

# **MANAGEMENT OF THE PARTURIENT WITH COMORBID NEUROLOGICAL DISEASE - PATHWAYS TO SUCCESS**

**LISA LEFFERT, MD**

**CHIEF OBSTETRIC ANESTHESIA**

**DEPARTMENT OF ANESTHESIA, CRITICAL CARE & PAIN MEDICINE**

**MASSACHUSETTS GENERAL HOSPITAL, BOSTON**

# DISCLOSURES

**I have no conflicts of interest**

**I am NOT a neurologist**

**I am married to a neurologist**



Dr. Lee Schwamm

# WHY THIS TOPIC?

- **Individual neurologic diseases are rare, but parturients with neurologic comorbidities are common**
- **Neuraxial are the techniques of choice for labor analgesia and cesarean delivery anesthesia**
- **Co-existing neurologic disease can impact eligibility for neuraxial anesthesia or general anesthesia (usual care)**
- **Knowing basic principles facilitates anesthetic choice**

**“Afflictions of the central nervous system and spinal column are contraindications”**

**EXACERBATION OF PRE-EXISTING NEUROLOGIC DISEASE  
AFTER SPINAL ANESTHESIA\***

**LEROY D. VANDAM, M.D.,† AND ROBERT D. DRIPPS, M.D.‡**

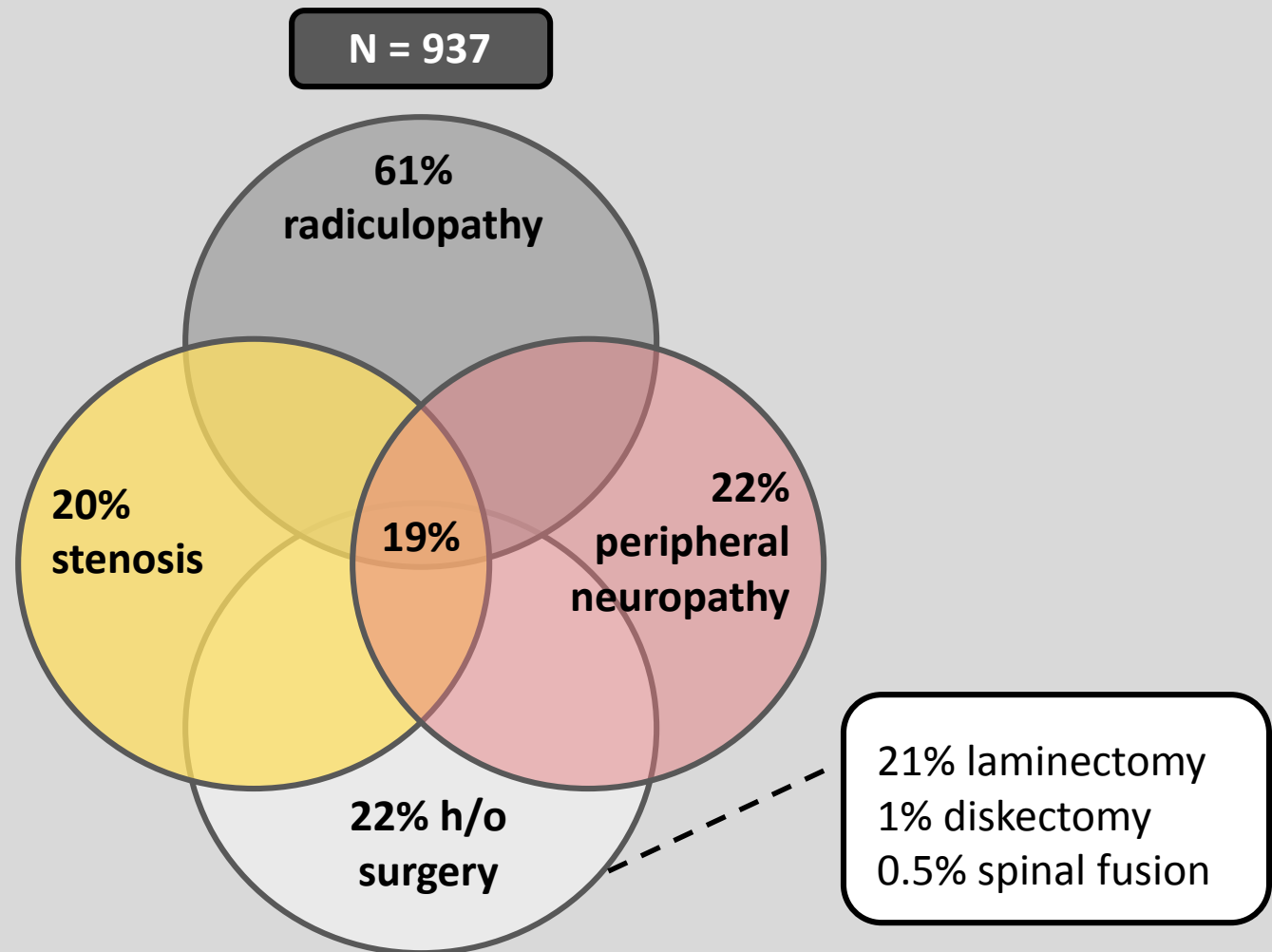
**BOSTON AND PHILADELPHIA**

**THE NEW ENGLAND JOURNAL OF MEDICINE**

**Nov. 1, 1956**

# Neuraxial Blockade in Patients with Preexisting Spinal Stenosis, Lumbar Disk Disease, or Prior Spine Surgery: Efficacy and Neurologic Complications

James R. Hebl, MD,\* Terese T. Horlocker, MD,\* Sandra L. Kopp, MD,\* and Darrell R. Schroeder, MS†

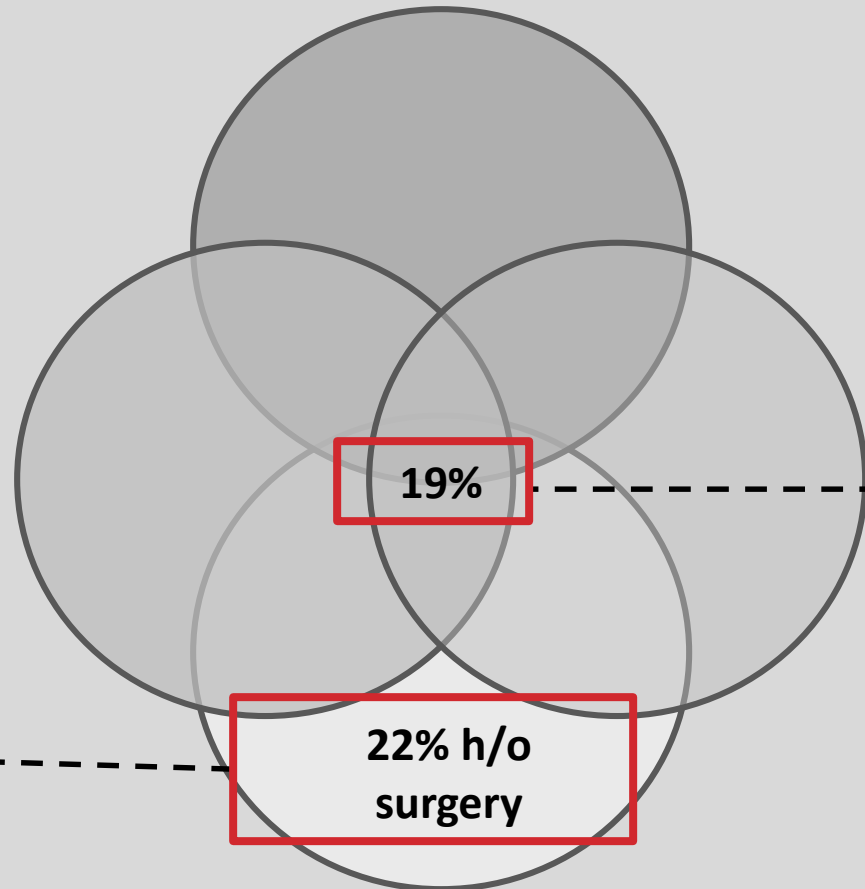


## Conclusions

Increase neurological complications secondary to surgery, anesthetic technique or natural history of disease?

### No Effect on Outcomes

- 97.1% vs. 97.6% efficacy
- No difference in technical or neurological complications



### ↑ Risk Complications

- 3.3% vs. 0.53%;  
P = 0.005
- 60% nonsurgical etiology

# OBSTETRICS VS. NON-OBSTETRICS

- Epidural Complications: **1:25,000 vs 1:3,600** ( $P < 0.0001$ )

*Moen, et al. Anesthesiology, 2004*

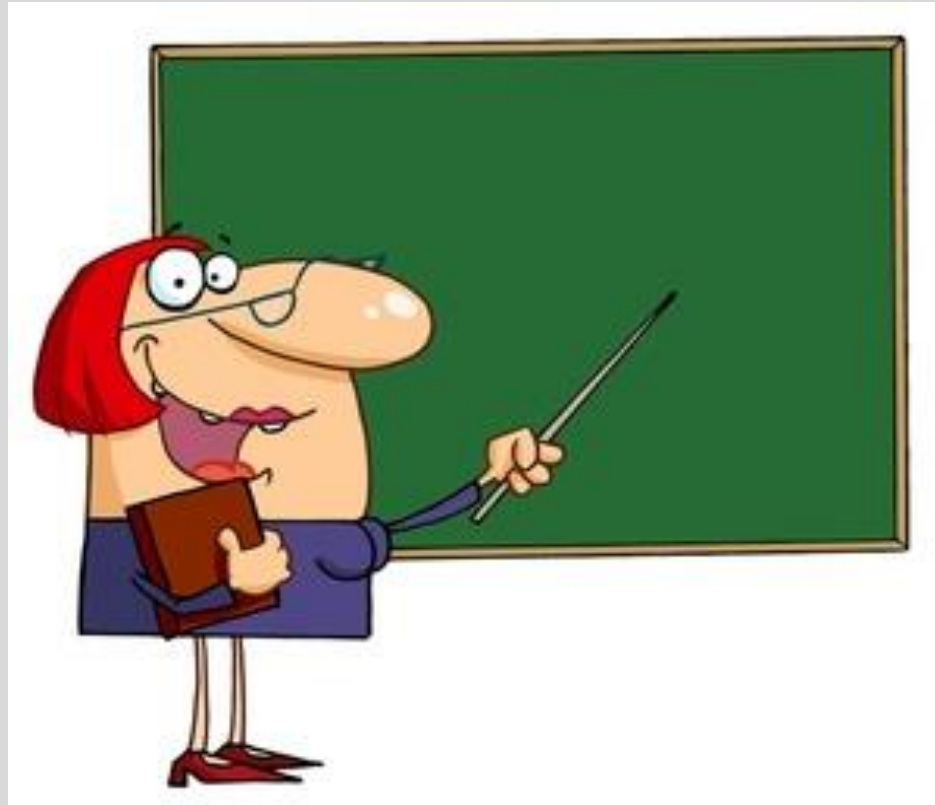
- Epidural/Spinal Hematoma:

- **1:200,000 vs. 1:3,600** ( $P < 0.0001$ ) *Moen, et al. Anesthesiology, 2004*

- **0:79,837 vs. 7:62,450** ( $P = 0.003$ ) *Bateman, et al. Anesth Analg, 2013*

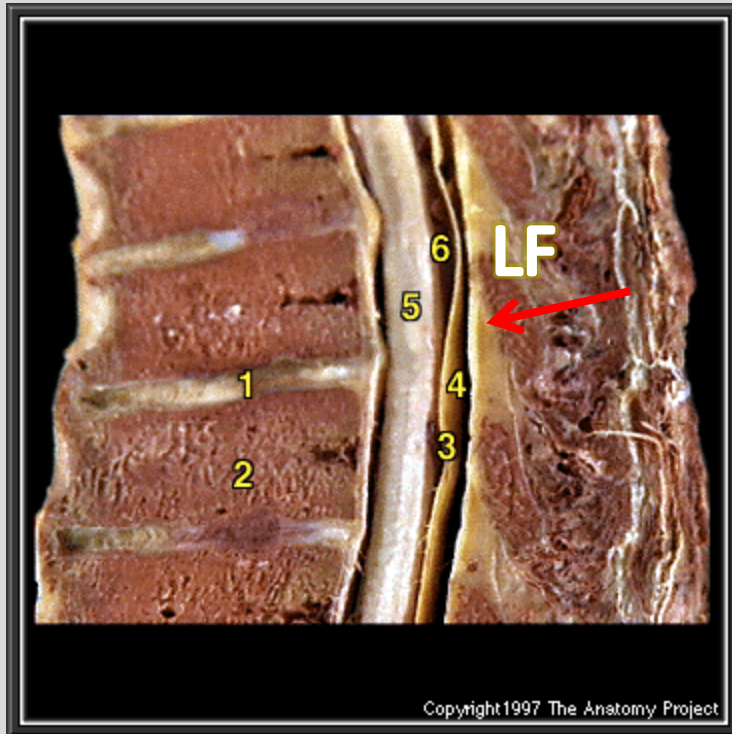
- **1:251,463** *D'Angelo, et al. Anesthesiology, 2014*

- Back pain: **~40%** OB patients *Breen, et al. Anesthesiology, 1994*





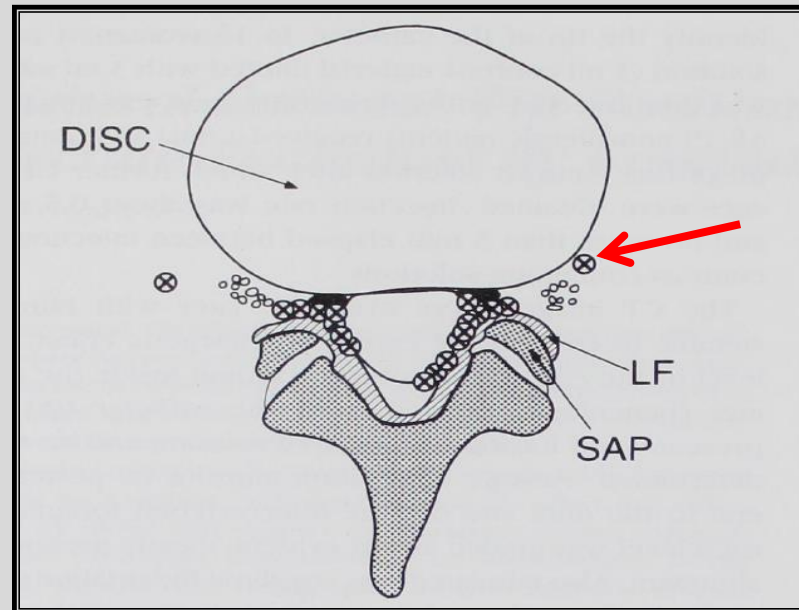
# THE SPINAL NEURAXIAL SPACE



1. Intervertebral disc
2. Vertebral body
3. Dura mater
4. Extradural or epidural space
5. Spinal cord
6. Subarachnoid space

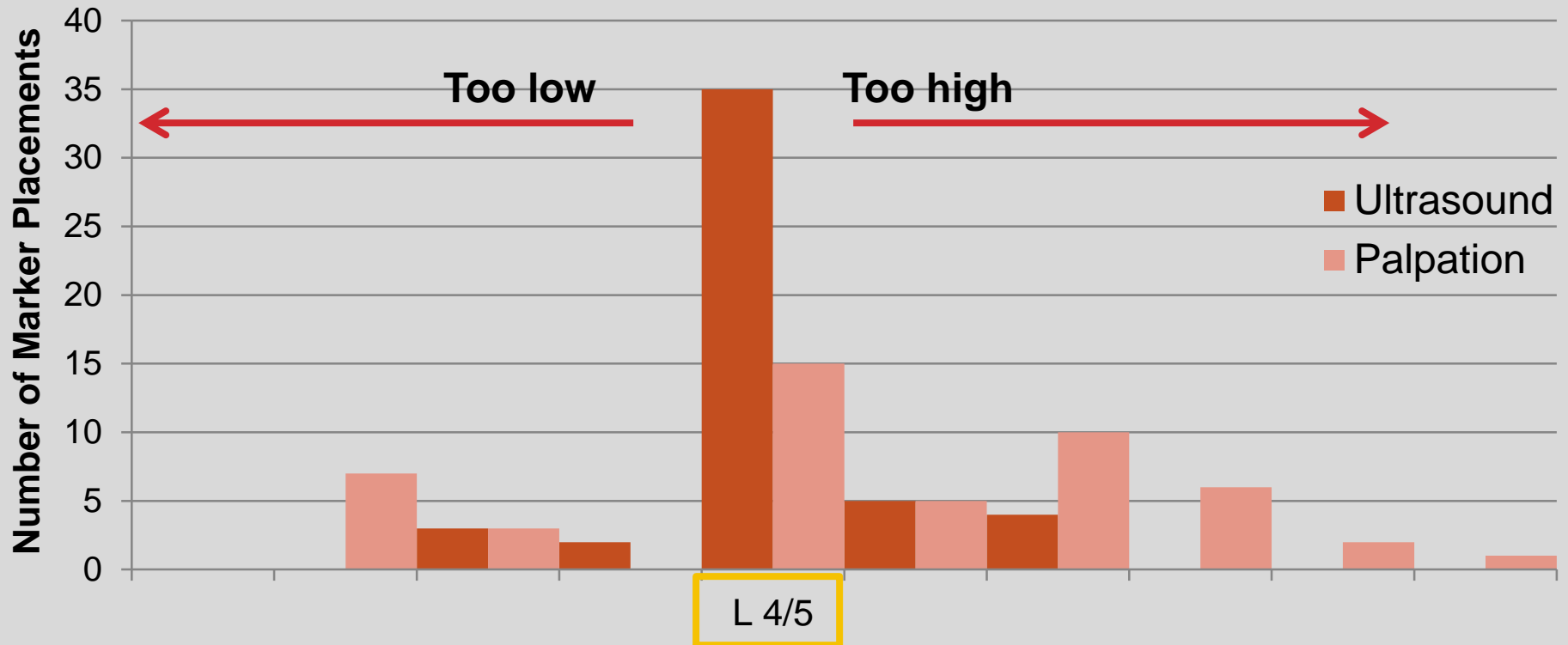
# EPIDURAL CATHETER POSITION

“Catheter tips were most often found lateral to the dura in the intervertebral foramen.”



# IDENTIFYING THE LUMBAR LEVEL

Anesthesiologists correctly identify the level: 29-37% of the time!



Incidence of marker placements by ultrasound and palpation

# KEY QUESTIONS

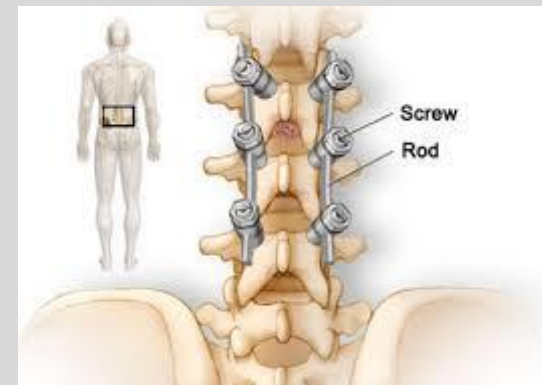
- **What is/are the primary lesion(s)**
- **Will we hurt the lesion**
  - Are the nerves abnormal
- **Will the lesion hurt us**
- **How do we approach the patient**



# WHEN BAD THINGS ARE IN GOOD PLACES: DISK DISEASE

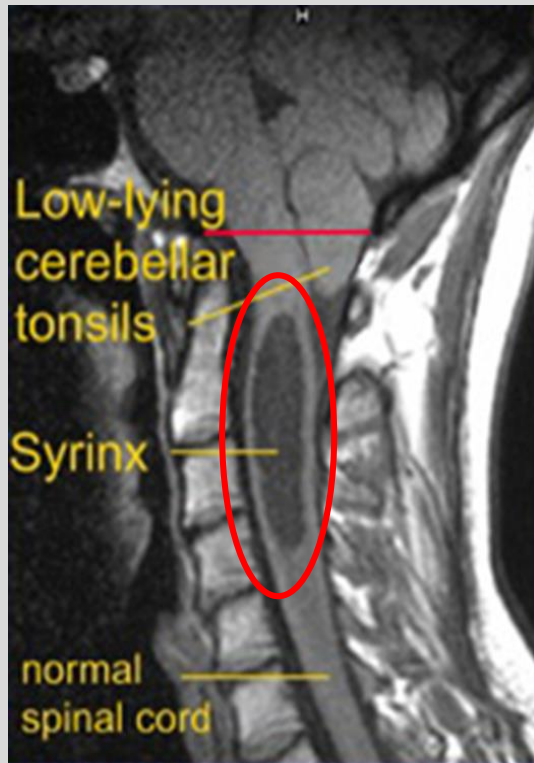
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- Spread of contrast material during epidurograms with (even) uncomplicated disease is abnormal
- Success rate in these patients is high, even after surgery
- Most significant additional risk may be positioning injuries
- If new, significant deficits post-partum, then consider expert consultation +/- imaging as needed



# WHEN BAD THINGS ARE IN GOOD PLACES

## Syrinx & Cysts



## Vascular Lesions & Tumors

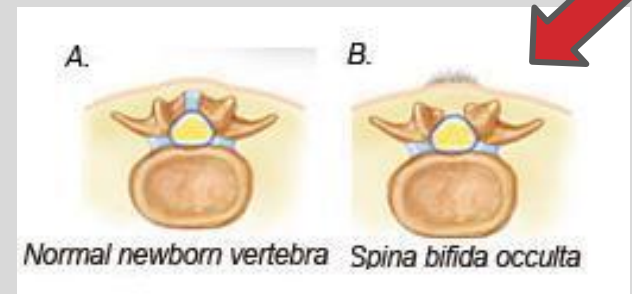


# WHEN BAD THINGS ARE IN GOOD PLACES: SPINA BIFIDA OCCULTA

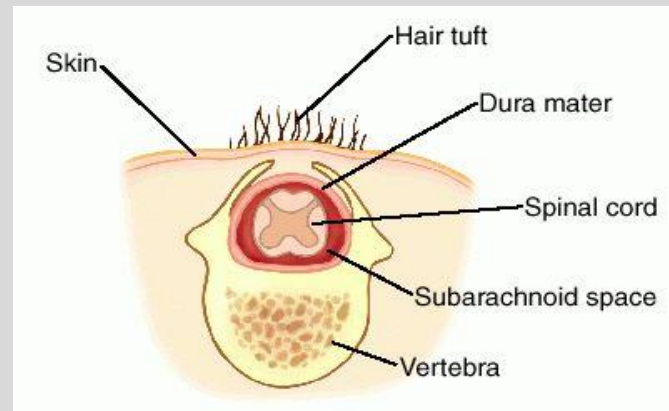
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## Failure of bony vertebrae to enclose the neural elements

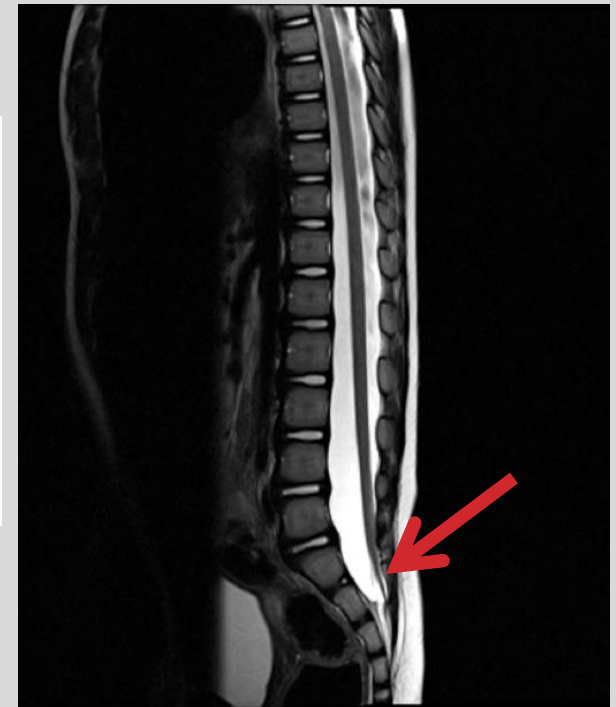
- Incidence: 1/1,400-1,500 newborns in U.S.
- *Spina Bifida Occulta*
  - Minor defect, >20% of population
  - No herniation of neural tissues
  - Usually defect of single vertebrae
  - Typically candidate for neuraxial although placement at level of defect may theoretically lead to “wet tap”



# WHEN BAD THINGS ARE IN GOOD PLACES: SPINA BIFIDA CYSTICA



## TETHERED SPINAL CORD



**If not surgically corrected, then NOT candidate for neuraxial anesthesia**



# WHEN BAD THINGS ARE IN BAD PLACES:

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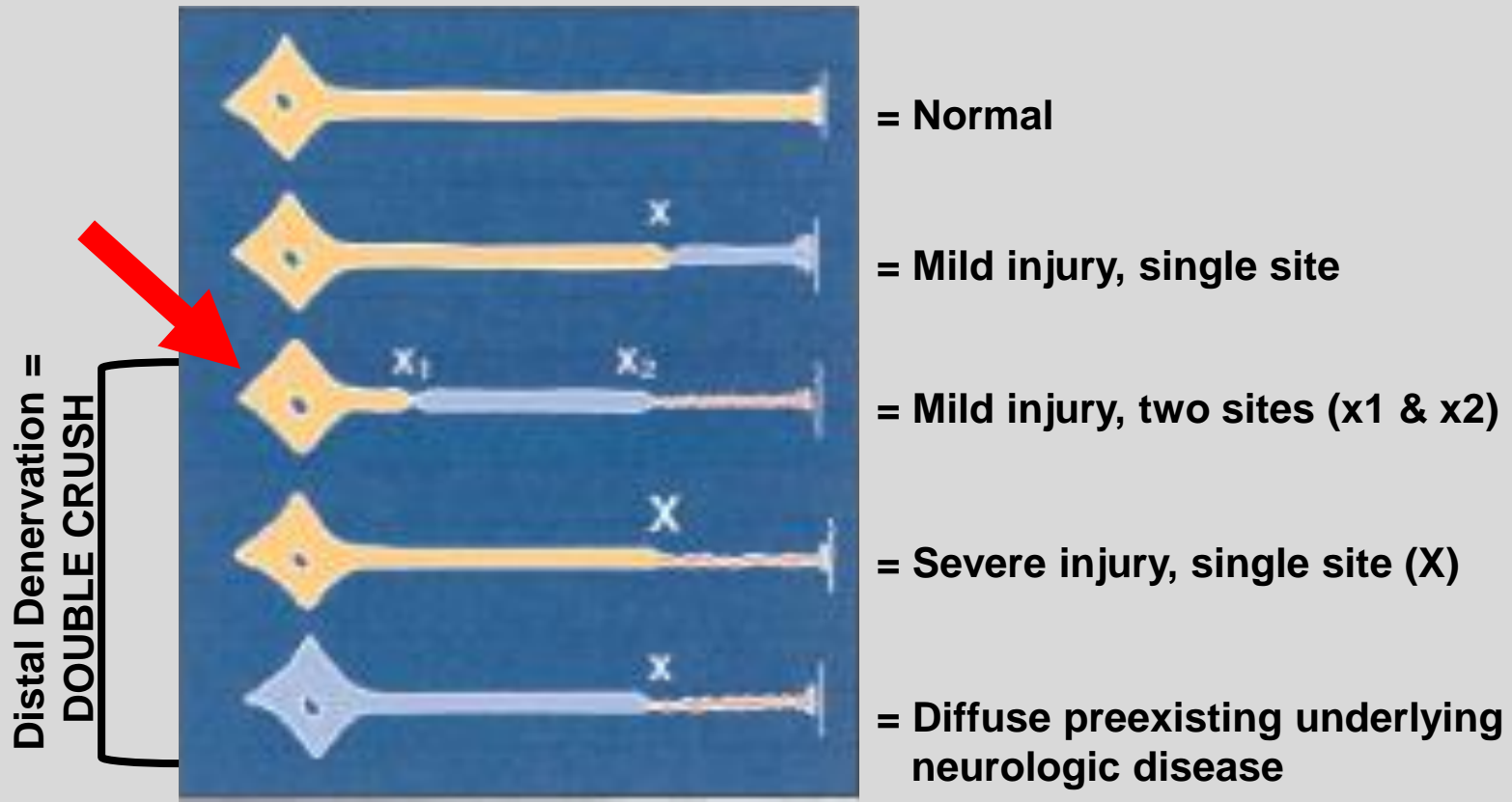
# KEY QUESTIONS

- What is/are the primary lesion(s)
- **Will we hurt the lesion**
  - Are the nerves abnormal
- Will the lesion hurt us
- How do we approach the patient



# “DOUBLE CRUSH” HYPOTHESIS

Two low grade insults may be worse than a single site insult



# MULTIPLE SCLEROSIS IN PREGNANCY

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- Pregnancy does not seem to affect disability progression
- Delivery mode, obstetrical complications, epidural analgesia and breast feeding do not affect postpartum relapse rate
- MS does not appear to confer higher risk of obstetric or neonatal complications

# Complications of Neuraxial Anesthesia in OB Patients with Multiple Sclerosis

Study First Author, Year	Study Design	Total Patients (n)	Neuraxial Analgesia		Early Postpartum Relapse Rate	Association of Relapse with Neuraxial Block	Short-Term Complications Related to Neuraxial Block
			Epidural	Spinal			
Achiron, 2004	RCT	108	79.6%	-	Varied by group because of drug	None	None reported
Bader, 1988	Case series	32	14 (44%)	13 (40%)	9 (28%)	Potentially greater risk with higher local anesthetic concentration	No higher incidence
Confavreux, 1998	Case series	223 (227 pregnancies)	41 (18%)	-	63 (28%)	No	None reported
Crawford, 1985	Case report	50 non-OB + 7 OB	57	-	1 (2%)	None	None reported
Dalmas, 2003	Case series	19	10 (53%)	-	5 (26%)	None	None reported
Finkelsztejn, 2011	Meta-analysis	1221	-	-	0.758 relapses/year	Not analyzed	Not analyzed
Kytta, 1984	Case series	56	3 (5%)	2 (3.5%)	Not reported	None	None reported
May, 2008	Case series	10	4 (40%)	1 (10%)	Not reported	Not analyzed	None reported
Pasto, 2012	Case series	349 pregnancies	65 (18.5%)	-	Mean = 0.45	None	None reported
Vukusic, 2004	Case series	227	42 (18.9%)	-	67 (28%)	No, but not design to assess the risk	None reported
Wang, 1999	Case report	1	1	-	0	None	None reported
Warren, 1982	Case report	1 (2 pregnancies)	2	-	1	None	7 weeks hypoesthesia right leg

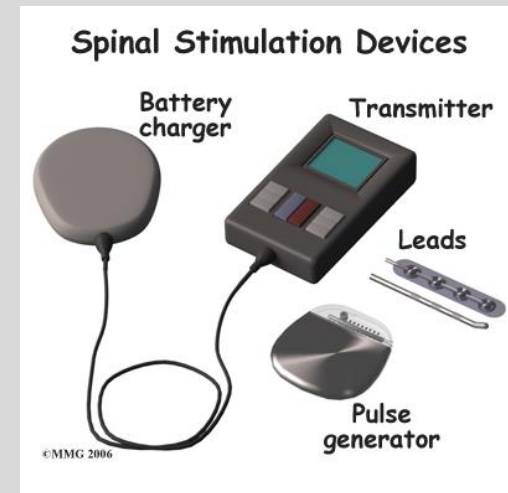
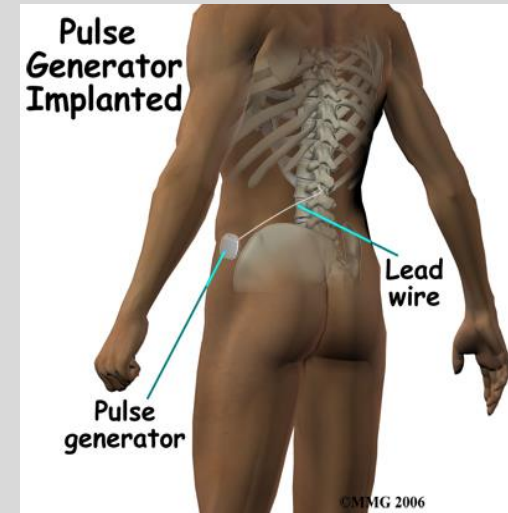
# KEY QUESTIONS

- What is/are the primary lesion(s)
- Will we hurt the lesion
  - Are the nerves abnormal
- **Will the lesion hurt us**
- How do we approach the patient



# APPLIANCES

- Why are they there?
  - Are they currently functional?



# KEY QUESTIONS

- What is/are the primary lesion(s)
- Will we hurt the lesion
  - Are the nerves abnormal
- Will the lesion hurt us
- **How do we approach the patient**



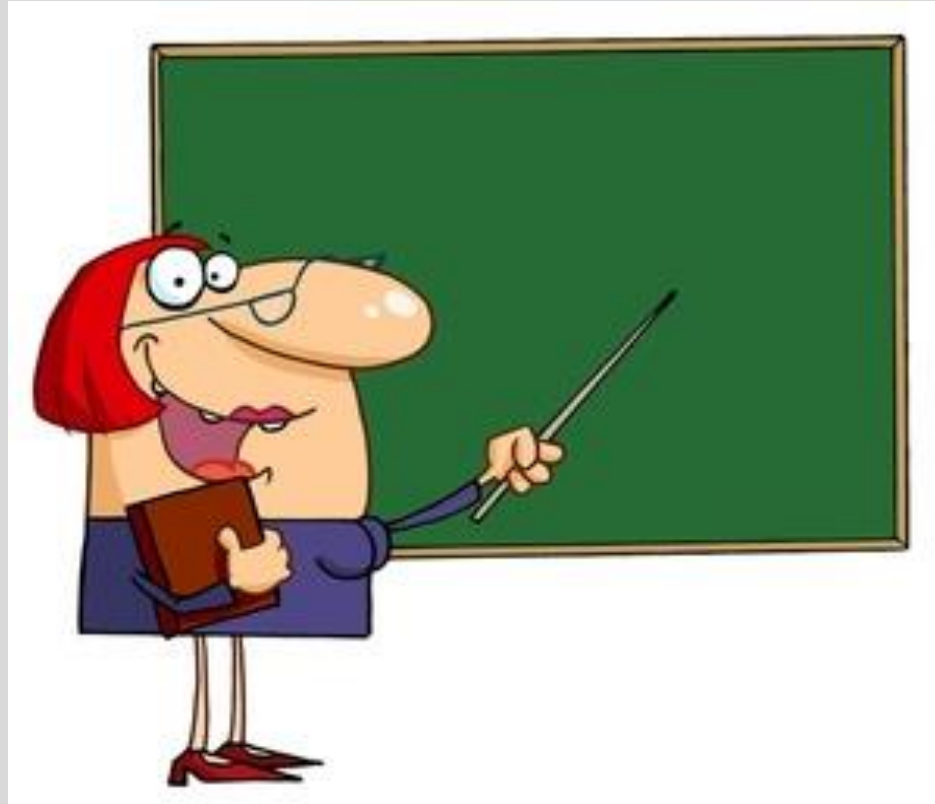


# STRATEGIES

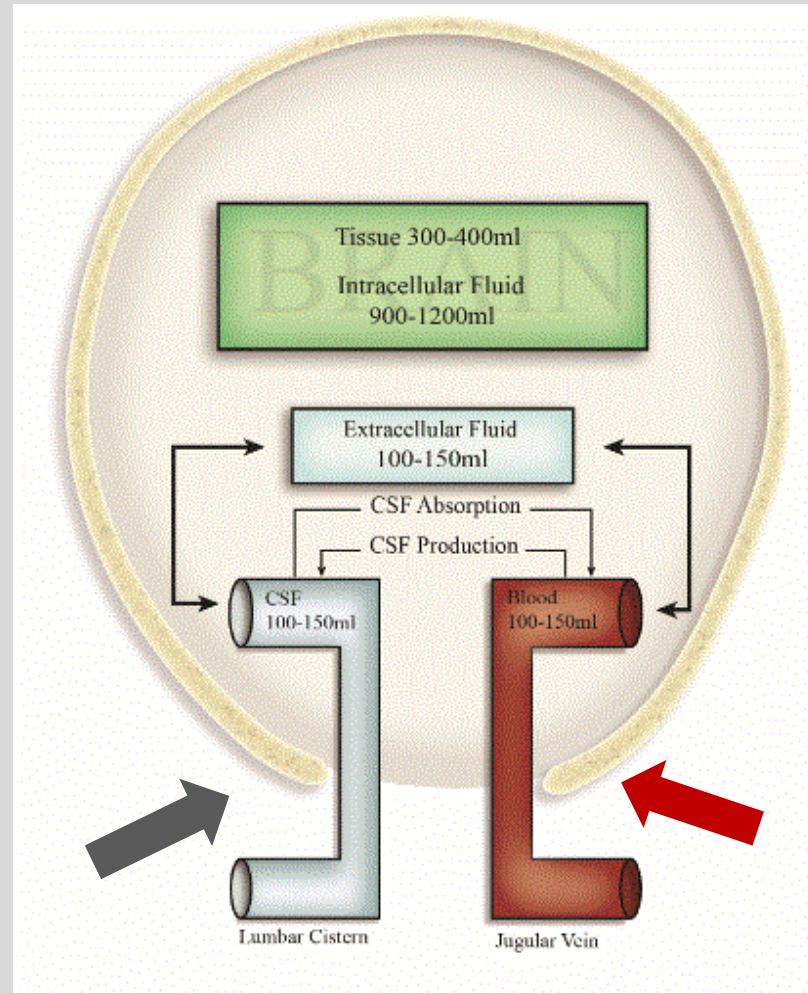
- **Informed Consent**

- Assess patient's motivation for neuraxial anesthesia
- Show them the data

- **Consider using ultrasound**

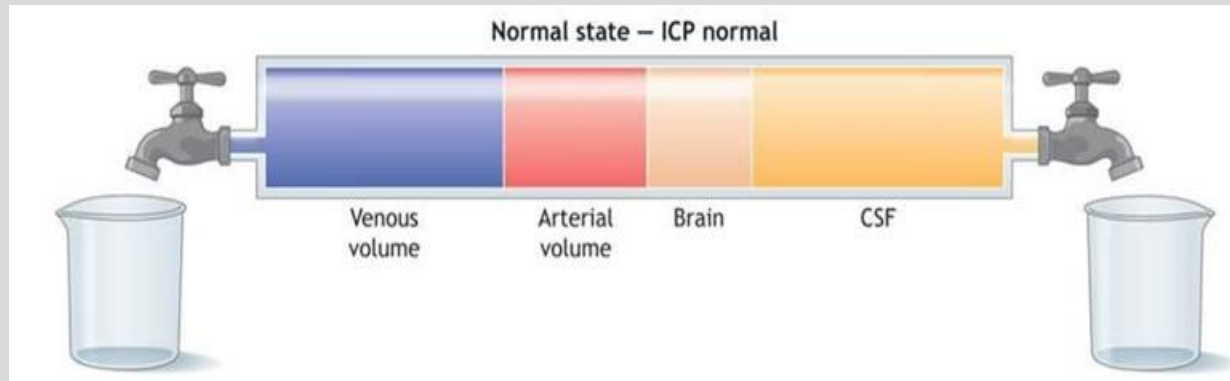


# INTRACRANIAL CONTENTS

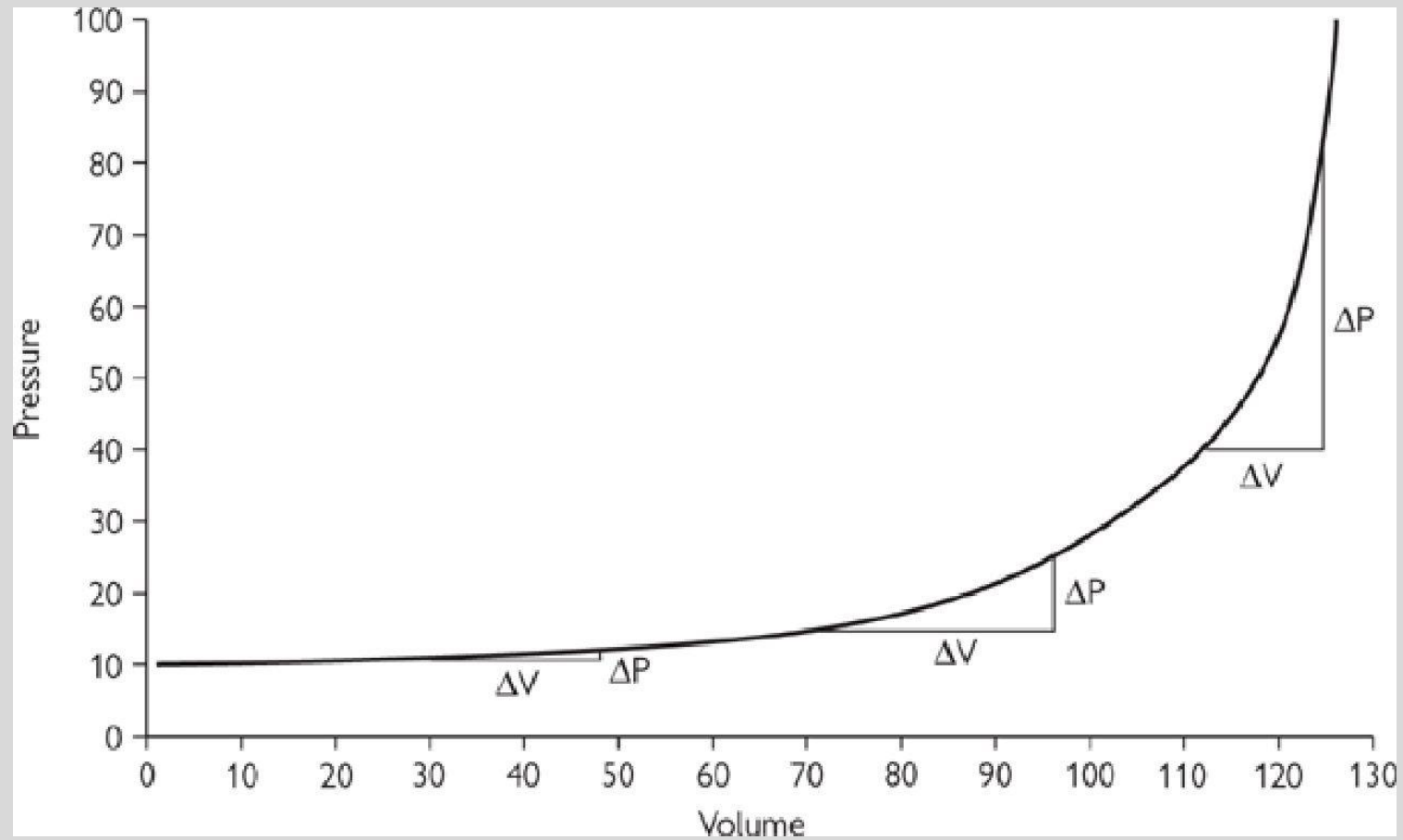


# INTRACRANIAL VOLUME: MONRO-KELLIE DOCTRINE

$$V_{\text{Blood}} + V_{\text{Brain}} + V_{\text{CSF}} = V$$



# INTRACRANIAL VOLUME/PRESSURE



# CLUES FOR INCREASED ICP

**Table 1. Features Associated with ICP**

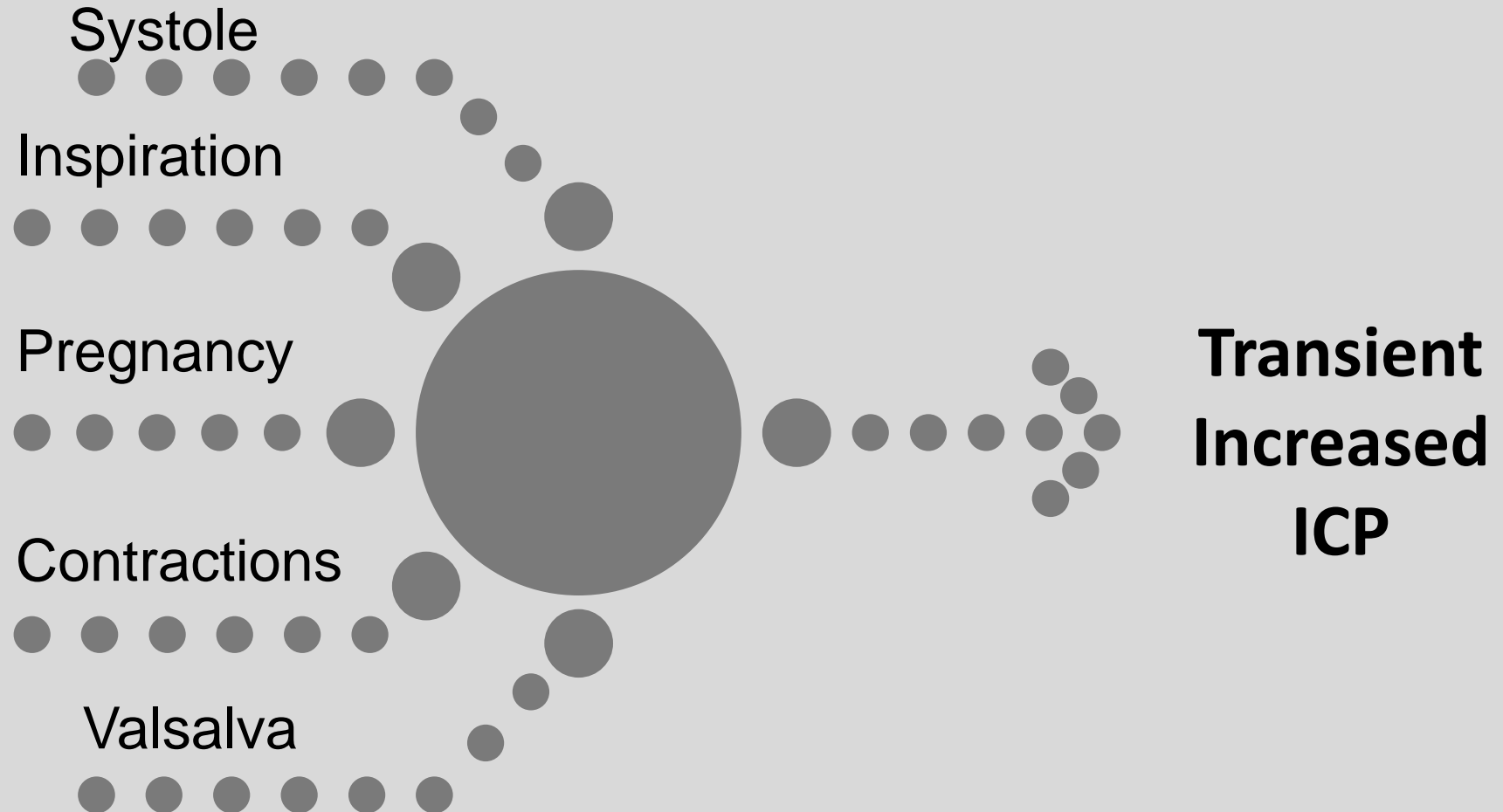
<b>Clinical Features</b>
Pupillary changes or asymmetry
Eye movements abnormalities
Papilledema
Hemiparesis
Facial weakness
New onset seizure
Decreased level of consciousness
<b>Radiologic Features on CT or MRI</b>
Tense dura
Flattened gyri
Narrowed sulci
Effaced cisterns
Compressed (or in obstruction, dilated) ventricles
Lateral shift of midline structures
(If advanced): displacement of brain tissue from one compartment to another

*CT = computed tomography; ICP = intracranial pressure; MRI = magnetic resonance imaging*



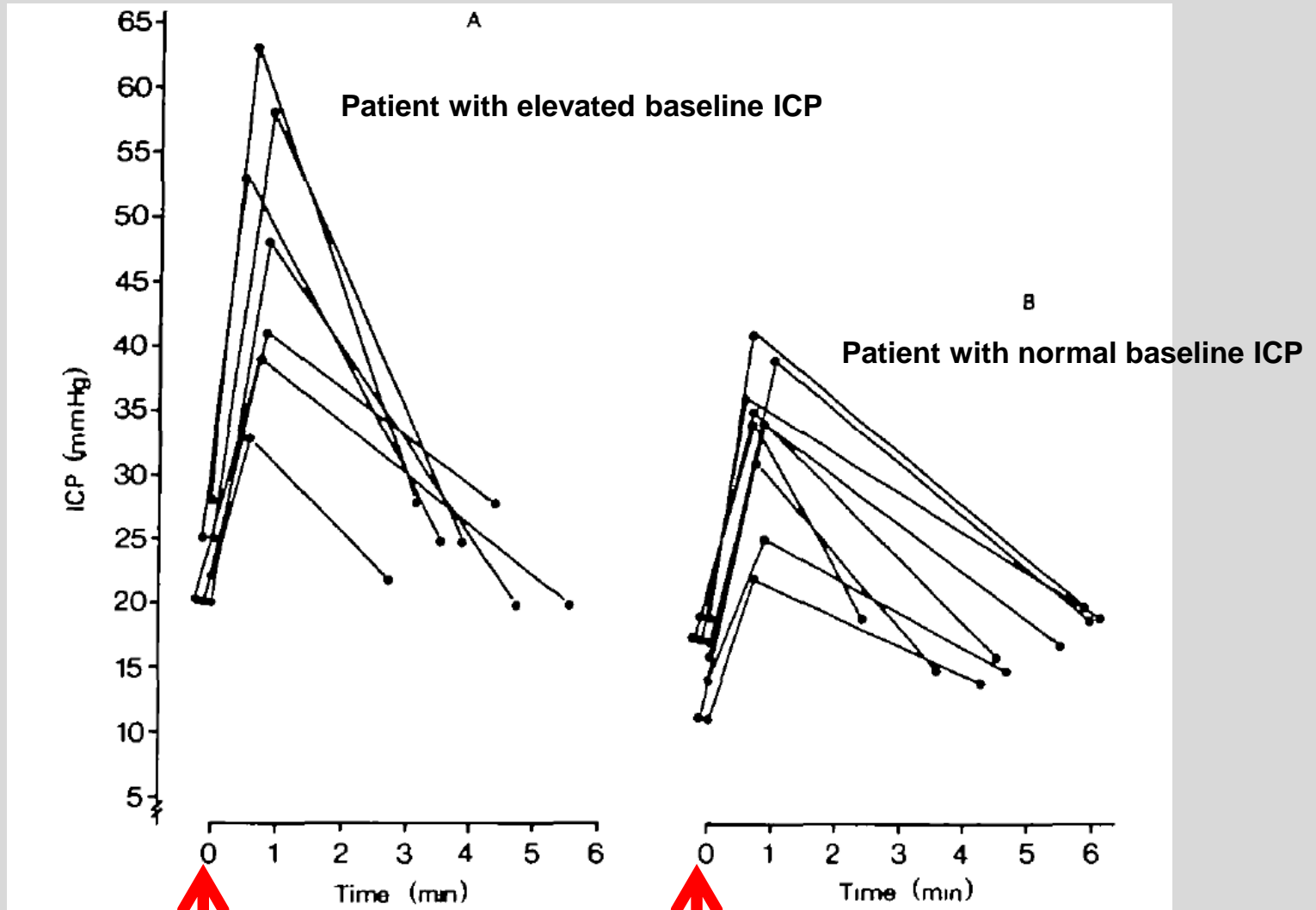
Does increased ICP  
always mean a  
contraindication to  
neuraxial?

# PHYSIOLOGIC PERTURBATIONS IMPACTING ICP

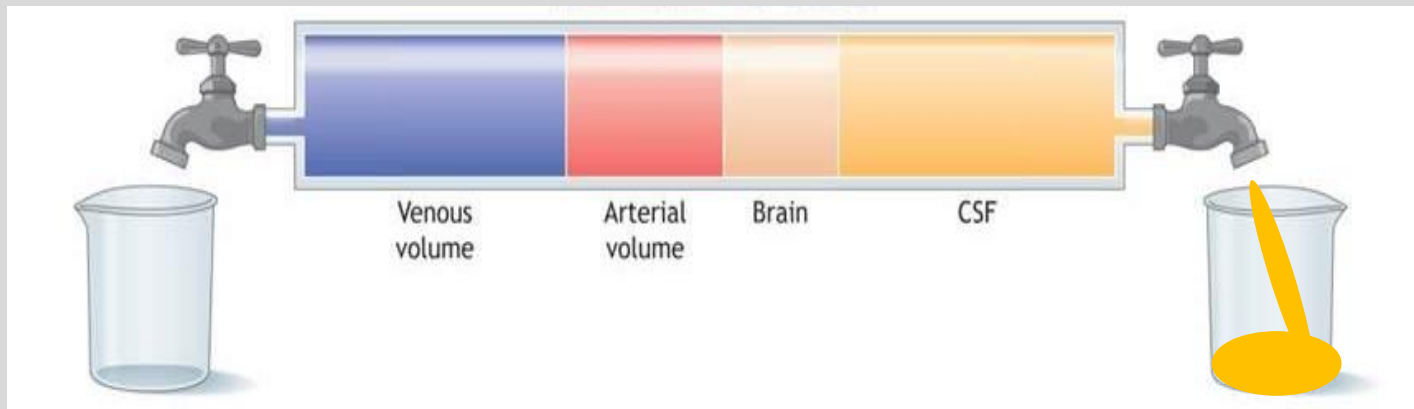




# IMPACT OF EPIDURAL ANALGESIA/ANESTHESIA ON ICP

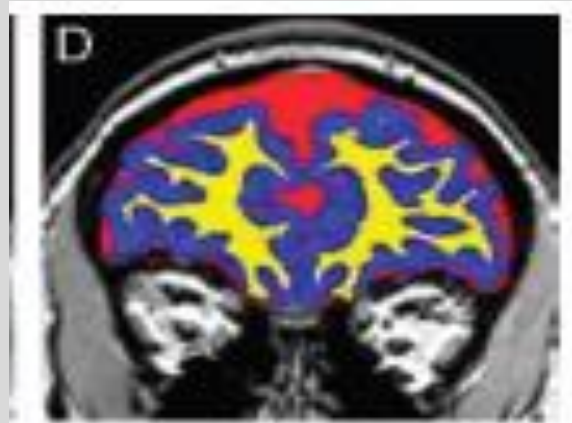


# INCREASED INTRACEREBRAL BLOOD VOLUME

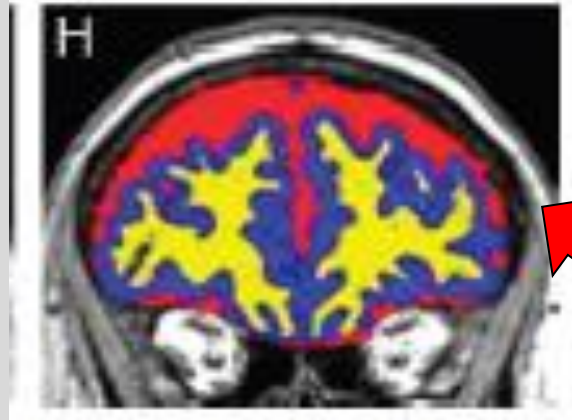


# BENIGN INTRACRANIAL HYPERTENSION

Control



Case



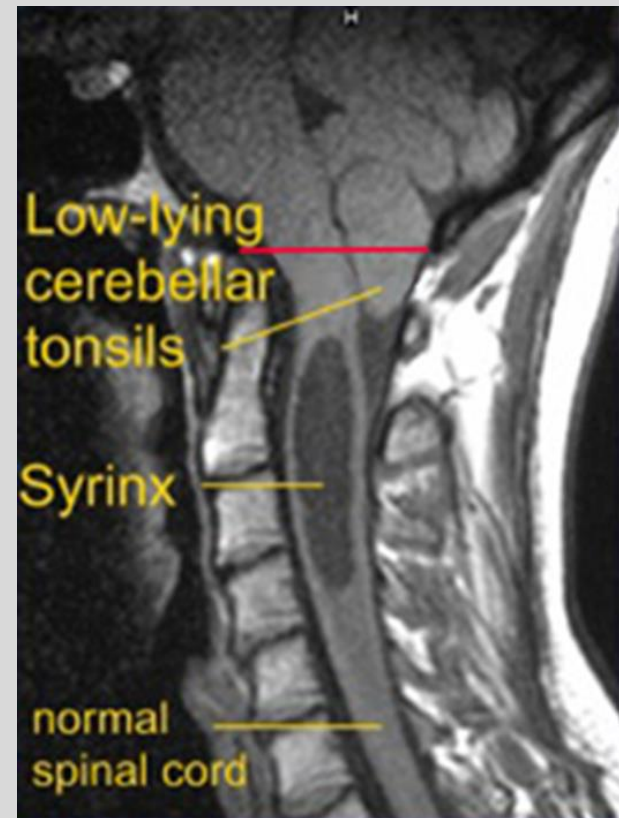
**33 yo obese primip with headache and visual field defect**

**Does normal ICP always  
imply low risk of herniation  
after dural puncture?**



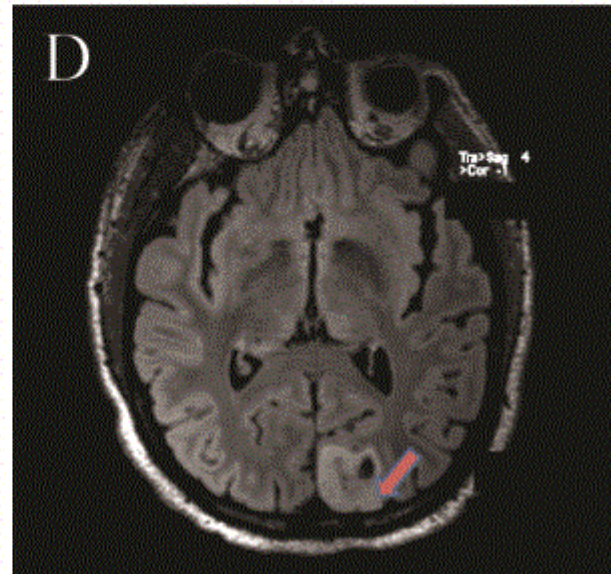
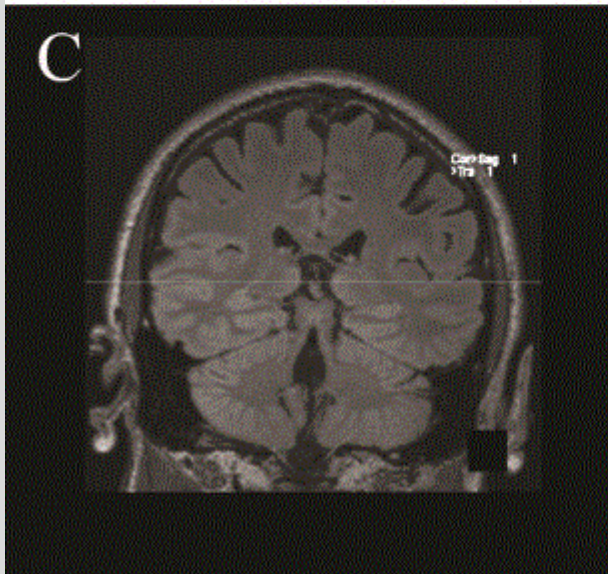
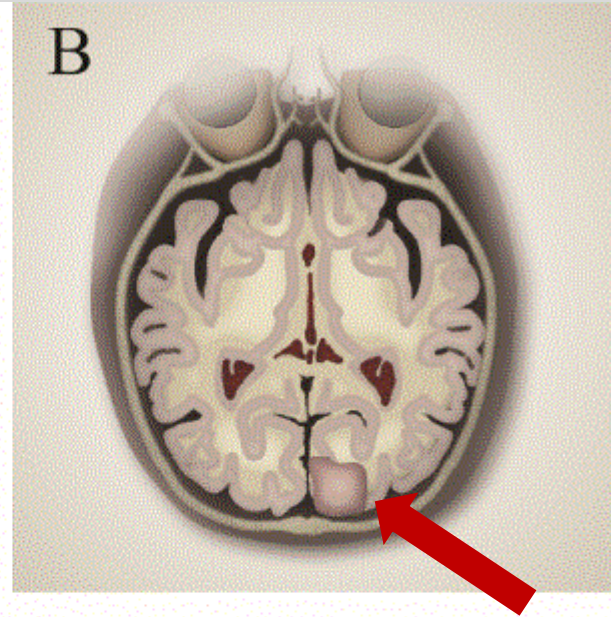
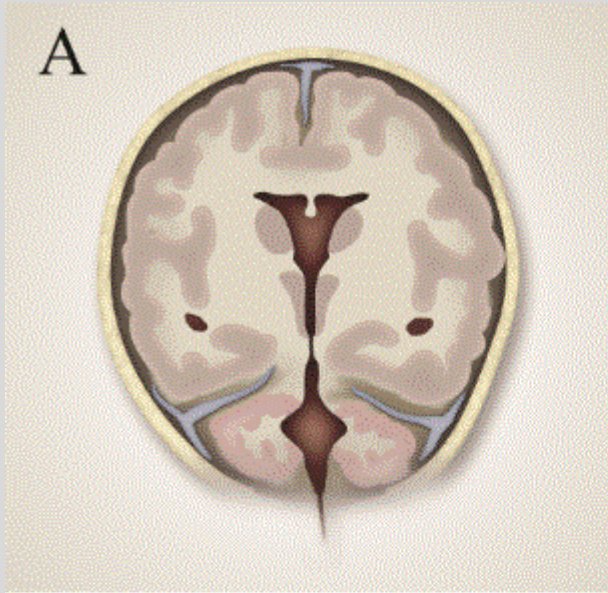
# ARNOLD CHIARI MALFORMATION

- Elongation and descent of cerebellar tonsils by  $\geq 5\text{mm}$  through foramen magnum
  - Type 1 (ACM-I) most common-spectrum of asymptomatic or have headache, ataxia, and/or sensorimotor impairment of extremities.
- May or may not have static and dynamic obstruction to CSF flow across the foramen magnum



Source	Type	Case (n)	Diagnosis Status	Surgical Correction	Anesthetic Complications
Chantigian et al. J Clin Anesth, 2002	ACM-1	9	4 Undiagnosed 5 Diagnosed	0/9	1 PDPH requiring blood patch 8 reported none
Landau et al. Anesth Analg, 2003	ACM-1	1	Diagnosed	1/1	None
Kuczkowski et al. Can J Anest, 2002	ACM-1	1	Diagnosed	0/1	None
Mueller and Oro. Am J Perinat, 2005	ACM-1	4	All diagnosed	3/4	1 reported neck pain/spasm 3 reported none
Hullander et al. Anesth Analg, 1992	ACM-1	1	Undiagnosed	0/1	HA and neck pain requiring blood patch
Semple and McClure. Anaesth, 1996	ACM-1	1	Undiagnosed	0/1	None
Nel et al. BJA, 1998	ACM-1	1	Diagnosed	0/1	None
Parker et al. Am J Perinat, 2002	ACM-1	1	Diagnosed	0/1	None
Newhouse and Kuczkowski. Arch Gynec Obstet, 2007	ACM-1	1	Diagnosed	0/1	None
Choi and Tygaraj. Case Report Anesth, 2013	ACM-1	1	Diagnosed	0/1	None
Sathi and Stieg. Neurosurgery, 1993.	ACM-1	1	Undiagnosed	0/1	PDPH requiring blood patch

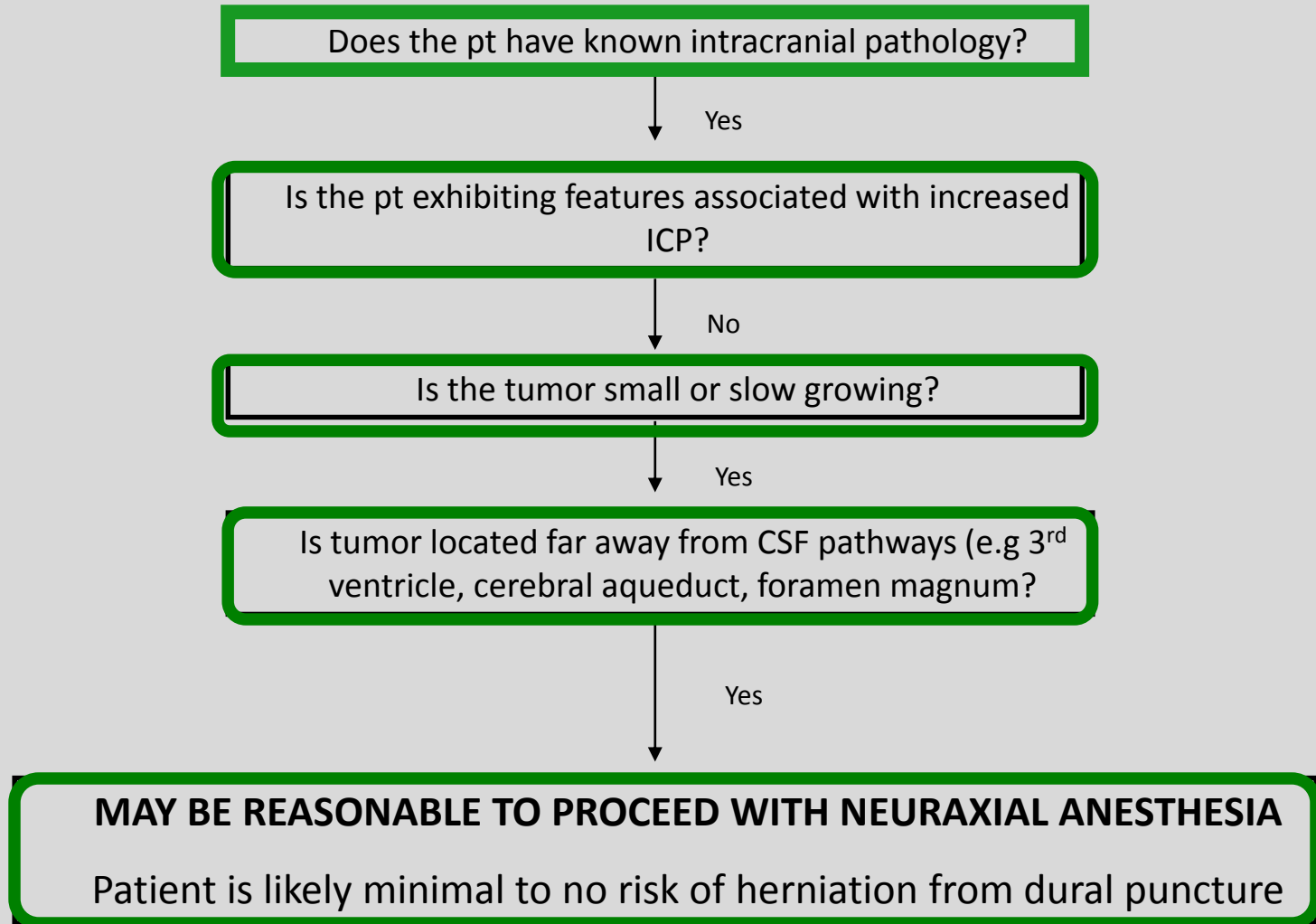




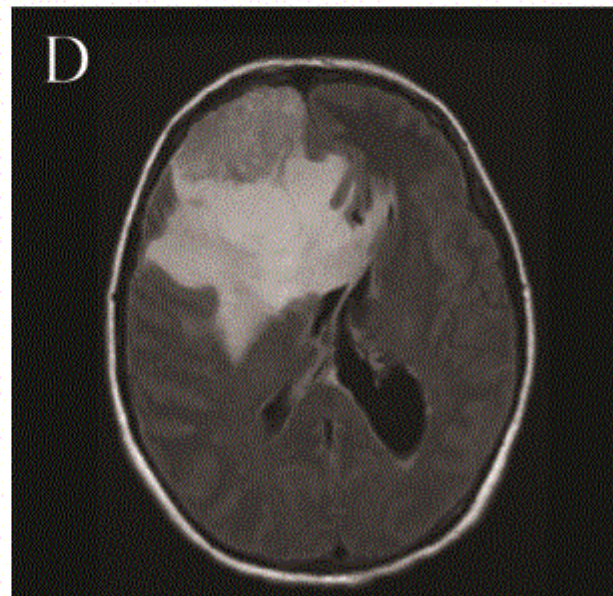
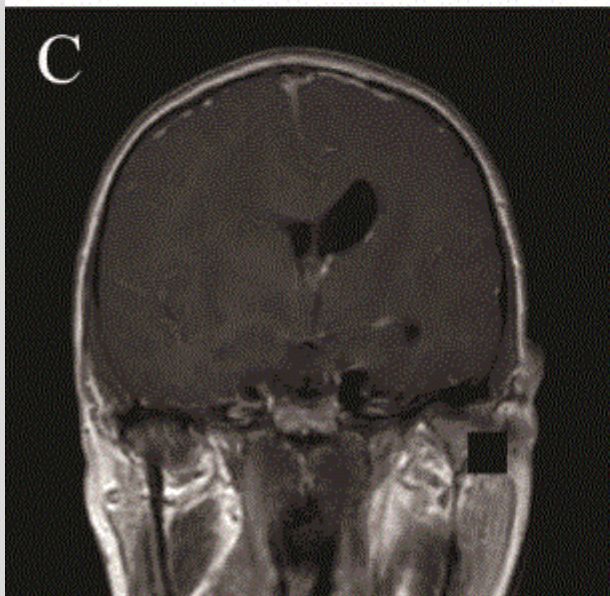
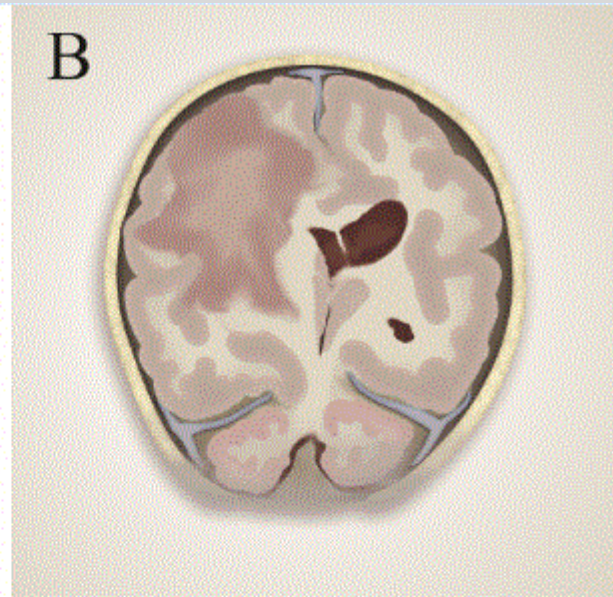
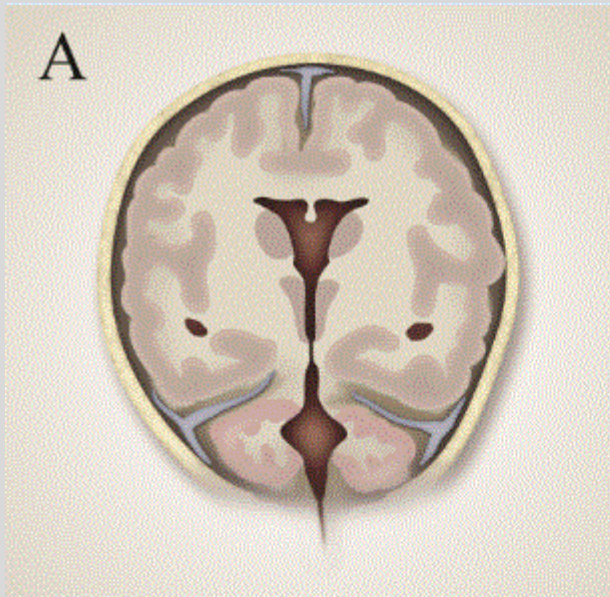
**Coronal Flair Image**

**Axial Image**

# DECISION FLOWCHART LOW RISK







**Flair Coronal Image**

**Axial Image**

# DECISION FLOWCHART HIGH RISK

Does the pt have known intracranial pathology?

Yes

Is the pt exhibiting features associated with increased ICP?

Yes

Is the tumor small or slow growing?

No

Is there significant mass effect with or without midline shift?

Yes

Is tumor located far away from CSF pathways (e.g 3<sup>rd</sup> ventricle, cerebral aqueduct, foramen magnum)?

No

**DO NOT PROCEED WITH NEURAXIAL ANESTHESIA**

Patient is likely at high risk of herniation from dural puncture



When neuraxial anesthesia poses a risk of herniation, is general anesthesia always better?

# EFFECTS OF GENERAL ANESTHESIA ON ICP

Anesthetic Agents/Maneuvers	OB-Oriented	Neuro-Oriented
Rapid Sequence Induction	↑↑	↓↑
Volatile Agents (pre-delivery)	↑↑	↓
IV Agents (pre-delivery)	↓↓	↑↑
Hyperventilation	↓↓	↑
“Awake” Emergence	↑↑	↑

*Ben-Adani et al. Acta Obstet Gynecol Scan, 2001; Boker et al, Can J Anesth, 2011; French et al, Int J Obstet Anesth, 2009; Semple et al. Anesthesia, 1996*

# SUMMARY

- Caring for obstetric patients with neurologic comorbidities is a team sport
- Understanding the basic physiology is of paramount importance whether or not general anesthesia is the technique chosen
- Don't throw the baby out with the bathwater!



