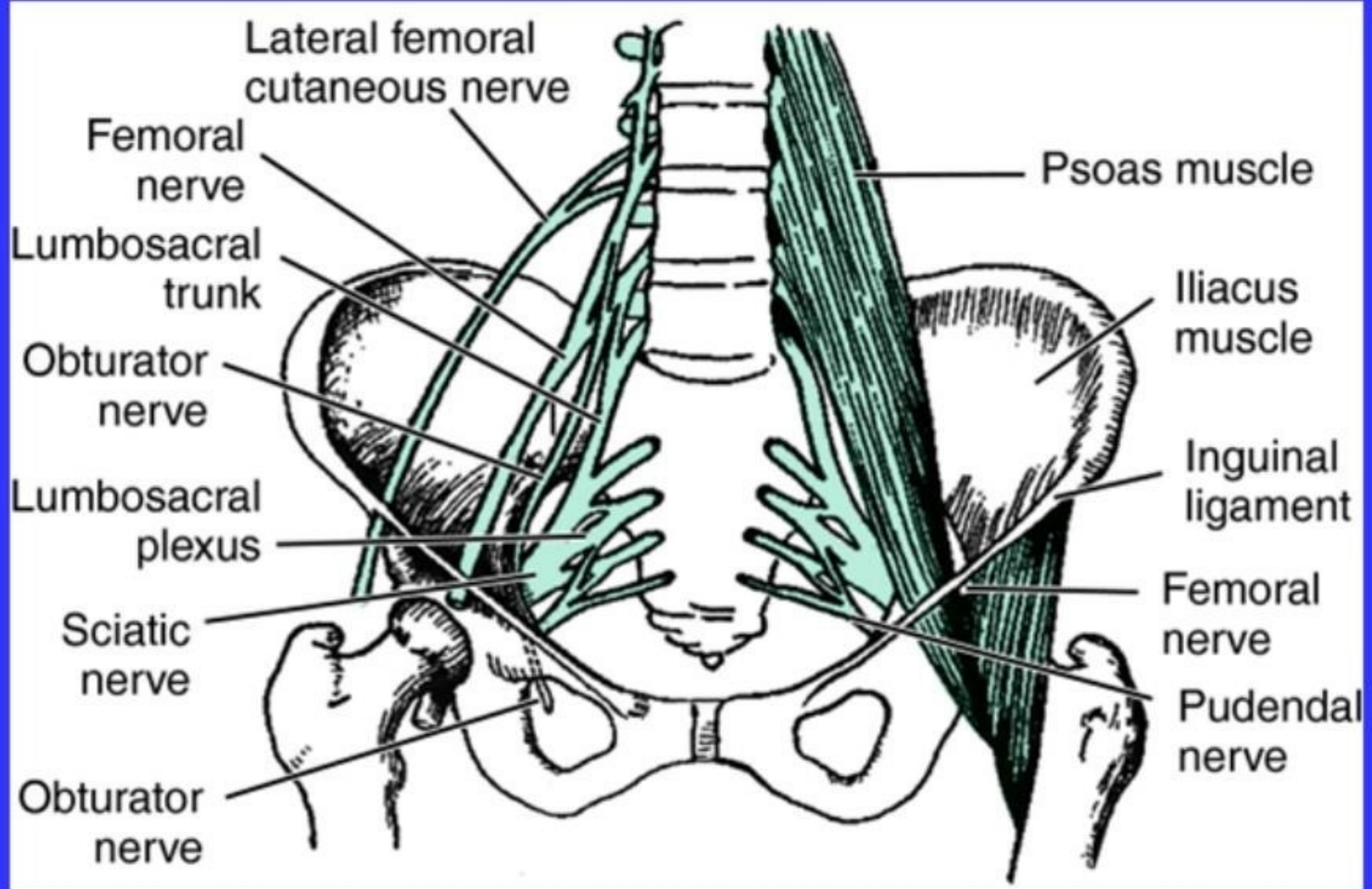


FIGURE 32-3 The lumbosacral trunk (L4 to L5) and obturator nerve (L2 to L4) are vulnerable to pressure as they cross the pelvic brim, particularly in cases of cephalopelvic disproportion. The femoral (L2 to L4) and lateral femoral cutaneous (L2 to L3) nerves are particularly vulnerable in the lithotomy position, where they pass beneath the inguinal ligament.

Adapted from Cole JT. Maternal obstetric paralysis. Am J Obstet Gynecol 1946; 52:374.

Maternal obstetrical palsy

- Abnormal presentation, persistent occiput posterior position, fetal macrosomia, breakthrough pain during epidural labor analgesia, a prolonged second stage of labor, difficult instrumental delivery, and prolonged use of the lithotomy position may be risk factors for postpartum neuropathy.

Safeguards to Minimize Peripheral Nerve Compression

Avoid prolonged use of the lithotomy position; regularly reduce hip flexion and abduction.

Avoid compression of sciatic or peroneal nerve (stirrup at fibula).

Place hip wedge under bony pelvis rather than buttock.

Use low-dose local anesthetic/opioid combinations during labor to minimize numbness and allow maximum mobility.

Encourage the parturient to change position regularly.

My advice to my residents on handling headache or leg neuro changes:

- Don't minimize or ignore the problem.
- Reassure— almost all lesions resolve within days to weeks.
- Make it easy for patient to reach you and / or a neurologist.
- When in doubt— consult.

Volatile anesthetic vapors

- Sevoflurane, desflurane (halothane in the old days). Not N₂O.
- Uterine relaxants– atony. Effect should be short lived once DC'd.
- Beneficial for uterine relaxation in uterine inversion or abdominal surgery.

Case 6--bleeding after CS under GA

- Nurse tells OB that patient is bleeding vaginally in the PACU after CS under GA. Patient is awake.
- OB confirms that anesthesiologist used sevoflurane.
- OB says, “Don’t worry, it’s the sevoflurane.”

Case 6--bleeding after CS under GA

- Patient has PPH from unrecognized cervical laceration.
- Volatile anesthetics are eliminated very rapidly from the body.
- At low dose, any uterine relaxant effect can be reversed by oxytocin.

Case 7– Muscle relaxants and magnesium

- Emergent CS in pre-eclamptic on mag for NRFHT □ GA.
- After induction and delivery, OB complains, “Patient is bucking, I can’t close!”
- Anesthesiologist gives vecuronium □ excellent relaxation / rapid closure.

Case 7– Muscle relaxants and magnesium

- Anesthesiologist can't “reverse” the vecuronium at the end of surgery. Patient is weak, despite being conscious.
- Patient remains intubated for several hours in PACU and is upset at the “terrible experience.”

Case 7– Muscle relaxants and magnesium

- What could have been done differently?
- Deepen anesthesia with propofol, fentanyl, sevoflurane, *without* resorting to vecuronium. “Relaxation without relaxant.”
- Abdominal wall has been distended—muscle *relaxant* not really needed, usually. Just avoid cough, strain, etc.

Case 7– Muscle relaxants and magnesium

When prolonged intubation is required ☐
think benzodiazepines (midazolam) for
amnesia.

Remember (and remind us) that magnesium
will increase effect of NMB agents.

Neuromuscular blocking drugs

- Vecuronium, rocuronium (like curare). Not succinylcholine (short-acting).
- May be used during CS under GA. Effect is prolonged by MgSO_4 .
- If we use too much $\square$ patient stays on a ventilator for a few hours.

Nitroglycerin

- Smooth muscle relaxant (dilator).
- Will relax uterus AND decrease BP. Dose is two puffs under the tongue or 40 mcgm IV.

Case 8— fetal bradycardia after CSE

- Treated with NTG IV, 100 mcgm.
- BP falls from 110/60 $\square$ 80/40.
- Rx with ephedrine or phenylephrine. This will not contract uterus but will raise BP.
- Terbutaline will not decrease BP.

Case 9– anaphylaxis to cefazolin

- C-section for arrest of descent, epidural in place.
- Epidural dosed in OR, good block, routine cefazolin given.
- Hypotension, wheezing, hives. BP not responsive to ephedrine, phenylephrine.

Case 9– anaphylaxis to cefazolin

- Rapid administration of epinephrine (40 mcg x 3 doses, vasopressin total of 4 units, IV volume□ increased BP.
- Arterial line started□ initial ABG shows BE of -7.
- Wheezing and hives abate. Intubation not needed. Baby delivered OK.

Case 9– anaphylaxis to cefazolin

- Patient recovered in OB PACU. Received a few more small doses of epinephrine (5-10 mcg).
- Observed in ICU for one day.
- I am not aware of any further problems.

Anaphylaxis learning points

- Vigilance and recognition.
- Rapid use of epinephrine when usual measures for spinal hypotension not effective. Adjunctive use of vasopressin?
- Abundant IV volume administration.
- Be ready to intubate, but not needed here.

Anaphylaxis learning points

- Measures of secondary importance—steroids, H1 (diphenhydramine) and H2 blockers (famotidine).
- Comments from OBs about this case?

The End