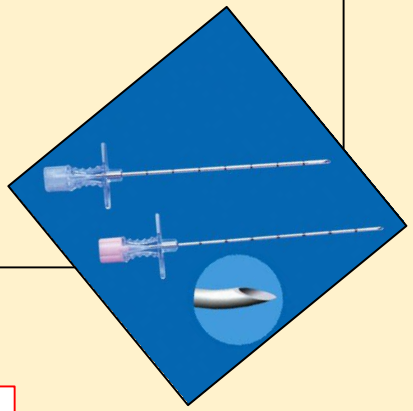
Post Dural Puncture Headache
old problem in 2017



Prof. Alexander Ioscovich

Chair of the Department of Obstetric and Ambulatory Anesthesia,

Shaare Zedek Medical Center, Hebrew University, Jerusalem

Past Chairman, Israel Association of Obstetric Anesthesia

איגוד הרופאים המרדימים בישראל

מפגש של החוג להרדמה מיילדותית בנושא

מבט כללי על PDPH

המפגש יוקדש לזכרה של ד"ר נטלי פירמן ז"ל

יום שישי 24 ביוני 2016, בית סוראסקי, תל השומר

מנחה - ד"ר אלכסנדר יוסקוביץ , יושב ראש החוג

08:00-09:00	התכנסות וכיבוד קל	
9:00-09:20	דברי פתיחה	ד"ר יוחנן שיפמן מנהל מחלקת הרדמה ביה"ח הדסה "הר הצופים"
9:20-09:45	PDPH - מבט של נוירולוג	ד"ר רוני אייבל, ביה"ח שערי צדק
9:45-10:10	PDPH - מבט הרדמתי	ד"ר שלמה פירמן, ביה"ח בילינסון
10:10-10:30	Major complications of dural puncture	ד"ר שמעון פירמן, ביה"ח הדסה עין כרם
10:30-10:45	"Please stop using large bore cutting spinal needles for lumbar puncture".	פרופ' יהודה גינוסר ביה"ח הדסה עין כרם
10:45-11:00	דיון: פרופ' יהודה גינוסר, פרופ' קרולין ויינגר	
11:00-11:20	הפסקת קפה	
11:20 –11:45	Low CSF Pressure Headache - Pain clinic point of view.	ד"ר אדריאן גרוזנפילד וד"ר נדים נשלנקוב ביה"ח "שיבא" תל השומר
11:45-12:05	תוצאות ראשוניות של סקר ארצי על גישה ל PDPH	ד"ר דניאל שטולין, ביה"ח שערי צדק
12:05 -12:20	דף הסכמה אחיד לביצוע Blood Patch	ד"ר אלכסנדר יוסקוביץ, ביה"ח שערי צדק
12:20-12:30	דיון	

TRUPHARM AMOS GAZIT LTD. MSD

European Society of Anaesthesiology ESA

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CLINICAL TRIAL NETWORK

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- EPiMAP Obstetrics
  - About EPiMAP
  - Objectives
  - Timeline
  - Join the study
  - Documents Protocol and

EPiMAP Obstetrics

EPiMAP Obstetrics: European Practices in the Management of Accidental dural Puncture in Obstetrics: European prospective multicentre observational audit to MAP out current practices in

End of 2017

Karl August Gustav Bier

- 1861 - 1949
- **Professor of Surgery** and Chief Surgeon at the Charité – University (Berlin)
- IV regional anesthesia – **Bier Block**
- **First operation under spinal** anesthesia – **1898**
- Discovery of **PDPH Phenomena**

~ 2000-2005

20 min

~2012 - 2017

Israel national PDPH survey

PDPH

Cephalalgia 2004 ICHD-2 → *Cephalalgia 2013 ICHD-3*

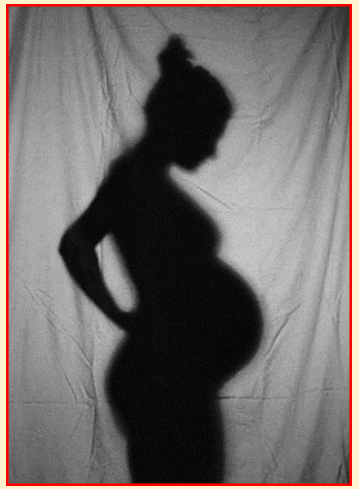
Cephalalgia
An International Journal of Headache
International Headache Society

A. Headache worsens/improves within 15 minutes after positional change, fulfilling C and D and with at least one of:
   neck stiffness tinnitus hypoacusia
   photophobia nausea

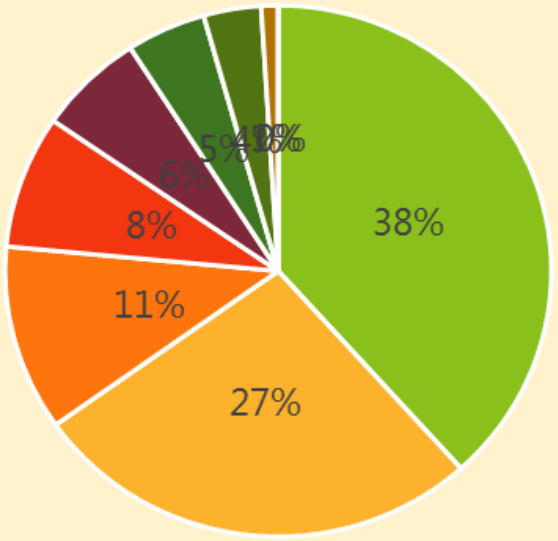
B. Dural puncture has been performed

C. Headache develops within 5 days after dural puncture

D. Resolves either:
   1. Spontaneously within 1 week – 6month
   2. Within 48 hours after effective treatment of the CSF leak
      (usually by epidural blood patch)



Post Partum Headache - Differential Diagnosis



(Goldszmidt e.a. 2005)

- **Primary Headache**
  - Migraine

1/3 fertile women have migraine

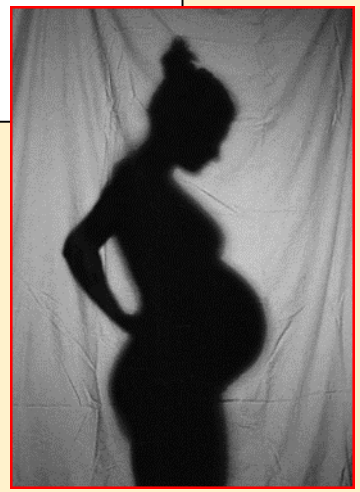
(Stewart, Cephalalgia 2008)

- **Tension Type**

Primary headaches 75%

(Goldszmidt, Can J Anesth 2005)

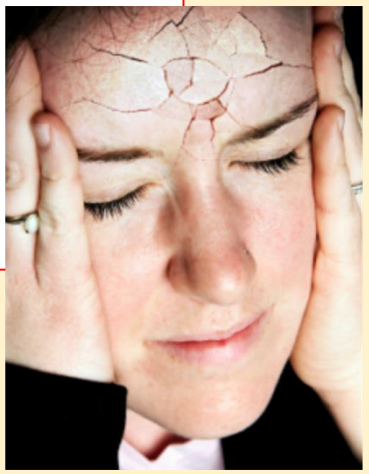
PDPH 4.7%



Think "PARTUM" in peripartum period

- **P**ressure (blood pressure for pre-eclampsia/eclampsia)
- **A**naesthetic (post-dural puncture headache)
- **R**eversible (**vasoconstriction syndrome**)
- **T**hrombosis (cerebral venous sinus thrombosis, ischaemic stroke)
- **"U**se your brain" (there are many other causes of headache!)
- **M**igraine.

- **Significant morbidity and mortality**
  (Klein, Loder IJOA 2010)



LIM SY, PRACT NEUROL 2014

Pathophysiology of PDPH

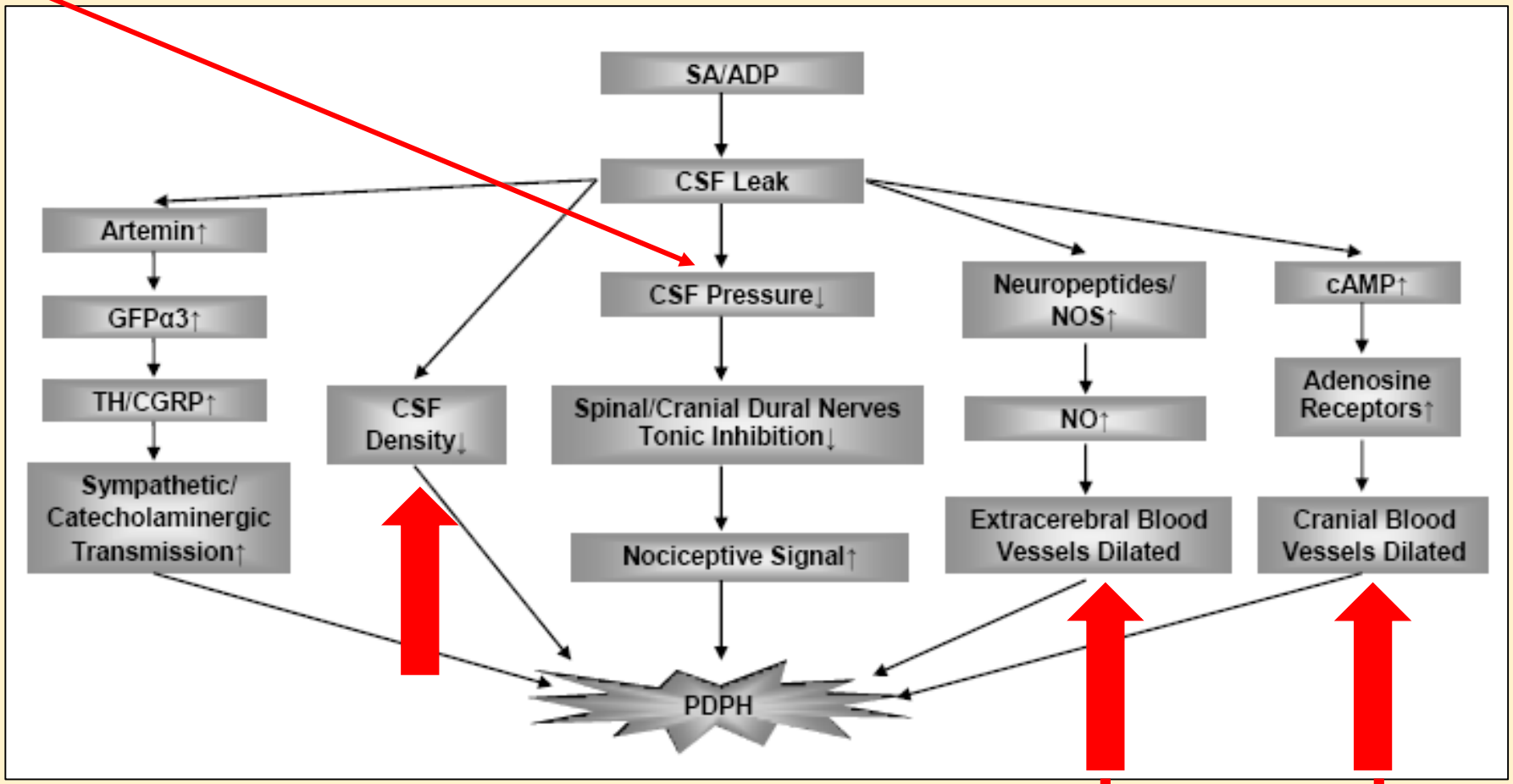
Decrease in CSF volume

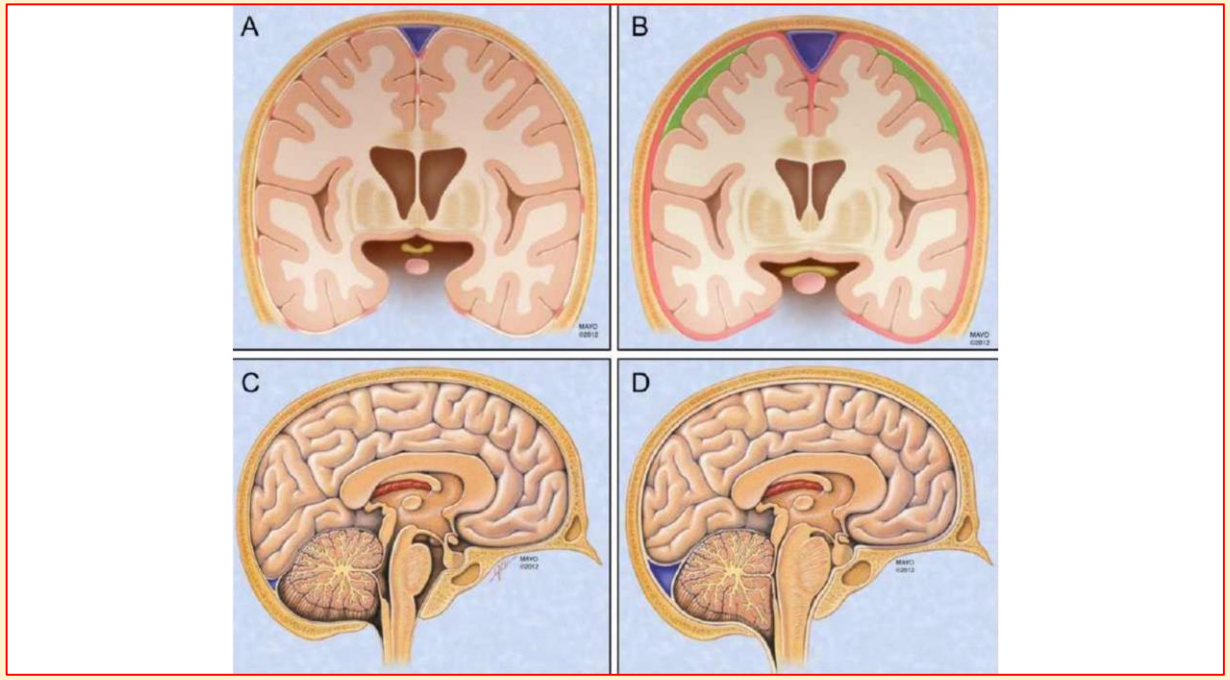
↓

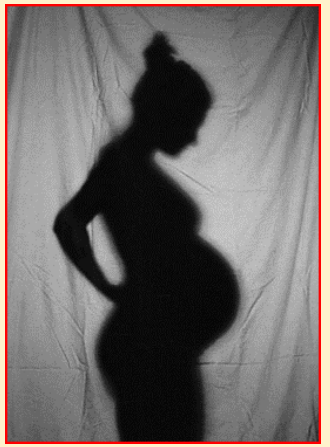
Shift of intracranial content

↓

Stretching the meninges







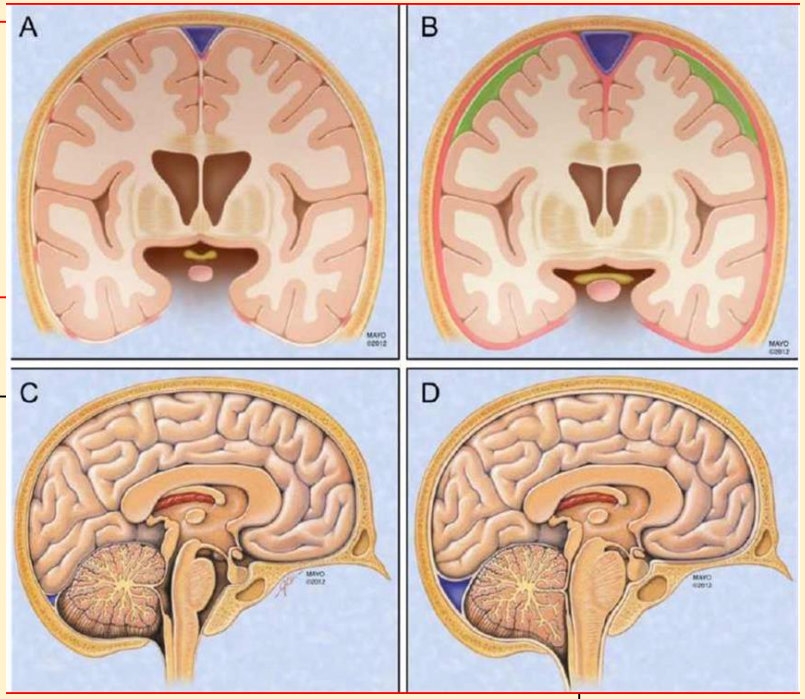
Untreated PDPH may lead to **chronic headache** or to more serious and even **life threatening** complications as **Intra Cranial Hemorrhage** or **Sinus Vein Thrombosis**

(Anesth Analg 2017;124:1219–28)

Compensatory intracranial vasodilation
or
Vasodilatation as a result of decreased CSF pressure

- Decreased flow in venules and arterioles
- Decreased flow in sinuses +Hypercoagulated state

  Sinus vein thrombosis

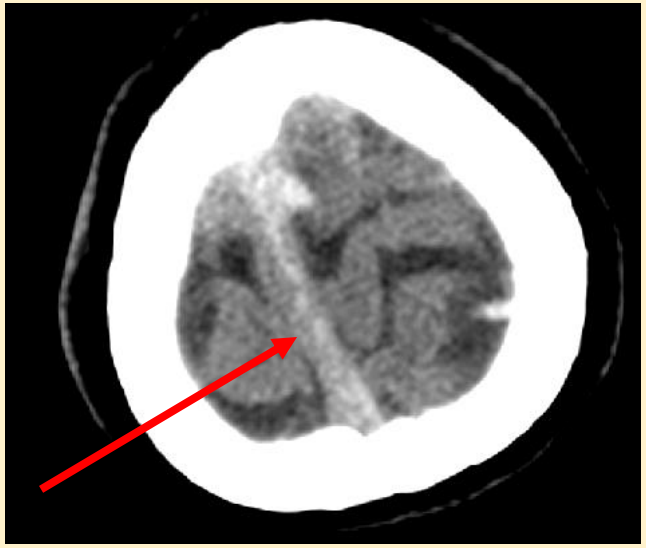


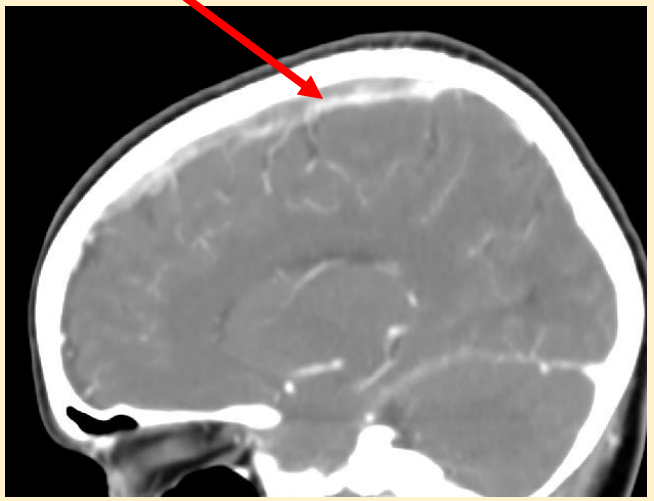
- **Sinus vein thrombosis** F:M 3:1, general 1:100,000.
- During pregnancy 11.6:100,000
- Increase in venous and capillary pressure leads to

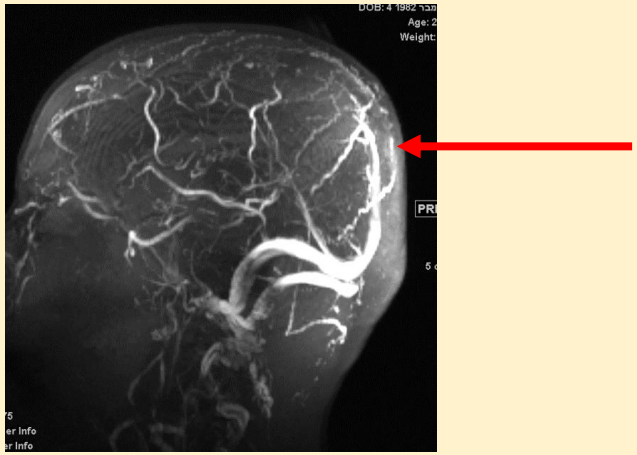
  blood-brain barrier disruption **Subdural hematoma**
- **In PubMed** " Post-dural puncture" + "intracranial hemorrhage" – 50 results
- "Post-dural puncture" + "subdural hemorrhage" – 44 results

Oure Case

- **29y.o G5P2AB2**
  - Delivered spontaneous normal vaginal delivery
  - During neuraxial analgesia, sudden onset new occipital headache
  - CT scan – Pneumoencephalus
  - **Non specific occipital and upper back pain** **No Blood Patch**
  - Clexane started (preventive dose, d/t immobilization)
- **PPD 10**
  - New onset of motor deficit
  - Seizures focal -> generalized
  - MRI/MRA/MRV – extensive symmetrical **subarachnoid hemorrhage** and **sagittal sinus thrombosis**



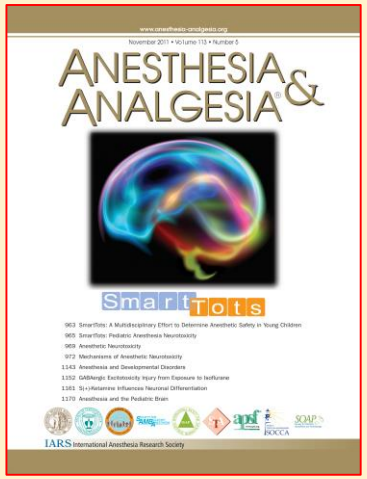




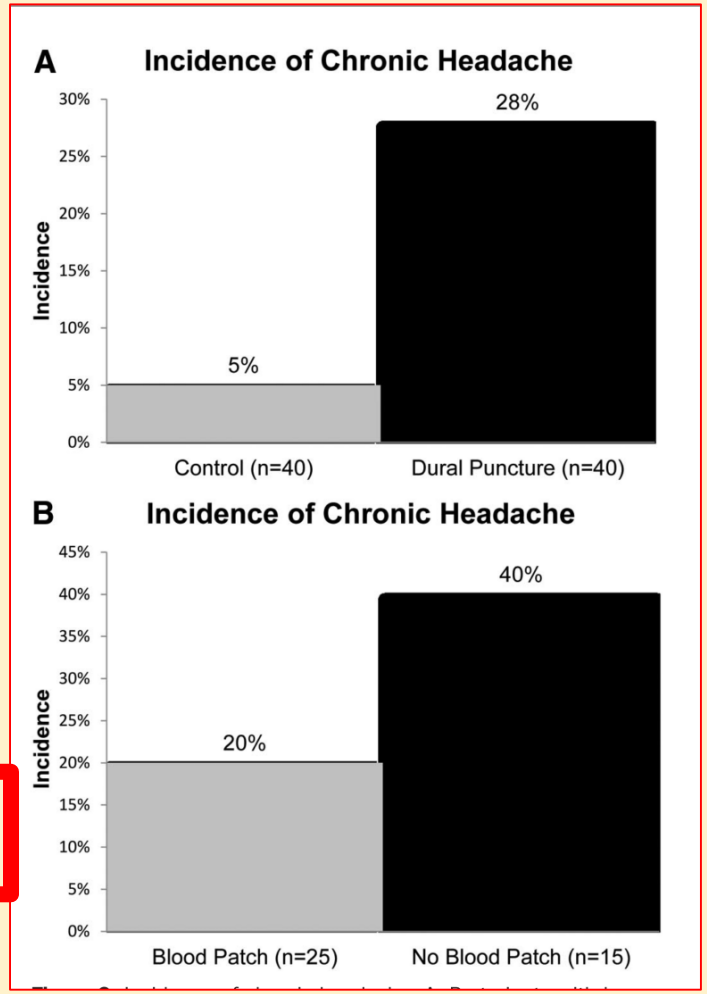
Unintentional Dural Puncture with a Tuohy Needle Increases Risk of Chronic Headache

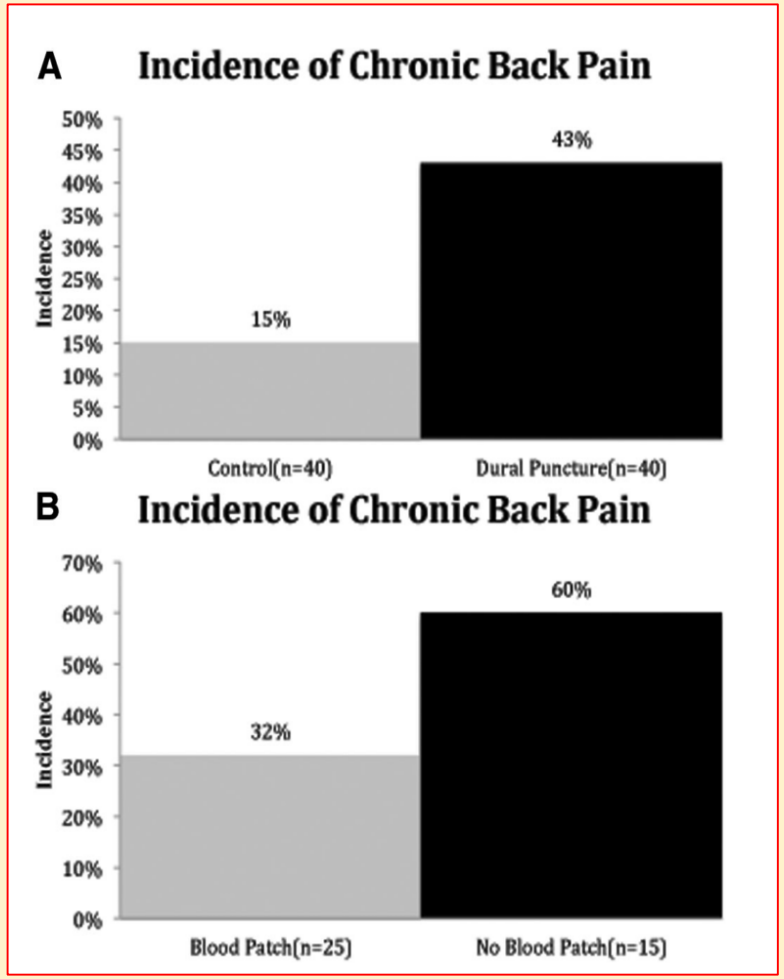
Christopher Allen-John Webb, MD, Paul David Weyker, MD, Li Zhang, MD, PhD, Susan Stanley, MD, D. Tyler Coyle, MD, Timothy Tang, Richard M. Smiley, MD, PhD, and Pamela Flood, MD

www.anesthesia-analgesia.org July 2012 • Volume 115 • Number 1



Chronic headache:
28 % versus 5 %





Chronic back pain:
43 % versus 15 %

With Blood Patch – 20%
Without Blood Patch -40%

With Blood Patch – 32%
Without Blood Patch -60%

How to prevent ADP or PDPH?

- Combined Spinal Epidural
- Liquid versus Air for LOR
- Patient position
- Type of catheter
- Gauge of Tuohy needle
- Use of ultrasound
- Training grade*

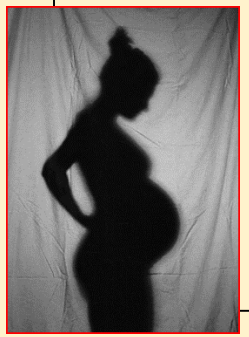
ITALIA

REVIEW

Can the incidence of accidental dural puncture in laboring women be reduced? A systematic review and meta-analysis

M. HEESEN [1], S. KLÖHR [1], R. ROSSAINT [2], M. VAN DE VELDE [3], S. STRAUBE [4]

[1]Department of Anesthesiology, Klinikum am Bruderwald, Bamberg, Germany; [2] Department of Anesthesiology, University Hospital Aachen, Aachen, Germany; [3]Department of Anesthesiology, University Hospital Gasthuisberg, Leuven, Belgium; [4]Institute of Occupational, Social and Environmental Medicine, University Medical Center Göttingen, Göttingen



Had no effects on the incidence of ADP or PDPH

Neither in non-RCTs nor in RCTs

Teaching Epidural Analgesia

Acta Anaesthesiologica Scandinavica
AN INTERNATIONAL JOURNAL OF ANAESTHESIOLOGY AND INTENSIVE CARE, PAIN AND EMERGENCY MEDICINE

Management of accidental dural puncture and post-dural puncture headache after labour: a Nordic survey

B. DARVISH[1], A. GUPTA[1,2], S. ALAHUHTA[3], V. DAHL[4], S. HELBO-HANSEN[5], A. THORSTEINSSON[6], L. IRESTEDT[7] and G. DAHLGREN[7]

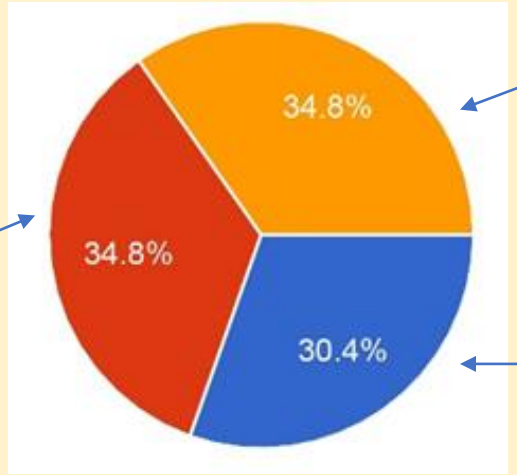
Version of Record online: 29 OCT 2010
DOI: 10.1111/j.1399-6576.2010.02335.x

Issue
Acta Anaesthesiologica Scandinavica
Volume 55, Issue 1, pages 46–53, January 2011

2010

- Teaching of epidurals was generally performed in the **non-obstetric population**, 86% (50–97%)
- **No formal requirements were demanded before performing epidurals in the labor ward in most Nordic countries (43–54%), except for Norway where the requirement was 10–30 epidurals**
- A majority of the hospitals felt the need for implementing a formal training program in the teaching of epidural analgesia in obstetrics, 53% (48–100%)

Israel 2016



> 12 month in the training program

6-12 month in the training program

< 6 month in the training program

Intrathecal catheter for PDPH prevention

- Apfel C. et al: British J. Of Anaesthesia 2010:

  Systematic quantitative review**: no significant benefit**

Heesen M et al: IJOA 2013: Meta analysis:

Incidence PDPH reduced but not significant

Significant reduction of EBP need

Russell I. et al: IJOA 2012: Prospective controlled study:

No significant reduction of PDPH/EBP

9 % risk of second ADP in reinsertion group

Verstraete S. et al: Acta Anaesth. Scand. 2014: Survey

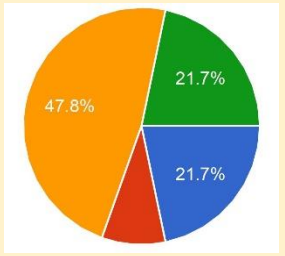
IT catheter reduced PDPH incidence 62%-> 42 %

EBP reduction 54% -> 36 %

(not significant)

Study	Sajjad & Ryan	Berger et al.	Baraz & Collis	Harrington & Schmitt	Baysinger et al.	
Year	1995	1998	2005	2009	2011	2016
Location	UK	North America	UK	U.S.	North America	Israel
ITC use after ADP	1%	38% may use	28% always use	18.5% always use	6% always use	**13% always use**

Surveys of Accidental Dural Puncture (ADP) and Postdural Puncture Headache (PDPH)



Israel survey

Catheter "in" for

47% (11) - 24h

21.7% (5) – just for 6-12 h

21.7% (5) – remove after labor

Prophylactical Normal Saline injection

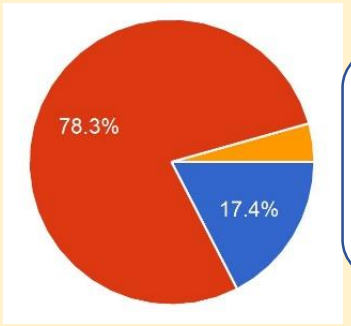
Surveys of Accidental Dural Puncture (ADP) and Postdural Puncture Headache (PDPH)

Study	Sajjad & Ryan	Berger et al.	Baraz & Collis	Harrington & Schmitt	Baysinger et al.	
Year	1995	1998	2005	2009	2011	2016
Location	UK	North America	UK	U.S.	North America	Israel
Prophylactic measures to prevent PDPH						
NS epidural injection before removal of catheter	70% →	25% →	18% →	12% frequently 25% occasionally →	7%	**17%**

Short-term improvements in headache

No long term benefit

(Charsley, Reg Anesth Pain Med 2001)



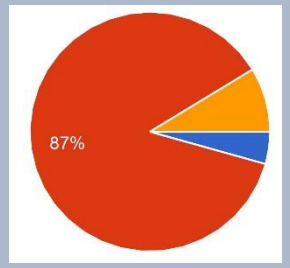
Israel survey		
Yes	4	17.4%
No	**18**	**78.3%**
Sometimes	1	4.3%

Prophylactic EBP; Yes or No?

Prophylactic EBP - No proven benefit

(RCT review, Agerson Anesth Analg 2010)

(Cochrane , Boonmak & Boonmak 2010)

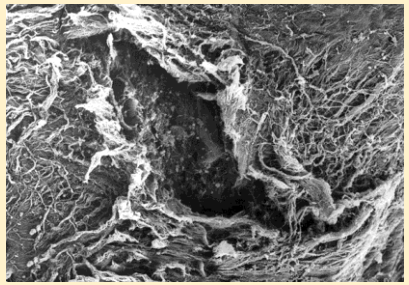


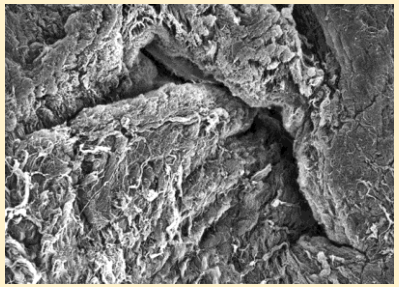
Our data
4.3% (1) – yes
8.7% (2) – frequently
87% (20) - never

Surveys of Accidental Dural Puncture (ADP) and Postdural Puncture Headache (PDPH)

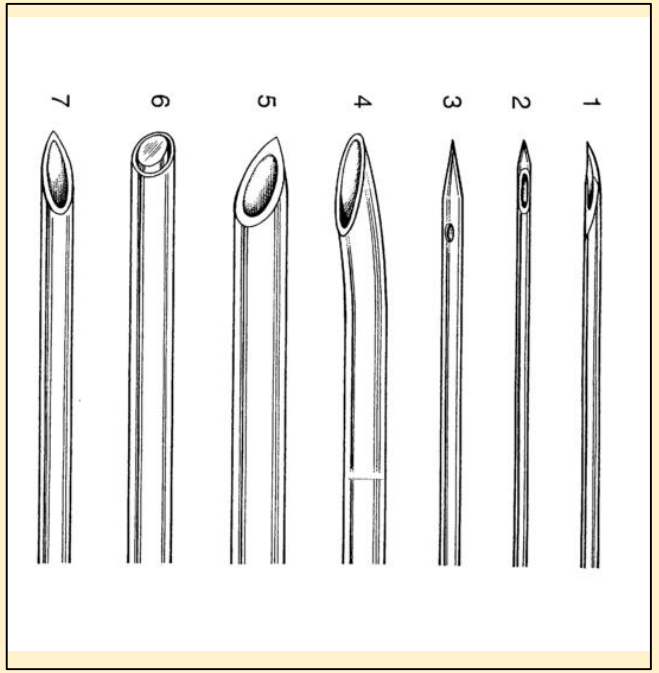
Study	Sajjad & Ryan	Berger et al.	Baraz & Collis	Harrington & Schmitt	Baysinger et al.	
Year	1995	1998	2005	2009	2011	2016
Location	UK	North America	UK	U.S.	North America	Israel
Prophylactic EPB	4%	37%	1%	10% frequently 31% occasionally	8%	**4.3%** frequently **8.7%** occasionally

Spinal needle for CS





Atlas of Functional Anatomy for Regional Anesthesia and Pain Medicine,
Miguel Angel Reina



Incidence of PSPH for different types of spinal needles

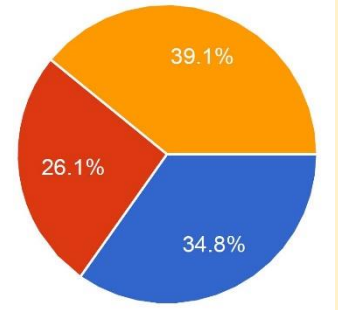
Needle size & Type	Bevel	Incidence of PDPH%
25G Quincke	Cutting	8.7
26G Atraucan	Cutting	5
24G Gertie Marx	Atraumatic	4
24G Sprotte	Atraumatic	2.8
25G Whitacre	Atraumatic	3.1

Anesth Analg. 2000;91:916–20.

BEVEL orientation: **perpendicular** vs. **parallel**
(3-fold increase)
(Norris , Anesthesiology **1989**)
Nothing new!

0.8-2%

G27	**8**	34.8%
G26	**6**	26.1%
G25	**9**	39.1%
אחר	**0**	0%



Time from diagnosis to treatment

EBP < 24h from diagnosis of PDPH Failure 71% (8 pt.)
EBP > 24h from diagnosis of PDPH Failure 4% (16 pt.)

Time vs. success rate for epidural blood patch
(Loeser EA . Anesthesiology 1978 Aug ;49(2):147-8)

EBP < 48h from Dural Puncture - Recurrence 59%
EBP > 48h from Dural Puncture - Recurrence 11%

An audit of epidural blood patch *(Banks S, Paech M, Gurrin L. Int J Obstet Anesth. 2001 Jul;10(3):172-6)*

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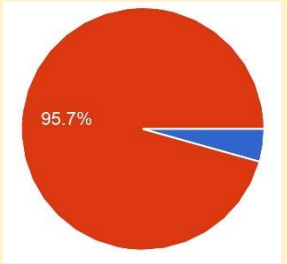
Year	1995	1998	2005	2009	2011	2016
Location	UK	North America	UK	U.S.	North America	Israel
EBP after <24h of conservative Tx	42%	44%	29%	41%	81%	**4%**

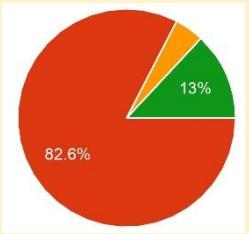


The most common time interval from diagnosis of PDPH to performing EBP was 24-48h
*(**Nordic survey**. Acta Anaesthesiol Scand 2011; 55: 46–53)*

In Israel 2016
< 24 h - 4.3% (1)
24-48 h - 95.7% (22)
> 48 h - 0

The volume of blood for Blood Patch

82.6% (19) - 15-25mL
13% (3) - up to high pressure filing
4.3% (1) - >25mL



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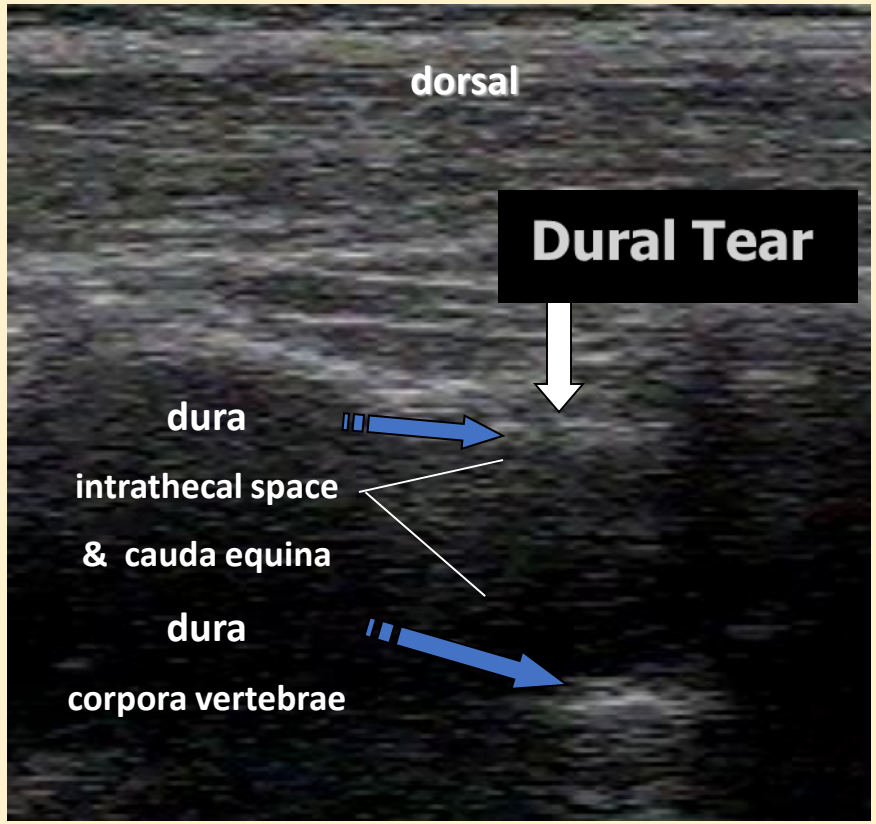
Year	1995	1998	2005	2009	2011	2016
Location	UK	North America	UK	U.S.	North America	Israel
Volume of blood injected	Not reported	Not reported	Not reported	66.8% give 16-20mL	60% give 11-20mL	**82.6% give 15-25mL**

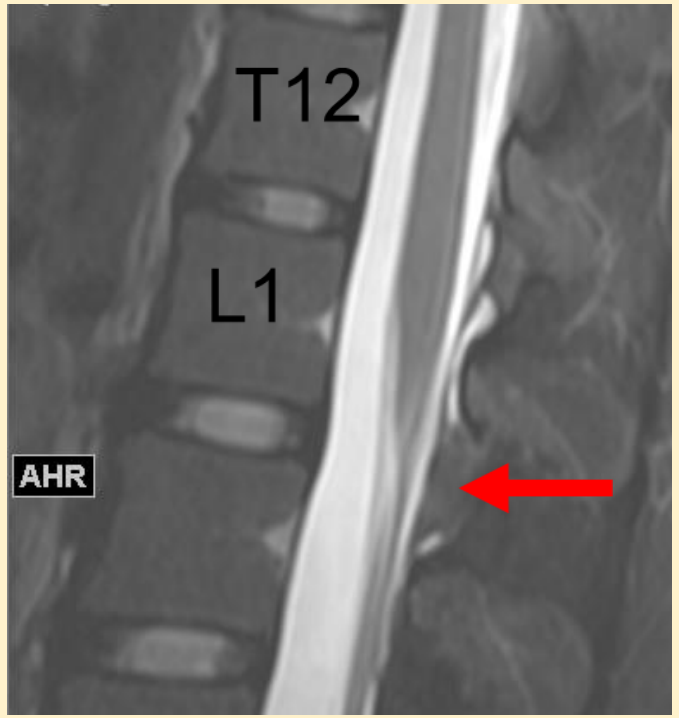
Table 4. Incidence of Headache Relief After Epidural Blood Patch

	<48 hours	≥48 hours	Overall
Permanent or partial relief			
15 mL	33.3 (9.0–65.1)	72.4 (52.8–87.3)	61.0 (44.5–75.8)
20 mL	61.5 (31.6–86.1)	78.6 (59.1–91.7)	73.2 (57.1–85.8)
30 mL	56.3 (29.9–80.3)	73.9 (51.6–89.9)	66.7 (49.8–80.9)
Permanent relief[a]			
15 mL	0.0 (0–26.5)	13.8 (3.9–31.7)	9.8 (2.7–23.1)
20 mL	15.4 (1.9–45.5)	39.3 (21.5–59.4)	32.3 (18.1–48.1)
30 mL	25.0 (7.3–52.4)	26.1 (10.2–48.4)	25.6 (13.0–42.1)

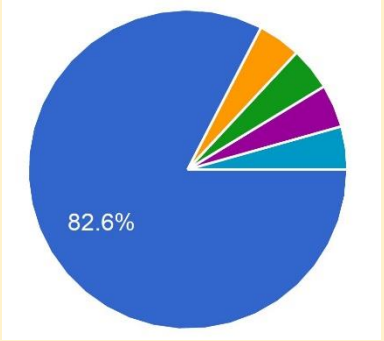
The Volume of Blood for Epidural Blood Patch in Obstetrics: A Randomized, Blinded Clinical Trial
(Paech, et al. Anesthesia & Analgesia 2011)

Imaging for the performance of Blood Patch





6 months after ADP , 2 BP and permanent PDPH
MRI Lumbar Spine – CSF Leak at T12-L1
improvement and complete resolution



Always wit US – 1
Sometime with US – 1
Always with xR – 1
Sometime with xR - 1

Grau et al: Anästhesiol Intensivmed Notfallmed SchmerzTh 2002

Conservative treatment of PDPH

- *Caffeine *Bed rest
- *Prone position *Theophylline
- *Aminophylline * ACTH
- *Gabapentin
- *Hydrocortisone *Pregabaline

Review of the Alternatives to Epidural Blood Patch for Treatment of Postdural Puncture Headache in the Parturient

(Anesth Analg 2017;124:1219–28)

Daniel Katz, MD, and Yaakov Beilin, MD

Table. Summary of Treatments

Summary of Treatments					
Category	Subcategory	Modality	Doses Reported	Clinical Efficacy	Additional Clinical Factors
Conservative therapies					
		Hydration	N/A	No benefit	May lead to patient discomfort because of increased micturition
		Bed rest	N/A	No benefit	May cause complications such as VTE
		Prone positioning	N/A	No benefit	Uncomfortable for the patient
		Abdominal binders	N/A	May decrease headache when applied soon after dural puncture	Uncomfortable for the patient
Medical therapies					
			300–500 mg PO or IV daily; 2–4 cups of coffee daily	Decreased pain scores, decreased headache persistence, and decreased need for supplementary intervention	Often well tolerated, readily available
			250 mg PO TID; 281.7 mg PO TID; 200 mg IV once	Decreased pain scores	Narrow therapeutic window
		Aminophylline	250 mg IV over 30 minutes for 2 days	Decreased pain scores	
	HPA axis	ACTH/cosyntropin	0.25–0.75 mg over 4–8 h IV once; 1 mg IM once	Decreased pain scores and decreased need for EBP	Data highly conflicted; efficacy appears to be higher for prophylaxis than for treatment
		Hydrocortisone	200 mg/100 mg IV followed by 100 mg IV TID for 48 h	Decreased pain scores	
	Other headache medications	Sumatriptan	6 mg SQ once	No benefit	
		Methylergonovine	0.25 mg PO TID for 24 h, if efficacious repeated for 48	Decreased pain scores and decreased need for EBP	Results from case series only; no RCTs reported
				Decreased pain scores	May be sedating
			PO daily for 2 days; 100 mg PO daily	Decreased pain scores	May be sedating; least amount of data regarding breast-feeding
Invasive therapies					
	Epidural injections of nonblood fluids	Saline	20 mL injection once; continuous infusions	Decreased pain scores	Transient benefit if single shot with recurrence of headache at 24 h
		Hydroxyethyl starch	20 mL injection daily for 2 d	Decreased pain scores	Multiple injections required to sustain benefits
		Fibrin glue	4 mL injection once	Decreased pain scores	Very small case series only, no RCTs, should be performed under fluoroscopy, expensive, only considered when multiple EBP have failed
	Epidural injections of medications	Dexamethasone	8 mg injection once	No benefit	
		Morphine	3 mg injection once; two 3 mg injections 24 h apart	Decreased pain scores and decreased need for EBP	Studies done with catheters left in situ for second injection, postinjection respiratory monitoring may be required

No benefit

Decreased pain scores

Occipital nerve blocks	Greater and lesser	2 mL 0.5% bupivacaine; 4 mL 0.25% levobupivacaine; 2 mL dexamethasone (6.6 mg) with 2 mL 1% lidocaine; 4 mL 0.25% bupivacaine with triamcinolone 20 mg	Decreased pain scores and decreased need for EBP
Sphenopalatine nerve blocks	Intranasal	1 cotton-tip applicator soaked with 5% water-soluble	Decreased pain scores and decreased need for EBP

Figure 3. Identification of the greater occipital nerve (GON) and the occipital artery (OA) via ultrasound.

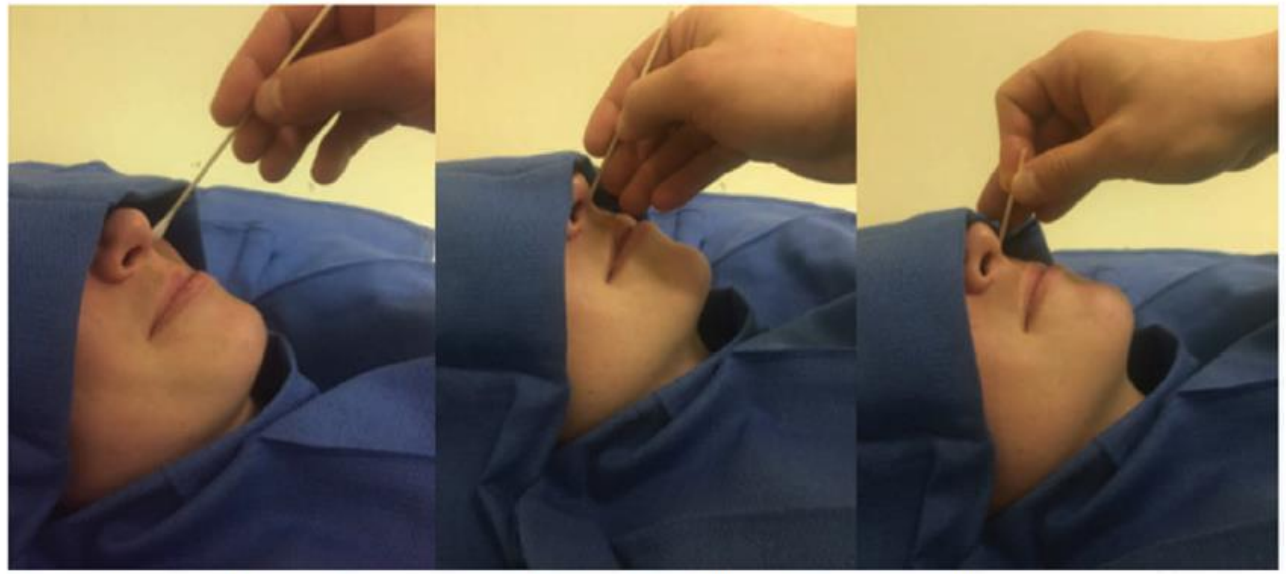
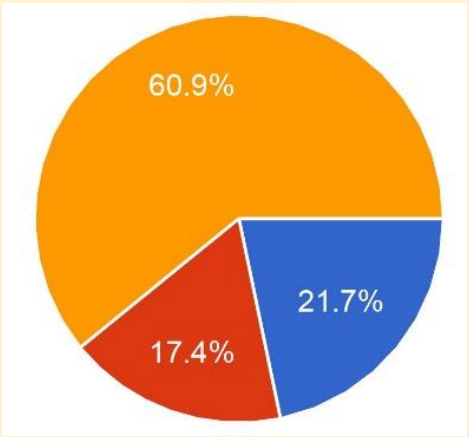


Figure 4. Advancement of local anesthetic soaked cotton-tip applicator for sphenopalatine ganglion block.

Figure 2 . Traditional and auricular acupuncture sites.

Institutional protocol for the PDPH treatment or for the performance of Blood Patch



Protocol for PDPH treatment 21.7% (5)
Protocol just for Blood Patch 17.4% (4)
No protocols 60.9% (14%)

Surveys of Accidental Dural Puncture (ADP) and Postdural Puncture Headache (PDPH)

Study	**Sajjad & Ryan**	**Berger et al.**	**Baraz & Collis**	**Harrington & Schmitt**	**Baysinger et al.**	
Year	1995	1998	2005	2009	2011	2016
Location	UK	North America	UK	U.S.	North America (Mainly U.S.)	Israel
Protocol for PDPH management	58.5%	8.3%	85%	10.8%	14%	**21.7%**

Thank you!!!