# From Back to Head

## (แทงข้างหลัง....ร้าวไปถึงหัว)

**23 Jul 2018**

Natinee Benjangkhaprasert

Phonneeya Nimpunyakampong

Advisor

Lecturer Choopong Luansritisakul

# Case

- 62 year-old Thai male
  - Diagnosis: CA Colon
  - Operation: Rt. hemicolectomy
- No known drug or food allergy
- No underlying disease

- Planned anesthetic technique
  - GA with ETT with controlled ventilation with epidural block

# Procedure

- Perform epidural block

  1st attempt at T12 - L1 (paramedian)

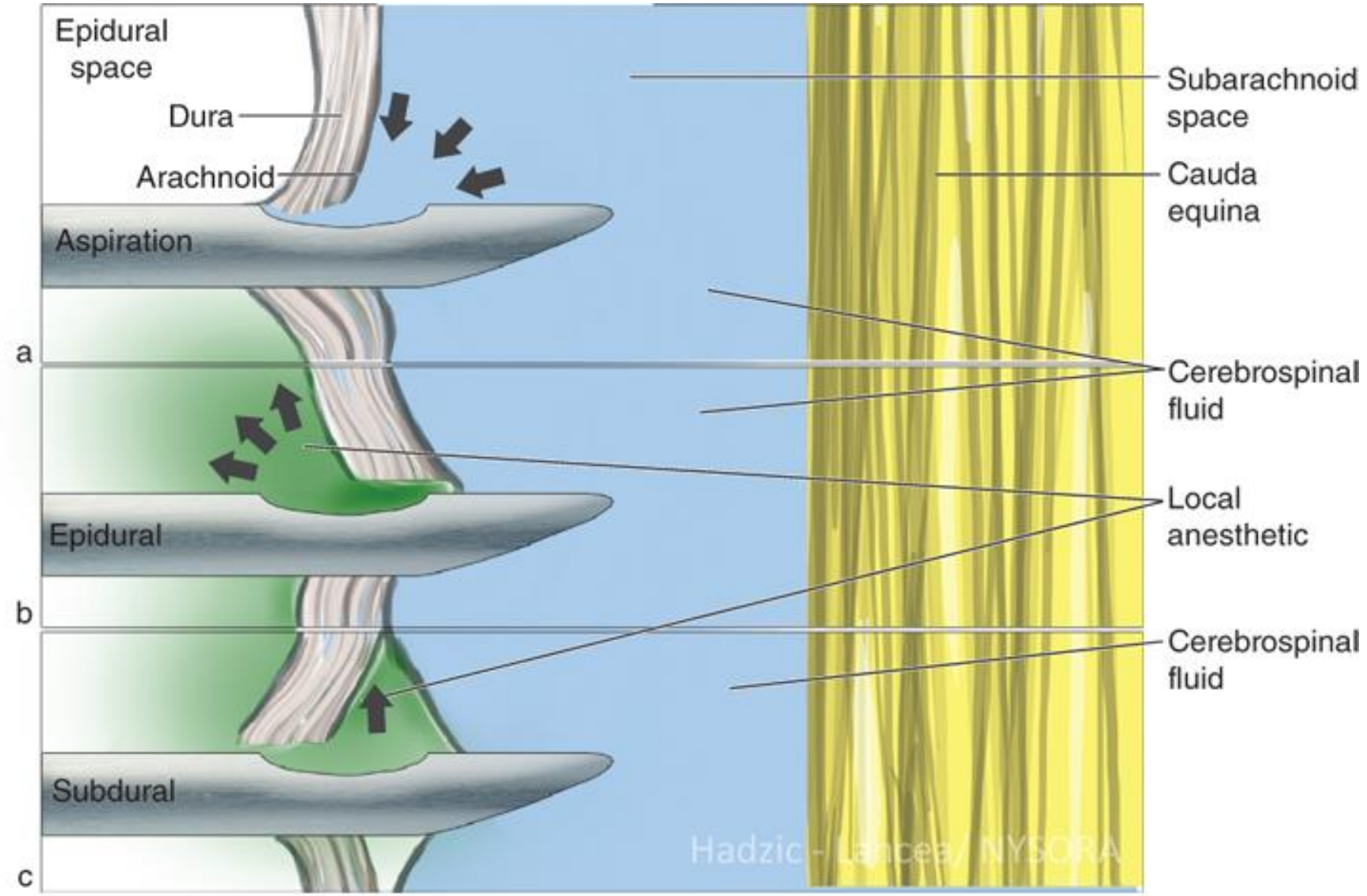
**>> Wet tap**

**What will you do?**

# Outline

- Accidental dural puncture
- Post dural puncture headache
  - Pathophysiology
  - Diagnosis
  - Risk factors
  - Treatment
- Prophylaxis of PDPH after ADP

# ACCIDENTAL DURAL PUNCTURE




Source: Admir Hadzic: Hadzic's Textbook of Regional Anesthesia and Acute Pain Management, Second Edition
www.AccessAnesthesiology.com

# Accidental dural puncture

- Unintentional dural puncture or Wet tap
- 0.19%-3.6% during epidural catheter placement
- PDPH develops in more than 50% of these patients.

C. C. Apfel, et al. Prevention of postdural puncture headache after accidental dural puncture: a quantitative systematic review, *BJA: British Journal of Anaesthesia*, Volume 105, Issue 3, 1 September 2010, Pages 255–263, https://doi.org/10.1093/bja/aeq191

Gurudatt CL. Unintentional dural puncture and postdural puncture headache-can this headache of the patient as well as the anaesthesiologist be prevented? *Indian Journal of Anaesthesia*. 2014;58(4):385-387. doi:10.4103/0019-5049.138962.

# Incidence in Siriraj 2018

- Which choice is ADP incidence in Siriraj?

  A. < 0.19%

  B. 0.19-3.6%

  C. > 3.6%

# Incidence in Siriraj 2018

| Month | ADP | Epidural | Incidence |
|---|---|---|---|
| January | 3 | 84 | 3.5% |
| February | 2 | 81 | 2.4% |
| March | 3 | 85 | 3.5% |
| April | 4 | 88 | 4.5% |
| May | 1 | 78 | 1.3% |
| June | 1 | 86 | 1.2% |
| **Total** | 14 | 502 | **2.8%** |

# Risk factors of ADP

- Puncture site: lower thoracic or lumbar
- Advanced age

**Factors related to ADP in epidural anesthesia patients**

**Table 2** Results of multivariable logistic regression analysis

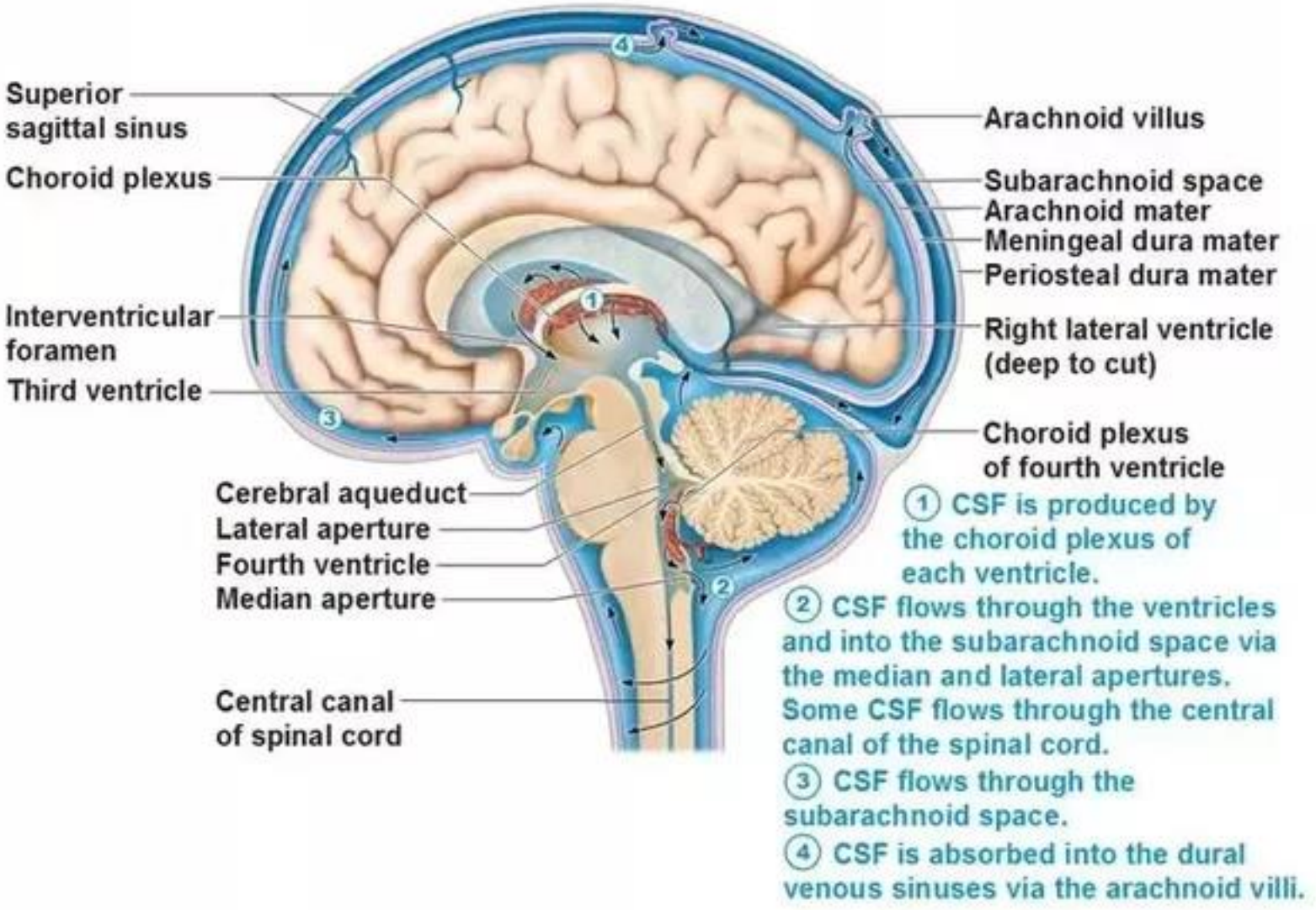
| | OR | 95% CI | *P* |
|---|---|---|---|
| Site for intervertebral puncture | | | |
| 10th-12th thoracic vertebrae | 5.19 | 1.41-19.14 | .01 |
| First to third lumbar vertebrae | 5.45 | 1.23-24.12 | .03 |
| Sex (if male) | 0.58 | 0.19-1.75 | .33 |
| Age (per y) | 1.04 | 1.01-1.07 | <.01 |
| Body weight (per kg) | 0.98 | 0.95-1.01 | .19 |



Kuroda, K., et al. Factors related to accidental dural puncture in epidural anesthesia patients. J Clin Anesth. 2015; 4: 58-61

# POST-DURAL PUNCTURE HEADACHE

# Circulation of Cerebrospinal Fluid (CSF)




https://www.quora.com/Does-spinal-fluid-regenerate

# Pathophysiology

- Loss of CSF through the dural puncture site
  - Decreased CSF pressure & volume
    - Loss of cushioning effect
      - Traction on intracranial pain-sensitive structures
    - Release of adenosine
      - Cerebral vasodilatation

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

# Diagnosis

- The 3rd edition of International Classification of Headache Disorders (ICHD-3) 2018
  - Orthostatic headache
  - Dural puncture has been performed
  - Develops within 5 days of the dural puncture
  - Remits spontaneously within 2 weeks, or after sealing of the leak with autologous epidural lumbar patch

https://www.ichd-3.org/7-headache-attributed-to-non-vascular-intracranial-disorder/7-2-headache-attributed-to-low-cerebrospinal-fluid-pressure/7-2-1-post-dural-puncture-headache/

# Diagnosis

- Exclude other causes
  - Infection
    - Meningitis, encephalitis
  - Vascular cause
    - Migraine, thrombosis, infarction, subdural & subarachnoid hematoma
  - Neoplasm

Bezov, D. , Ashina, S. and Lipton, R. (2010), Post-Dural Puncture Headache: Part II – Prevention, Management, and Prognosis. Headache: The Journal of Head and Face Pain, 50: 1482-1498.

# Diagnosis

- Exclude other causes
  - Pharmacological, metabolic
    - Dehydration, caffeine withdrawal
  - Others
    - Pre-eclampsia, tension headache, pneumocephalus, lactation headache

Bezov, D. , Ashina, S. and Lipton, R. (2010), Post-Dural Puncture Headache: Part II – Prevention, Management, and Prognosis. Headache: The Journal of Head and Face Pain, 50: 1482-1498.

- Neck stiffness
- Auditory symptoms
  - Tinnitus, hearing loss, hyperacusis
- Vestibular disturbance
  - Dizziness, vertigo
- Visual symptoms
  - Blurred vision, photophobia, diplopia
- Nausea

https://www.ichd-3.org/7-headache-attributed-to-non-vascular-intracranial-disorder/7-2-headache-attributed-to-low-cerebrospinal-fluid-pressure/7-2-1-post-dural-puncture-headache/

# Risk factors

**Patient factors**

- Age 20-30 years old
- Female
- Pregnancy
- Low body mass index
- History of prior PDPH
- Non-smoker

**Technical factors**

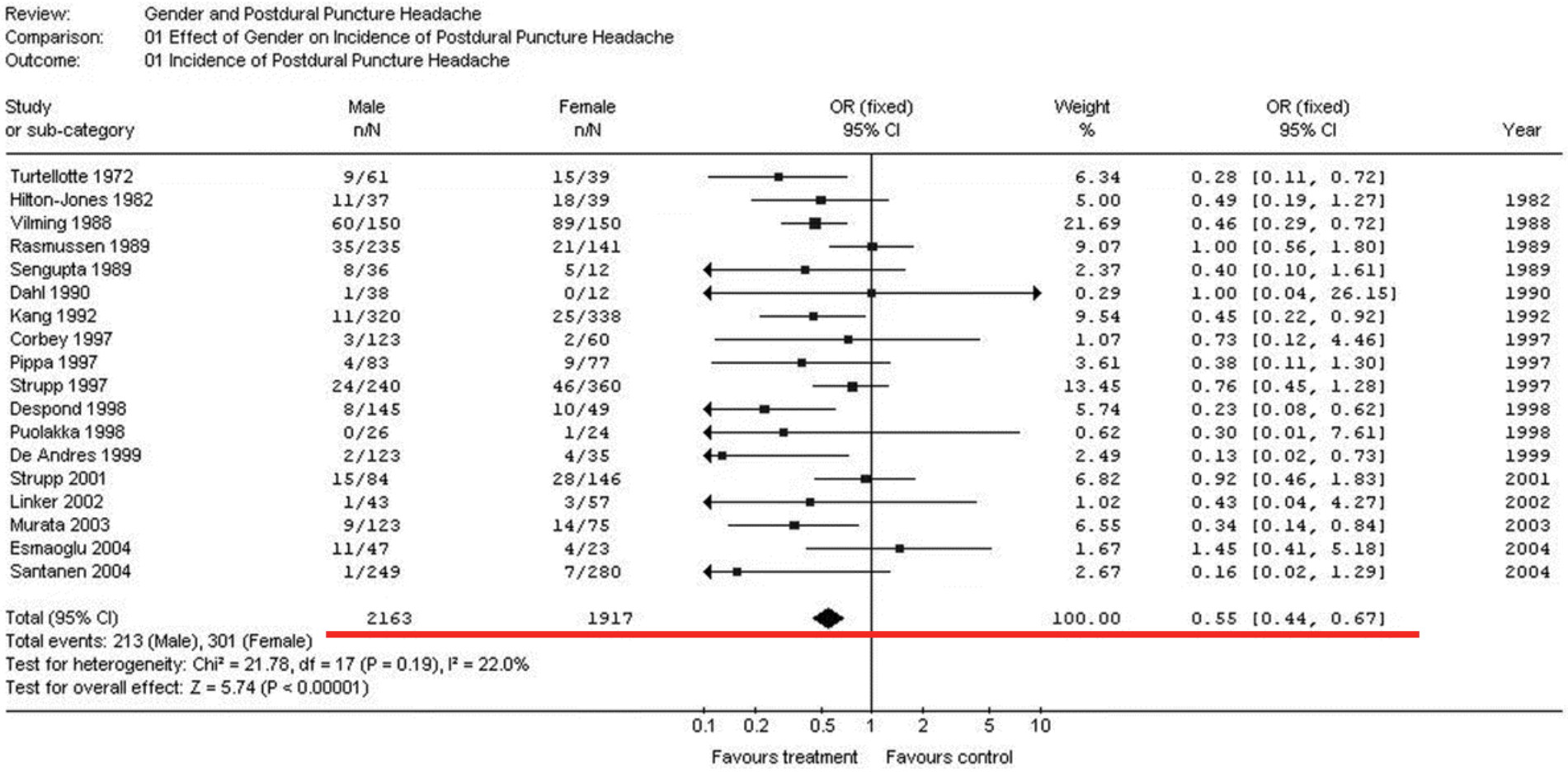
- Cutting needles
- Larger needle size
  - ↑ PDPH rate, severity, associated symptoms
- Perpendicular bevel direction
- Operator inexperience
  - Larger number of meningeal punctures

**Risk factors** | **Patient factors** | **Age 20-30 years old**

- Age 20-30 years old
  - 3-5 times more than those after 60
- PDPH began to decrease after age of 40
- Multifactorial mechanism
  - Pain perception
  - Psychological factors
  - Hormonally related difference in cerebral vessel reactivity
  - Elasticity of the dura

Bezov, D. , Lipton, R. B. and Ashina, S. (2010), Post-Dural Puncture Headache: Part I Diagnosis, Epidemiology, Etiology, and Pathophysiology. Headache: The Journal of Head and Face Pain, 50: 1144-1152.

# Risk factors → Patient factors → Female




Christopher L. Wu, Andrew J. Rowlingson, Seth R. Cohen, Robert K. Michaels, Genevieve E. Courpas, Emily M. Joe, Spencer S. Liu; Gender and Post–Dural Puncture Headache. *Anesthesiology* 2006;105(3):613-618.

- High incidence of PDPH in parturients: 76-85%
- May be attributed to
  - Increased estrogen level
  - Increased CSF pressure during vaginal delivery
  - Dehydration secondary to NPO status, blood loss, postpartum diuresis



Krzysztof M., et al. Post-dural puncture headache in pregnant women: What have we learned?. Rev. Col. Anest. 2006

# Risk factors | Patient factors | Low body mass index

| BMI | PDPH incidence |
|---|---|
| **< 25** | **62% (95% CI 50-73%)** |
| 25 to < 30 | 55% (95% CI 48-61%) |
| ≥ 30 | 42% (95% CI 36-49%) |

Peralta F., et al. The Relationship of Body Mass Index with the Incidence of Postdural Puncture Headache in Parturients. Anesth Analg. 2015 Aug; 121(2): 451–456. doi: 10.1213/ANE.0000000000000802

# Risk factors | Patient factors | History of prior PDPH

**Table 2** Postdural puncture headache (PDPH) prevalence in patients with and without a previous history of PDPH

| | New PDPH episodes | |
|---|---|---|
| PDPH history | *n* | % |
| No previous PDPH history | | |
| Women | 12/113 | 10.6 |
| Men | 3/103 | 2.9 |
| Both genders | 15/216 | 6.9 |
| Previous PDPH history | | |
| Women | 8/33* | 24.2 |
| Men | 0/9 | 0.0 |
| Both genders | 8/42† | 19.0 |

*$P = 0.0452$ in the $\chi^2$ test vs. the group of women without PDPH previous history.

†$P = 0.0118$ in the $\chi^2$ test vs. the group of both gender without PDPH previous history.



Amorim JA, et al. Postdural puncture headache is a risk factor for new postdural puncture headache. Cephalalgia. 2008

| | PDPH incidence | Odd ratio |
|---|---|---|
| Smokers | 13.7% | |
| Non-smokers | 34.1% | 3.3 (95% CI 1.3-8.1) |



Dodge HS, et al. Cigarette smokers have reduced risk for post-dural puncture headache. Pain physician. Jan 2013.

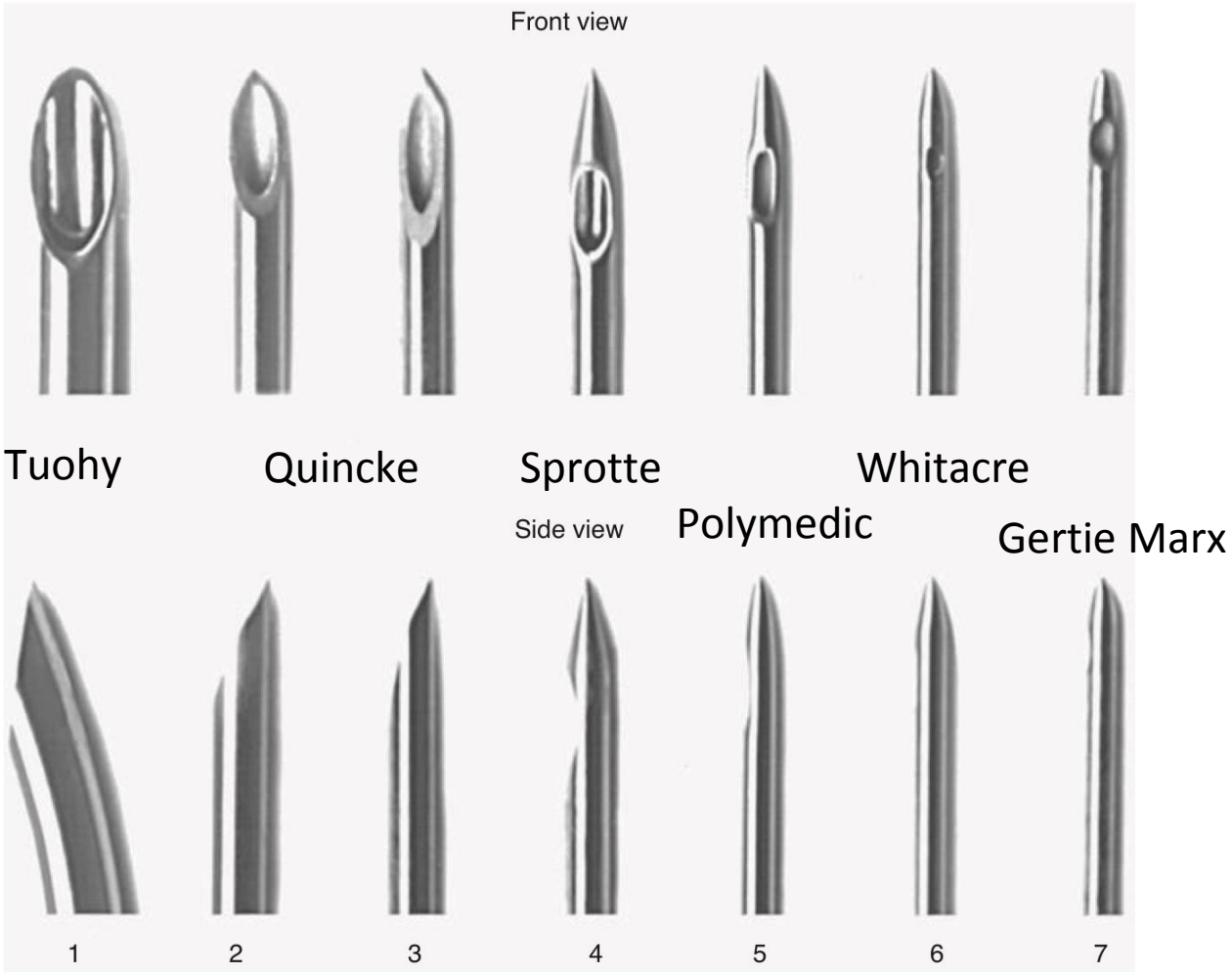



**Fig. 17.10** Comparative needle configuration for (1) 18-gauge Tuohy, (2) 20-gauge Quincke, (3) 22-gauge Quincke, (4) 24-gauge Sprotte, (5) 25-gauge Polymedic, (6) 25-gauge Whitacre, and (7) 26-gauge Gertie Marx. (From Schneider MC, Schmid M. Postdural puncture headache. In Birnbach DJ, Gatt SP, Datta S, eds. *Textbook of Obstetric Anesthesia.* Philadelphia: Churchill Livingstone; 2000:487-503.)



Miller, Basic of Anesthesia, 7th edition

Cochrane Library

Cochrane Database of Systematic Reviews

**Needle gauge and tip designs for preventing post-dural puncture headache (PDPH) (Review)**

Arevalo-Rodriguez I, Muñoz L, Godoy-Casasbuenas N, Ciapponi A, Arevalo JJ, Boogaard S, Roqué i Figuls M

# Atraumatic needles VS traumatic needles

| Outcomes | Illustrative comparative risks* (95% CI) | | Relative effect (95% CI) | No of participants (studies) | Quality of the evidence (GRADE) |
|---|---|---|---|---|---|
| | Assumed risk | Corresponding risk | | | |
| | Atraumatic needles | Traumatic needles | | | |
| Onset of PDPH | 30 per 1000 | 64 per 1000 (52 to 80) | RR 2.14 (1.72 to 2.67) | 9378 (36 studies) | ⊕⊕⊕◯ moderate[1] |

Arevalo-Rodriguez I, et al. Needle gauge and tip designs for preventing post-dural puncture headache (PDPH). Cochrane Database Syst Rev. 2017 Apr 7;4:CD010807.

# Risk factors | Technical factors | Needle size

Table 2: Incidence rate of PDPH with needle sizes[2,3,5]

| Needle bore size | | Approximate incidence rate | |
|---|---|---|---|
| | | Quincke (cutting) | Whitacre (non-cutting) |
| Size decreases ⇩ | 16-19 G | >70% | – |
| | 20G | 40% | 2–5% |
| | 22G | 36% | 0.63–4% |
| | 24G | 0–9.6% (Sproute needle) | |
| | 25G | 3–25% | 0–14.5% |
| | 26G | 0.3–20% | 2.5–4% |
| | 27G | 1.5–5.6% | 0 |
| | 29G | 0–2% | – |

Omole O, et al. Postdural puncture headache: evidence-based review for primary care, South African Family Practice 2015, 57:4,241-246

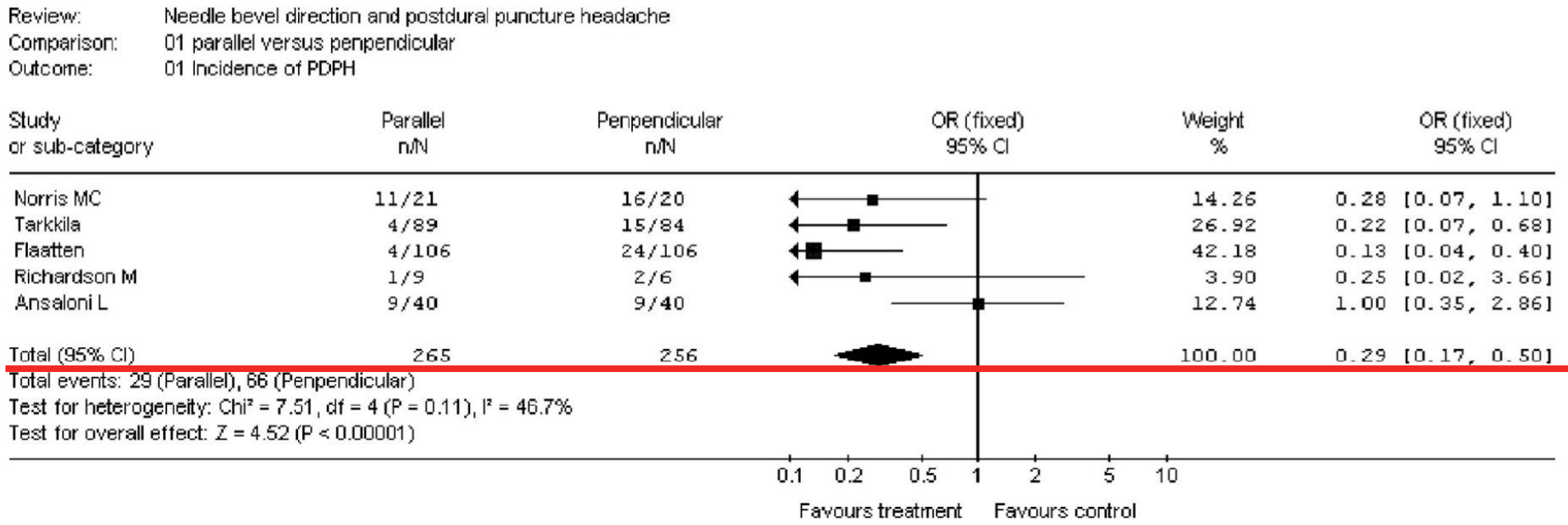



**FIGURE 1.** Pooled estimate of incidence of postdural puncture headache. This figure shows the weighted (pooled) estimate for the incidence of postdural puncture headache (PDPH). "n" Represents the actual number of PDPHs and "N" represent the actual number of dural punctures. The entire diamond (pooled estimate) lies to the left of the odds ratio (OR) = 1 (which represents "no difference"), suggesting that insertion of a beveled needle in a parallel orientation is associated with a significant lower odds (OR = 0.29; 95% CI, 0.17–0.50) of PDPH than that inserted in a perpendicular orientation.



Richman M., et al. Bevel Direction and Postdural Puncture Headache: A Meta-Analysis. The Neurologist: July 2006

# Treatment of PDPH

# Treatment

## Conservative

- Non-phamarcologic
  - Bed rest
  - Hydration
- Pharmacologic
  - Caffeine
  - Theophylline
  - Gabapentin, pregabalin
  - Corticosteroids
  - Sumatriptan
  - Cosyntropin

## Invasive

- Epidural blood patch
- Epidural colloids
- Greater occipital nerve block
- Sphenopalatine gangion block

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

# Treatment > Conservative > Bed rest & Hydration

- Use for the first 24 to 48 hours
  - More than 85% of PDPH resolves
- Bed rest in the supine position
  - Sometimes, the prone position relieves PDPH
- Oral or intravenous hydration
  - No evidence that aggressive hydration is beneficial in a patient with normal fluid intake.
  - Avoidance of dehydration is advisable to help limit headache severity.

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

- Mechanism of action
  - Block adenosine receptors
    - Increase cerebral vasoconstriction
  - Stimulate sodium-potassium pumps
    - Augment CSF production
- Caffeine was superior to a placebo for pain relief in PDPH
- Dose: 300-500 mg oral or IV, once or twice daily

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

# Treatment Conservative Caffeine

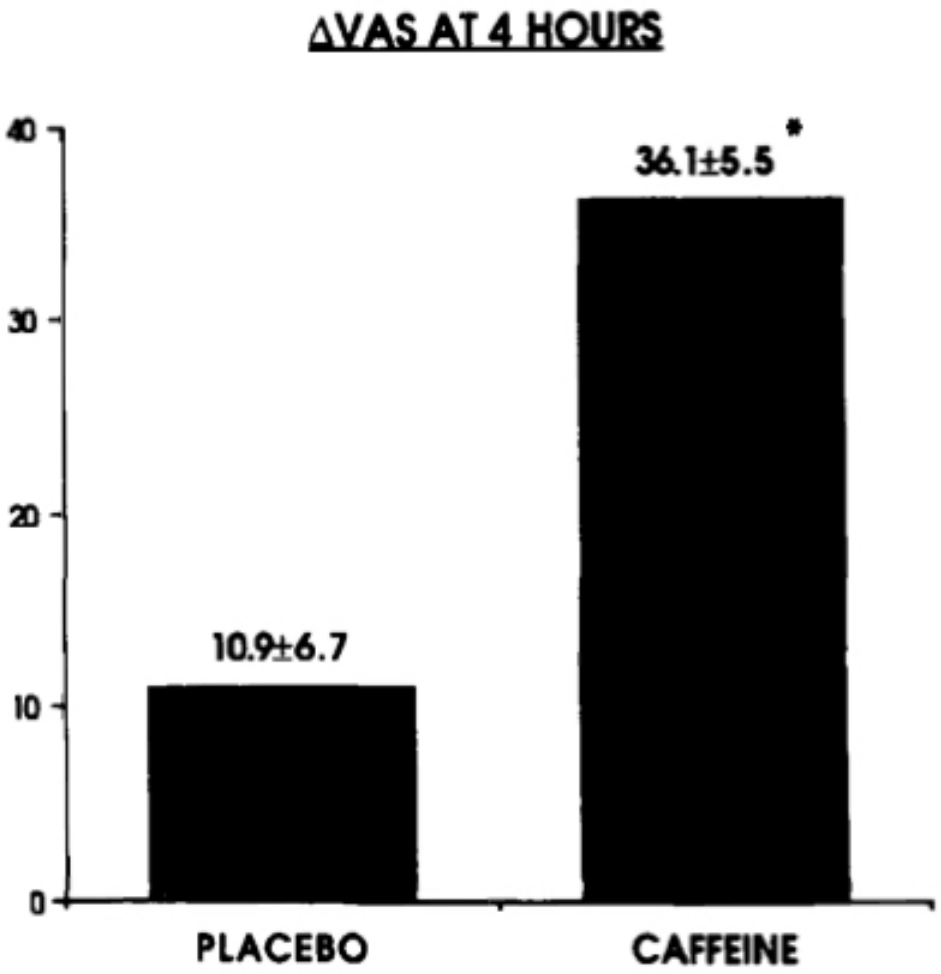
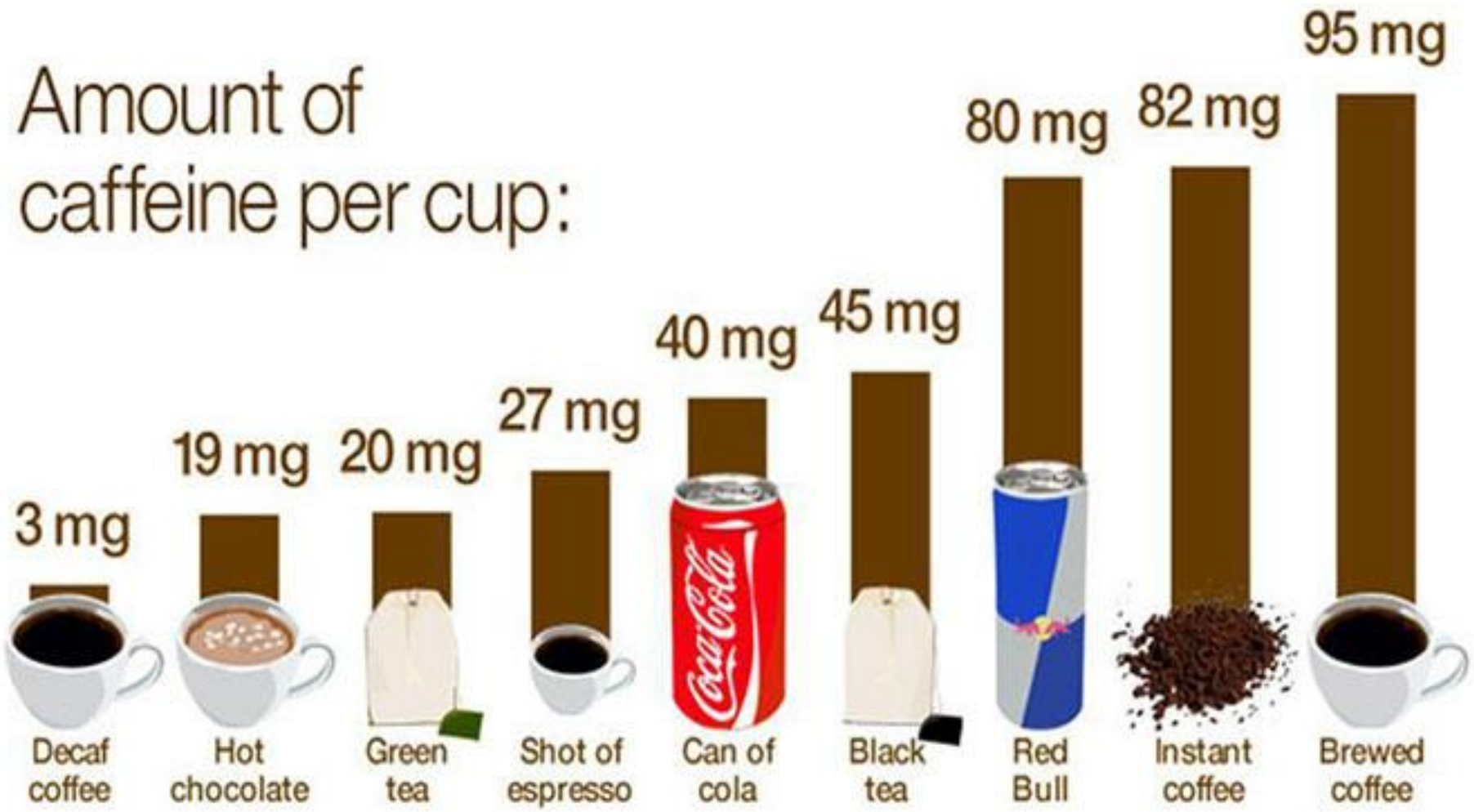



Figure 2. Change in VAS pain score ($T_0 - T_4$). Values expressed as mean ± SEM. *$P = 0.014$ vs placebo.

Camann WR, et al. Effects of oral caffeine on postdural puncture headache. A double-blind, placebo-controlled trial. Anesth Analg. 1990 Feb;70(2):181-4.

# Treatment Conservative Caffeine




https://www.billi-uk.com/caffeine-content-favourite-drinks/

http://www.oaa-anaes.ac.uk/assets/_managed/editor/File/Guidelines/PDPH/Kitching%20Stevenage%20PDPH%20guideline.pdf

- Transient, non-sustained relief in PDPH
- Not reduce the need for an epidural blood patch
- Adverse events including
  - Cardiac arrhythmias and maternal seizures.
  - In high doses (probably >300mg) caffeine may enter breast milk and potentially lead to neonatal irritability.

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

- Mechanism of action
  - Block adenosine receptor
    - Cerebral vasoconstriction

B. Rachinger-Adam, et al. Treatment of refractory post-dural puncture headache with low doses of the strong opioid piritramide, *BJA: British Journal of Anaesthesia*, Volume 110, Issue 3, 1 March 2013, Pages 490–491

*The VAS at 2, 6, and 12 hrs after treatment in the two groups*

| Headache intensity | Theophylline group (N = 30) | Acetaminophen group (N=30) | P-value |
|---|---|---|---|
| 2 hrs after treatment | 5.00 ± 1.57 | 5.97 ± 1.27 | 0.01 |
| 6 hrs after treatment | 3.43 ± 1.73 | 4.33 ± 1.49 | 0.03 |
| 12 hrs after treatment | 2.67 ± 2.35 | 4.24 ± 1.97 | 0.005 |

- Theophylline is a safe and effective treatment for PDPH

Mahoori A, et al. Theophylline versus acetaminophen in the treatment of post-dural puncture headache (PDPH). Middle East J Anaesthesiol. 2013 Oct; 22(3): 289–292.

- Gabapentinoids are similar in structure to the endogenous GABA neurotransmitter
  - Unclear mechanism
  - Some of their activity may modulate the release of excitatory neurotransmitters
    - Via an interaction with voltage-dependent calcium channels

**Table 2: Pain according to visual analog scale scores in pain's onset and after 24, 48 and 72 h**

| Variable | Acetaminophen | Gabapentin | Pregabalin | *P* value |
|---|---|---|---|---|
| Pain's onset | 7.50±1.35 | 8.03±1.60 | 8.87±1.19 | 0.001 |
| After 24 h | 5.07±1.48 | 4.87±1.16 | 3.67±0.71 | 0.001 |
| After 48 h | 3.07±1.37 | 2.47±1.13 | 0.87±0.73 | 0.001 |
| After 72 h | 1.57±1.04 | 1.03±0.18 | 0.13±0.30 | 0.001 |

- The mean VAS score was significantly lower in pregabalin group compared with others 24, 48 and 72 h after the onset of headache (P = 0.001 for all of them) and lower in Gabapentin group compared with Acetaminophen group 24, 48 and 72 h after the onset of headache (P = 0.001 for all analyses).

Mahoori A., et al. Comparing the effect of pregabalin, gabapentin, and acetaminophen on post-dural puncture headache. Saudi J Anaesth. 2014 Jul-Sep; 8(3): 374–377. doi: 10.4103/1658-354X.136436

- Unclear mechanism
- Favoring the reabsorption of CSF from extradural space
  - Increase CSF volume
- Block production of proinflammatory cytokines such as IL-1, IL-2, and TNF-α
  - Analgesic action

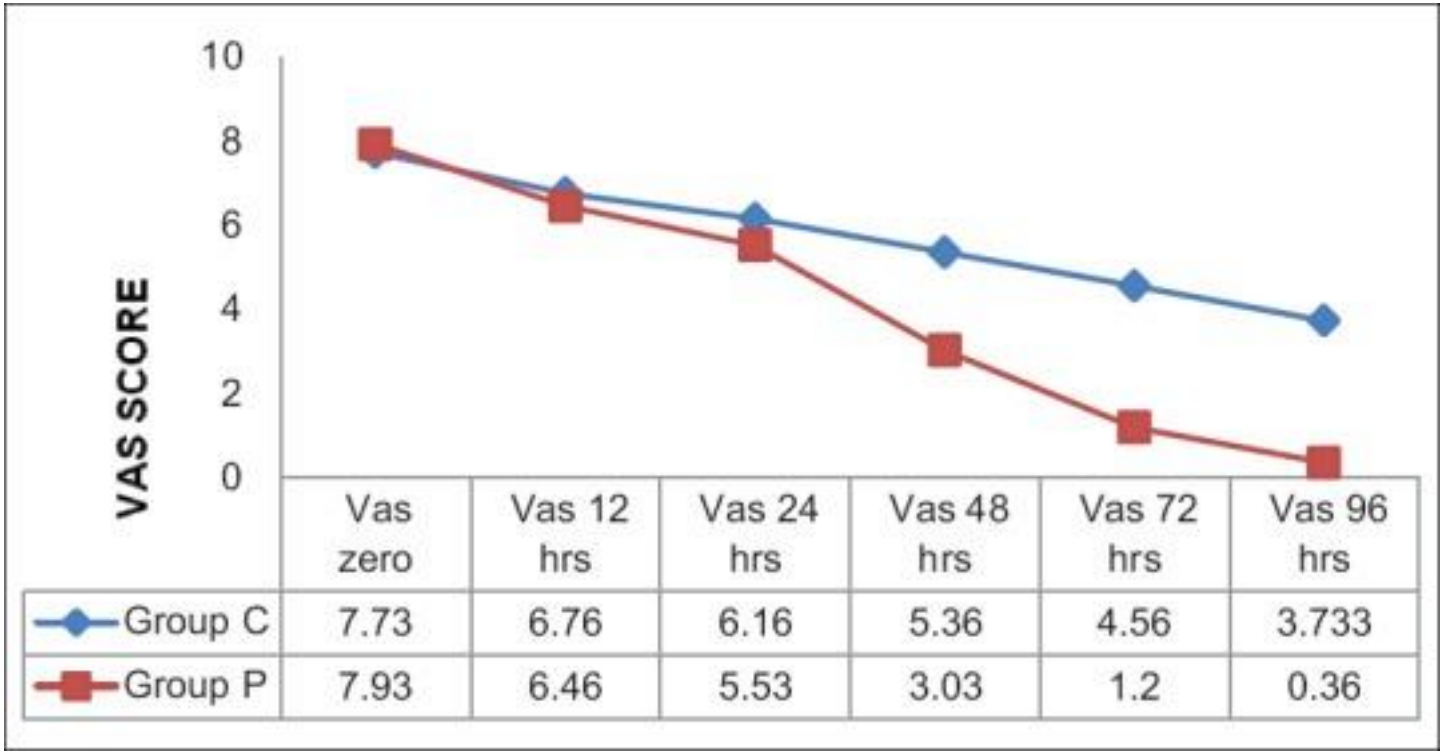
MR Alam, et at. Role of very short-term intravenous hydrocortisone in reducing postdural puncture headache. J Anaesthesiol Clin Pharmacol. 2012 Apr-Jun; 28(2): 190–193.

| Hour | Group | | *P* value |
|---|---|---|---|
| | Conventionally treated* | Conventional + IV hydrocortisone | |
| 0 | 9.17 ± 1.69 | 9.32 ± 0.83 | 0.6642 |
| 6 | 6.02 ± 2.46 | 2.06 ± 1.98 | <0.0001 |
| 24 | 3.77 ± 1.85 | 0.94 ± 2.67 | <0.0001 |
| 48 | 1.95 ± 1.12 | 0.69 ± 1.64 | 0.0010 |

**Conventional treatment = Recumbent positioning, i.v. or oral hydration, analgesics with caffeine, stool softeners and soft diet*

MR Alam, et at. Role of very short-term intravenous hydrocortisone in reducing postdural puncture headache. J Anaesthesiol Clin Pharmacol. 2012 Apr-Jun; 28(2): 190–193.

# Treatment Conservative Corticosteroids




| | Vas zero | Vas 12 hrs | Vas 24 hrs | Vas 48 hrs | Vas 72 hrs | Vas 96 hrs |
|---|---|---|---|---|---|---|
| Group C | 7.73 | 6.76 | 6.16 | 5.36 | 4.56 | 3.733 |
| Group P | 7.93 | 6.46 | 5.53 | 3.03 | 1.2 | 0.36 |

- The use of oral prednisolone was effective in relieving both severity and duration of PDPH after spinal anesthesia

Gupta S, Mehta N, et al. Role of Oral Prednisolone in the Management of Postdural Puncture Headache after Spinal Anesthesia in Urological Patients. *Anesthesia, Essays and Researches*. 2017;11(4):1075-1078. doi:10.4103/0259-1162.183565.

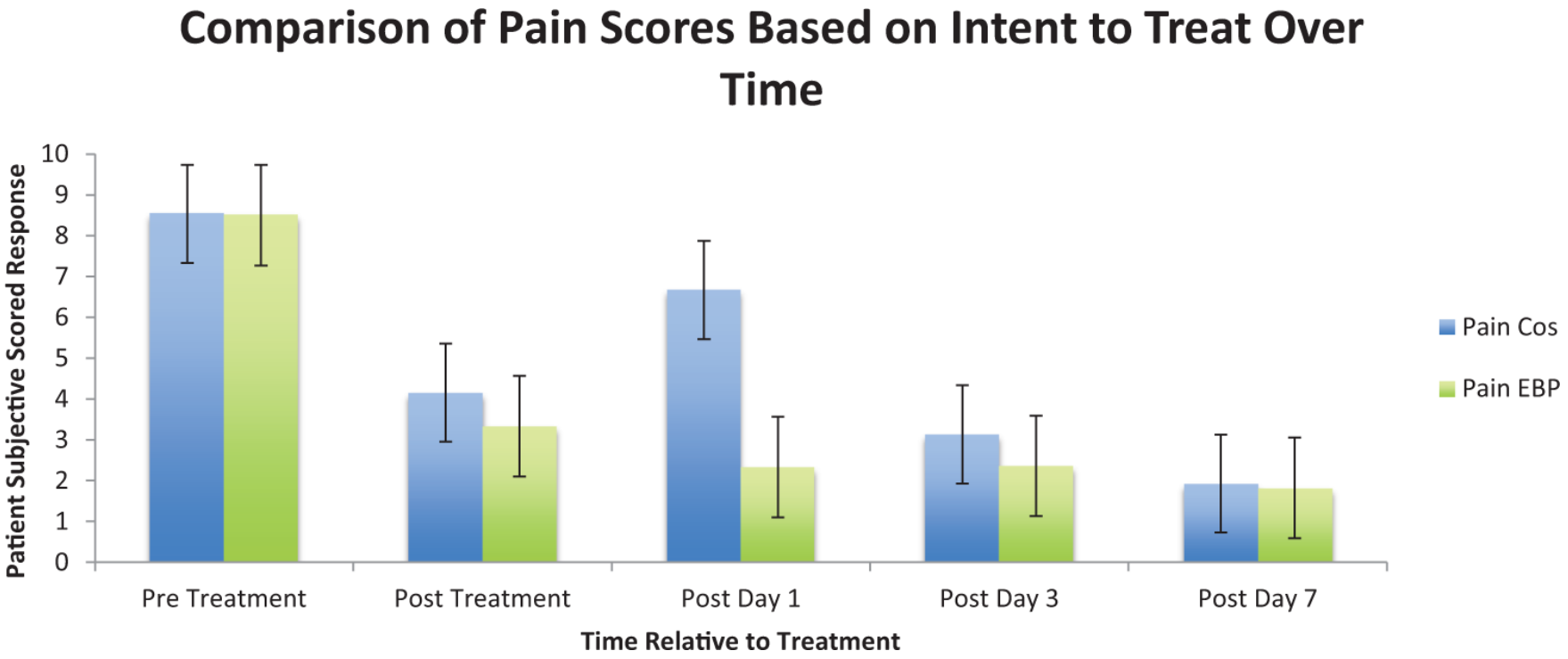
- Serotonin receptor antagonist
  - Cerebral vasoconstriction
- A few case reports have described the relief of PDPH with sumatriptan

Basurto Ona X, et al. Drug therapy for treating post-dural puncture headache. Cochrane Database Syst Rev. 2015; (7): CD007887. Published online 2015 Jul 15. doi: 10.1002/14651858.CD007887.pub3

- Synthetic derivative of adrenocorticotropic hormone (ACTH)
- Mechanism of action
  - Stimulate endorphin release
  - Anti-inflammatory action
  - Fluid and electrolyte retention
  - Stimulate CSF production

Hanling SR, et al. Intravenous Cosyntropin Versus Epidural Blood Patch for Treatment of Postdural Puncture Headache, *Pain Medicine*, Volume 17, Issue 7, 1 July 2016, Pages 1337–1342

**Treatment** | **Conservative** | **Cosyntropin**




- No difference between intravenous cosyntropin and EBP in reducing PDPH pain scores prior to ED discharge and at 3 and 7 days following treatment.

Hanling SR, et al. Intravenous Cosyntropin Versus Epidural Blood Patch for Treatment of Postdural Puncture Headache, *Pain Medicine*, Volume 17, Issue 7, 1 July 2016, Pages 1337–1342

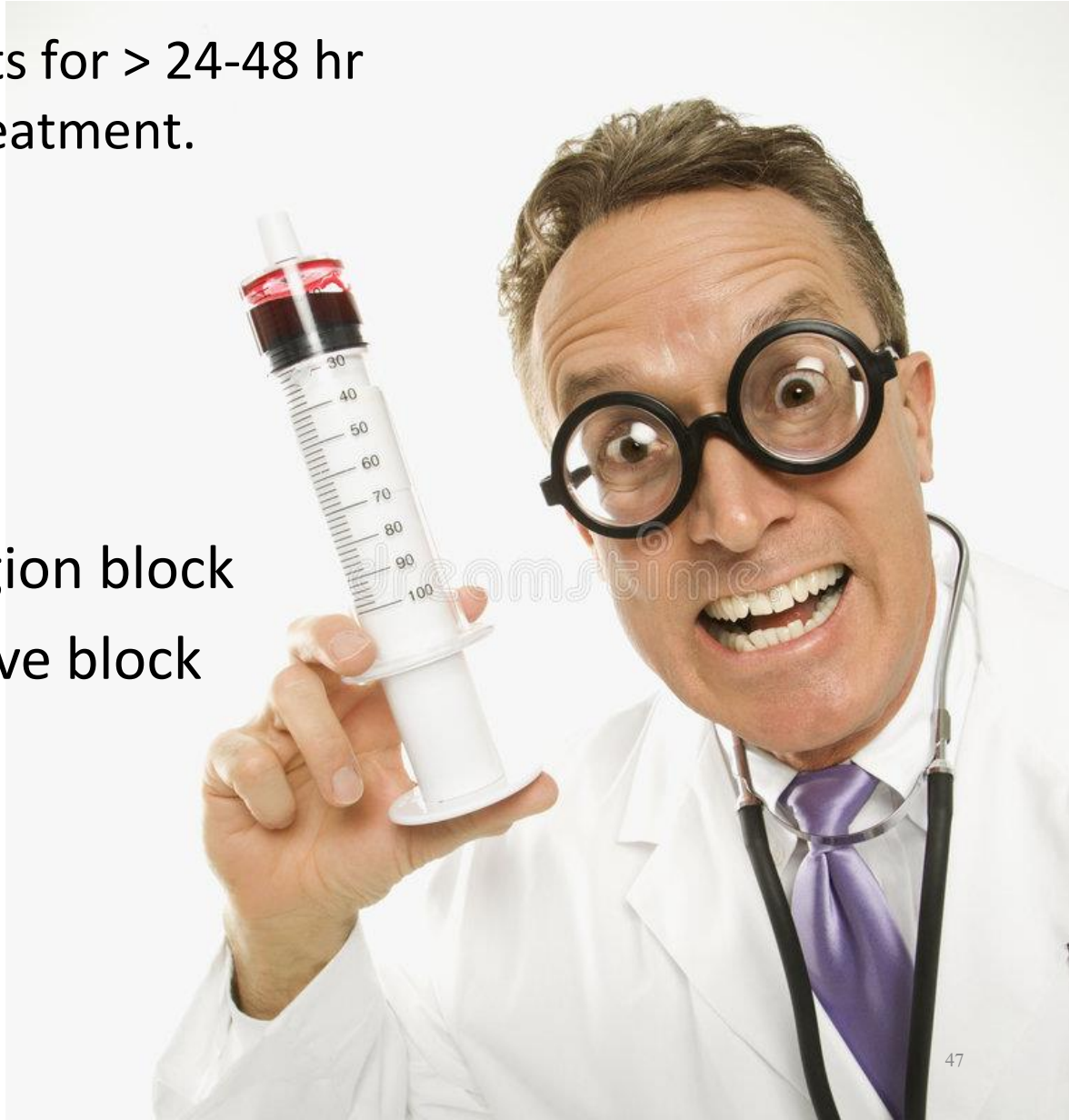
- Caffeine
  - Decrease PDPH persistence, supplementary intervention
- Gabapentinoids, hydrocortisone, theophylline
  - Decrease pain severity scores
- Sumatriptan and cosyntropin
  - Lack of conclusive evidence

Basurto Ona X, et al. Drug therapy for treating post-dural puncture headache. Cochrane Database Syst Rev. 2015; (7): CD007887. Published online 2015 Jul 15. doi: 10.1002/14651858.CD007887.pub3

# Invasive Treatment

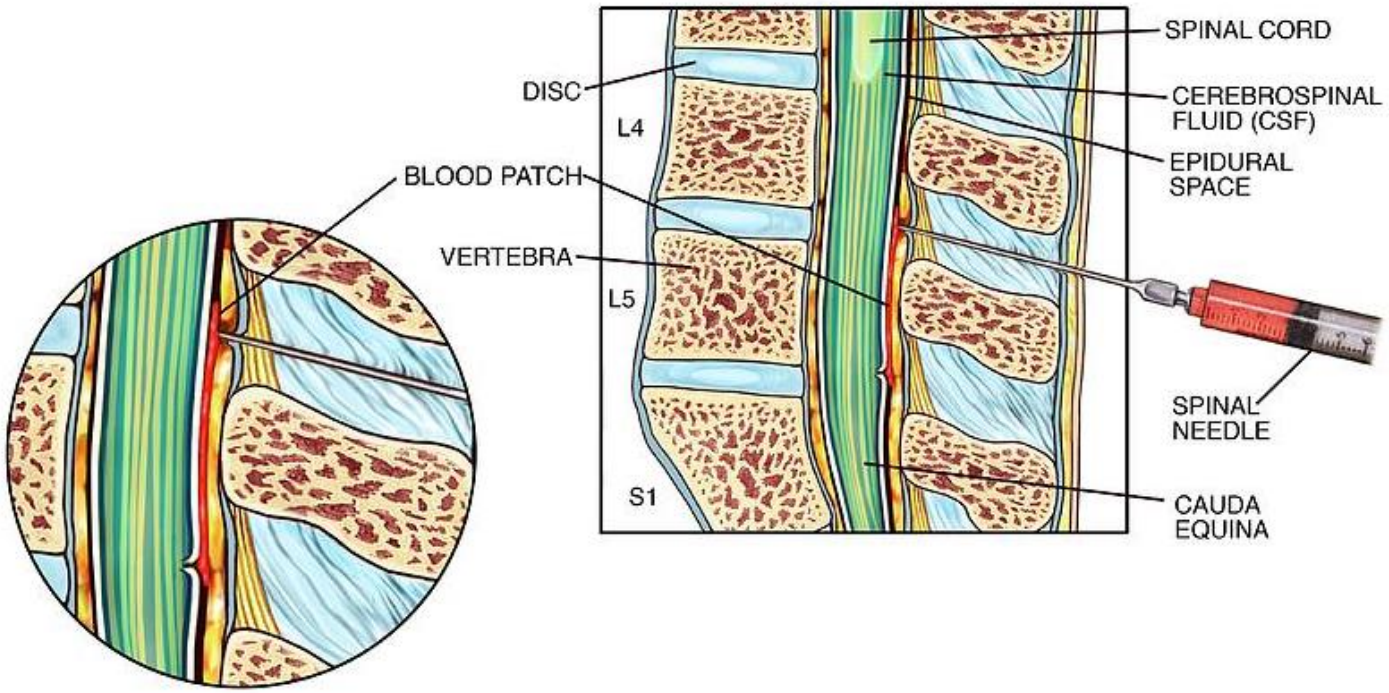
When the symptoms persists for > 24-48 hr despite the conservation treatment.

- Epidural blood patch
- Epidural colloids
- Sphenopalatine gangion block
- Greater occipital nerve block



# Treatment > Invasive > Epidural blood patch

- The treatment of choice
- Success rate of 61–98%




Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

- Mechanism
  - Epidural blood adheres to the thecal sac.
    - Clot formation and sealing the dural puncture site
  - Increase the lumbar CSF pressure
    - Reflex cerebral vasoconstriction
- Less effective within 24-48 hour of dural puncture
  - Initial high CSF flow may displace the clot
  - Clot degradation may occur.

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

- The optimal volume of blood is unknown.
- Ranging from 5 to 30 ml.
- Paech et al. randomized 121 patients to receive 15, 20, or 30 ml of blood
  - Similar efficacy in all of the three groups, with a success rate of 70%

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

- Contraindications
  - Coagulopathy
  - Infection at the injection site
  - Patient refusal or lack of cooperation

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

# Treatment > Invasive > Epidural blood patch

- Complications
  - Failure (15-20%),
  - Worsening of PDPH by creating additional dural puncture
  - Infection eg. Meningitis, arachnoiditis
  - Subdural hematoma
  - Seizures
  - Spastic paraparesis
  - Cauda equina syndrome
  - Back pain, neck pain
    - Self-limited

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

- Alternative to epidural blood patch
- Dextran-40 or hydroxyethyl starch.
- Mechanism of action
  - Increased epidural pressure
  - decreased CSF leakage
- Low level evidence

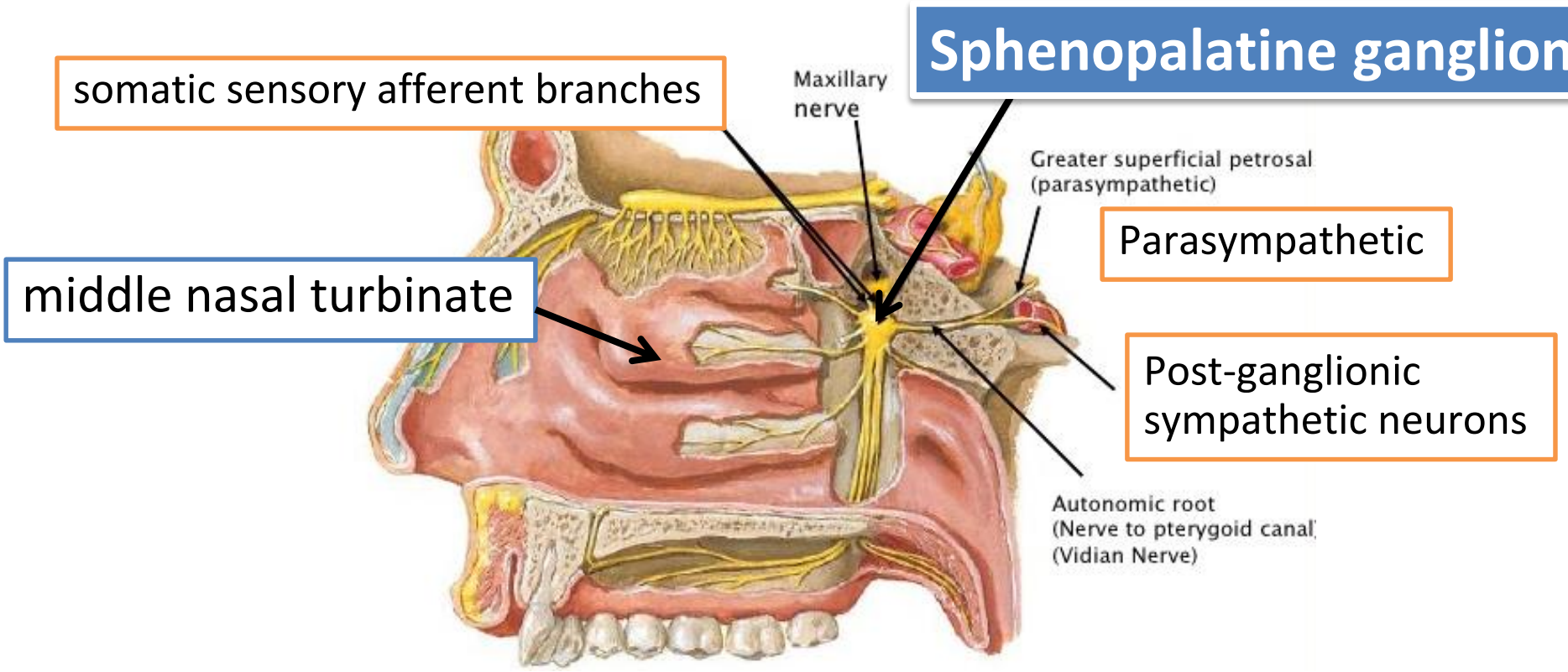

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

- Complications
  - Transient discomfort
  - Burning sensation

***Long term effect of colloid particles in the epidural space is unknown

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

# Treatment > Invasive > Sphenopalatine block




Nair AS. Bilateral transnasal sphenopalatine block for treating postdural puncture headache. Korean Journal of Anesthesiology. 2018;71(1):73-74. doi:10.4097/kjae.2018.71.1.73

- Traditionally used to treat chronic conditions
  - migraine, cluster headache, trigeminal neuralgia, and atypical facial pain.
- Case series: treat PDPH in obstetric patients.
- Mechanism of action
  - Inhibit parasympathetic activity

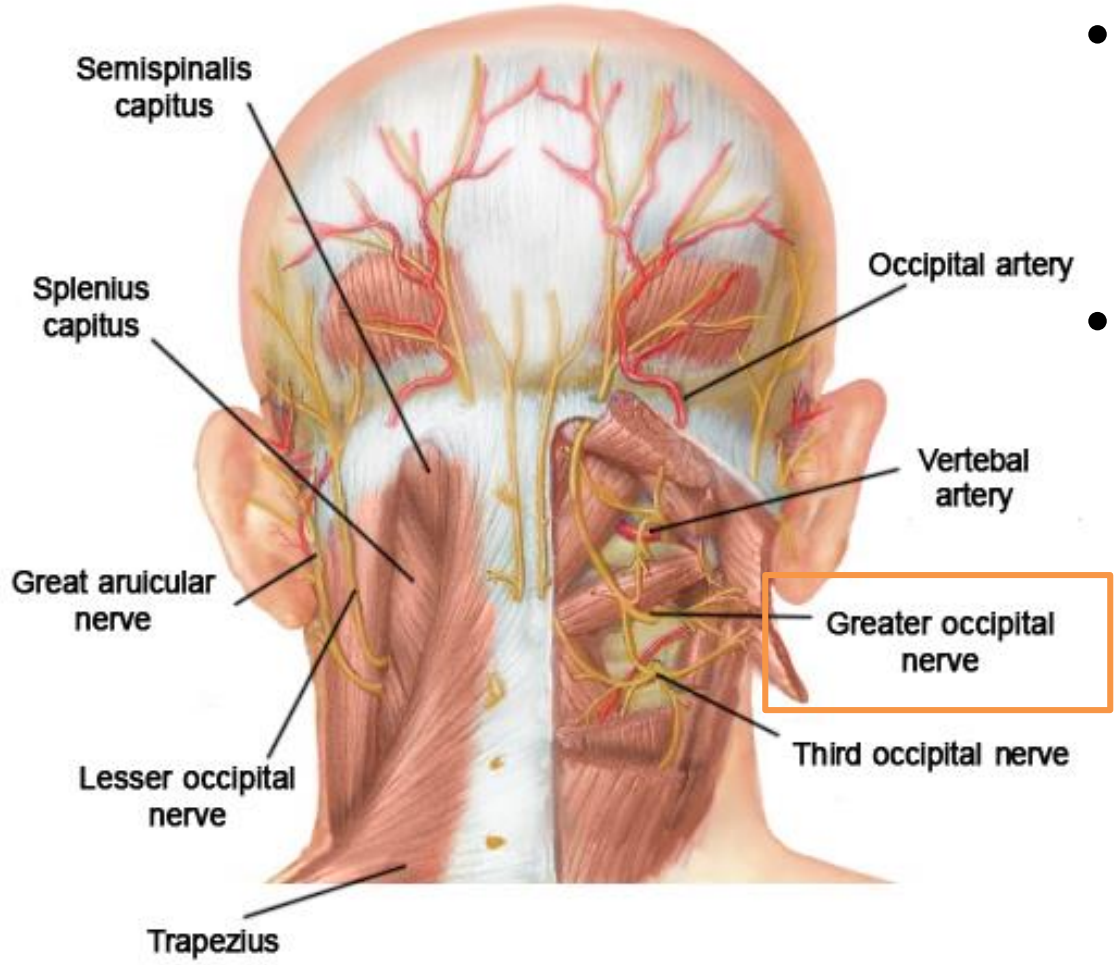
  => Inhibit vasodilatation => relieve pain

Nair AS. Bilateral transnasal sphenopalatine block for treating postdural puncture headache. Korean Journal of Anesthesiology. 2018;71(1):73-74. doi:10.4097/kjae.2018.71.1.73

# Treatment | Invasive | Sphenopalatine block

https://youtu.be/-Ez7VCj_kgk

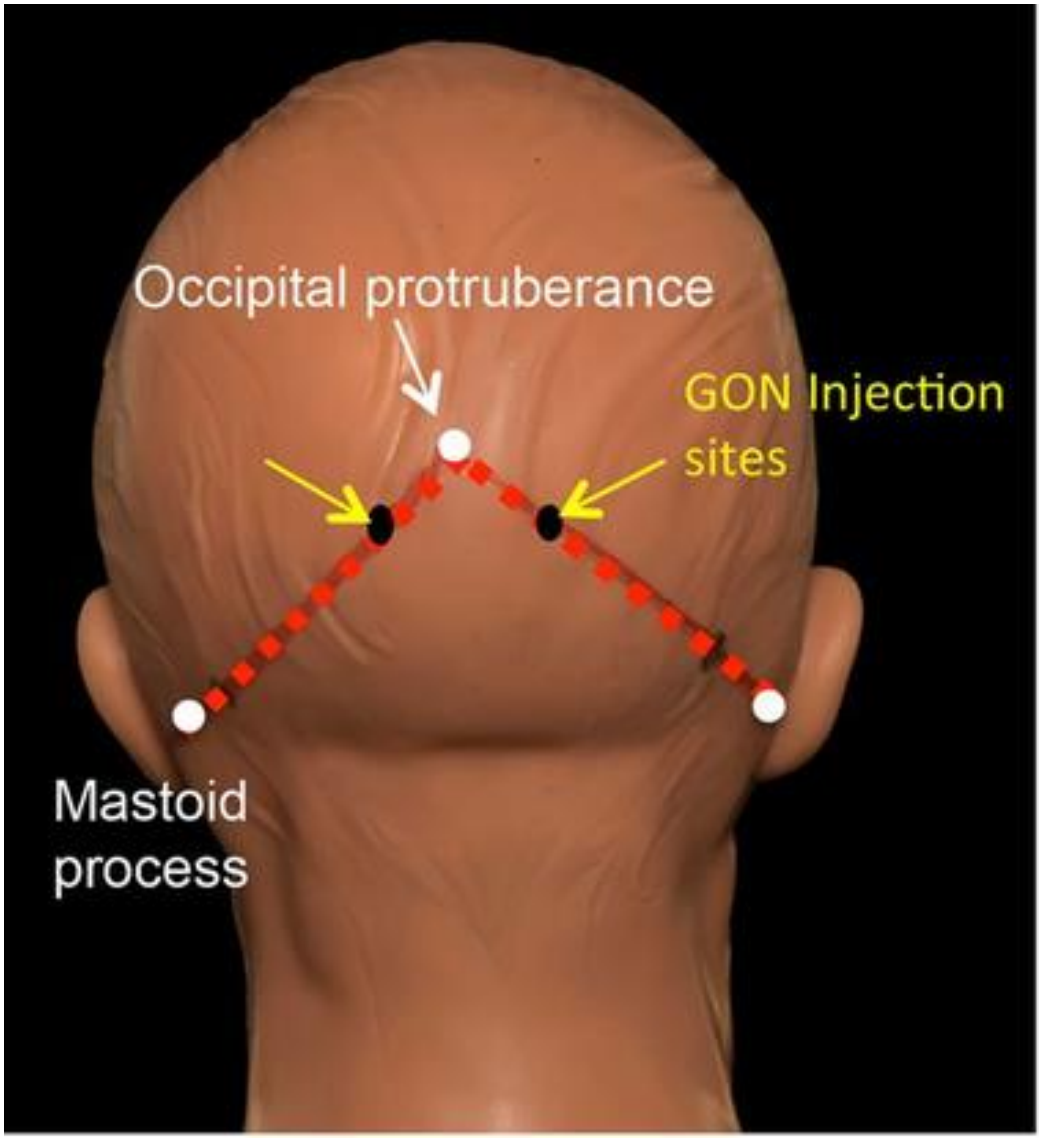
# Treatment > Invasive > Greater occipital n. block




- is derived from the dorsal root of the C2 nerve.
- The main sensory nerve in the occipital region.

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

- Injection sites




Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

- Have been used for the treatment of different types of headache
- PDPH: reduce pain severity, less invasive and leads to prompt symptom relief.
- Side effects
  - Local alopecia
  - Transient dizziness
  - Worsening of the headache

Kwak K-H. Postdural puncture headache. Korean Journal of Anesthesiology. 2017;70(2):136-143. doi:10.4097/kjae.2017.70.2.136.

# Back to the case

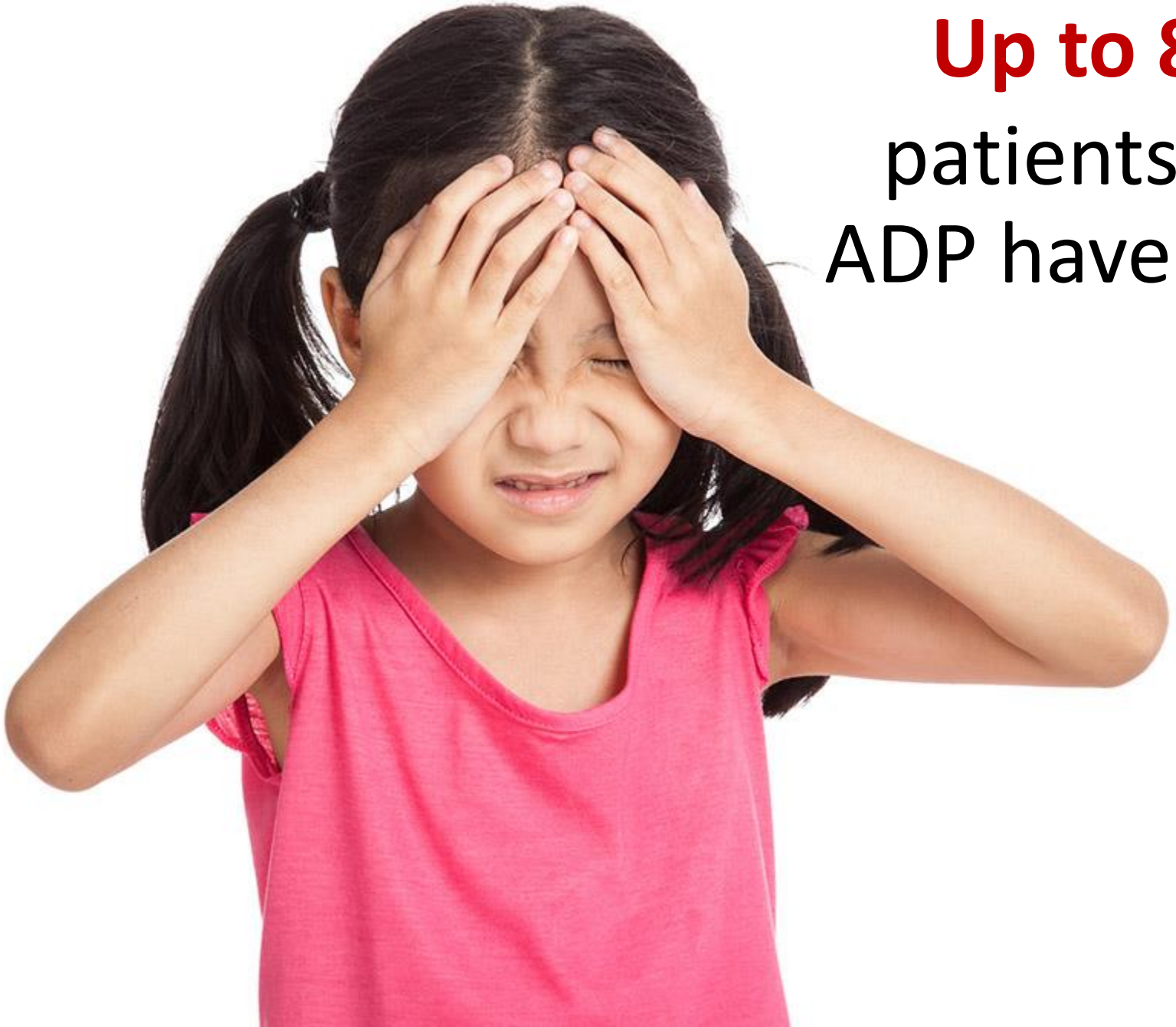
- 2nd attempt at T11 – T 12 (paramedian)
  >> successful

- After GA was conducted, the surgeon operated the patient.
- The intraoperative period was uneventful.

# Post-operative analgesia

- Continue PCEA
  - 0.0625% bupivacaine + morphine 0.02 mg/ml
  - Basal rate 5 ml/hr
  - PCA dose 2 ml

- Off PCEA on POD 3
- No PDPH



**Up to 80%**
patients with
ADP have PDPH.

# Prophylaxis

## Conservative

- Hydration
- Bed rest
- Prophylactic drugs
  - Epidural Morphine
  - IV Cosyntropin
  - IV Aminophylline

## Invasive

- Epidural blood patch
- Intrathecal catheter placement
- Epidural saline administration

- Aim to
  - decrease CSF loss through the dural hole
  - restore CSF with additional fluid intake.
- Simple
- No serious adverse effects

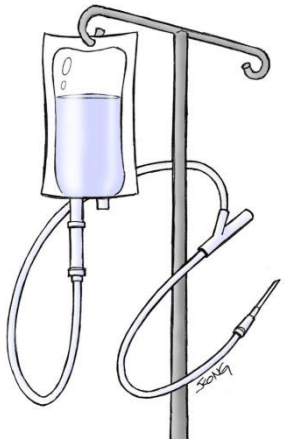
Cochrane Library
Cochrane Database of Systematic Reviews

## Posture and fluids for preventing post-dural puncture headache (Review)

Arevalo-Rodriguez I, Ciapponi A, Roqué i Figuls M, Muñoz L, Bonfill Cosp X

- 24 trials with 2996 participants.
- Fluid supplementation VS no supplementation
  - The incidence of PDPH
    - RR 1, 95% CI 0.59 to 1.69

**No significant difference**



Arevalo-Rodriguez I, Ciapponi A, Roqué i Figuls M, Muñoz L, Bonfill Cosp X. Posture and fluids for preventing post-dural puncture headache. The Cochrane Library. 2016 Mar 7.

- Bed rest VS immediate mobilization
  - The incidence of PDPH
    - RR 1.24; 95% CI 1.04 to 1.48

**No significant difference**

Arevalo-Rodriguez I, Ciapponi A, Roqué i Figuls M, Muñoz L, Bonfill Cosp X. Posture and fluids for preventing post-dural puncture headache. The Cochrane Library. 2016 Mar 7.

- Epidural morphine
- Intravenous cosyntropin
- IV caffeine
- IV aminophylline

# Epidural Morphine

- RCT; 25 parturients with ADP

| | Morphine (*n* = 25) | Saline (*n* = 25) | |
|---|---|---|---|
| Occurrence of PDPH | 3.0 (12%) | 12.0 (48%) | (p = 0.014) |
| Onset of PDPH; days | 3.0 (3–4 [3, 4]) | 2.0 (1–2.5 [1–3]) | (p = 0.028) |
| Maximum VRSP; (0–10) | 5.0 (4–5 [4–5]) | 6.0 (4–7 [3–8]) | (p = 0.458) |
| Recommended therapeutic EBP | 0.0 | 6.0 (24%) | |
| Therapeutic EBP performed | 0.0 | 4.0 (16%) | |
| Nausea and vomiting | 11.0 (44%) | 4.0 (16%) | (p = 0.06) |
| Itching | 3.0 (12%) | 0.0 | |

**Significant reduction in**
**Incidence of PDPH and requirement of TEBP**



Al-metwalli RR. Epidural morphine injections for prevention of post dural puncture headache. Anaesthesia 2008; 63: 847-50.

# IV Cosyntropin


- A synthetic analogue of adrenocorticotrophin (ACTH)

| | |
|---|---|
| **รายการยา** | **Cosyntropin Inj 0.25 mg/mL [Synacthen]** |
| **ชื่อสามัญ** | Cosyntropin **ชื่อการค้า** Synacthen |
| **ชื่อพ้อง** | tetracosactide (INN), tetracosactrin (BAN), cosyntropin (USAN) |
| **รูปแบบยา** | solution for injection |
| **ราคาขาย** | 844.00 **บาท** |

| | สปสช. | ปกส. | ข้าราชการ | แบงค์ชาติ | นักศึกษา | | การสั่งยา | การเบิกค่ายา |
|---|---|---|---|---|---|---|---|---|
| **สิทธิการเบิกเบื้องต้น*** | ✖ | ✖ | ✖ | ✖ | ✖ | **เงื่อนไข** | | ✖✖ |
| **เพดานราคาการเบิกจ่าย** | | | | | | | | |

# IV Cosyntropin

- RCT; 90 parturients with ADP

| Variable | Cosyntropin Group (n = 45) | Control Group (n = 45) | *P* Value |
|---|---|---|---|
| Incidence of PDPH | | | |
| PDPH occurred | 15 (33.3) | 31 (68.9) | 0.001 |
| PDPH did not occur | 30 (66.7) | 14 (31.1) | |
| Need for EBP | | | |
| EBP needed | 5 (11.1) | 13 (28.9) | 0.035 |
| EBP not needed | 40 (88.9) | 32 (71.1) | |
| Need for repeat EBP (number received second EBP/number received EBP) | 2/5 (40) | 4/13 (30.8) | 1.0 |

**IV Cosyntropin might be useful in prophylaxis of PDPH.**

Hakim SM. Cosyntropin for prophylaxis against postdural puncture headache after accidental dural puncture. Anesthesiology 2010; 113: 413-20.

# IV aminophylline

- RCT study 120 patients operates C/S under SB.

| Headache in each group | IV aminophylline (n = 60) | Control (n = 60) | P value |
|---|---|---|---|
| 24 h | 3 (5%) | 19 (31%) | <0.001 |
| 48 h | 3 (5%) | 14(23.3%) | <0.004 |

- Later retrospective cohort study shows no

**IV Aminophylline might be useful in prophylaxis of PDPH.**

**Need more evidence.**

Sadeghi SE, ... ion on prevention of post dural puncture headache in patients who received spinal anesthesia for elective cesarean section. World Journal of Medical Sciences 2012;7(1):13–6.

# Prophylaxis

## Conservative

- Hydration
- Bed rest
- Prophylactic drugs
  - Epidural Morphine
  - IV Cosyntropin
  - IV Aminophylline

## Invasive

- Epidural blood patch
- Intrathecal catheter placement
- Epidural saline administration

- attractive option as it is highly successful in treatment of PDPH.
- It can be performed through the epidural catheter just before the epidural catheter is removed.

British Journal of Anesthesia, 2010

## Prevention of postdural puncture headache after accidental dural puncture: a quantitative systematic review

C. C. Apfel[1*], A. Saxena[1], O. S. Cakmakkaya[2], R. Gaiser[3,4,5], E. George[1] and O. Radke[6]

- Pooled results of the 4 RCT
  - RR of 0.32 (0.10–1.03): no significant difference

**Not recommend to perform PEBP.**

Apfel CC, Saxena A, Cakmakkaya OS, Gaiser R, George E, Radke O. Prevention of postdural puncture headache after accidental dural puncture: a quantitative systematic review. British journal of anaesthesia. 2010 Aug 3;105(3):255-63.

- Benefits
  - Allows immediate analgesia through the intrathecal catheter.
  - No addition risk of repeated dural punctures
- Risks
  - Meningitis or abscess
  - Arachnoiditis
  - Cauda equina syndrome

- Two hypotheses of mechanism
  1. The catheter plugs the dural hole and stops the CSF leakage.
  2. The inflammatory reaction in the dura surrounding the puncture site may facilitate sealing the hole and prevent leakage of the CSF.

Regional Anesthesia and Pain Medicine, 2016

## Accidental Dural Puncture Management
*10-Year Experience at an Academic Tertiary Care Center*

*Norman Bolden, MD* and Ermias Gebre, MD†*

- A retrospective study of 218 ADP cases
- A re-sited epidural group VS a spinal catheter group.
  - the incidence of PDPH: **no significant difference**
  - the number of EBPs: **significantly reduced in ITCP group**
    - **52.0%** versus **20.3%** (OR, 4.2; 95% CI, 2.4–7.6; P < 0.001)

**The long-term intrathecal catheter might be an option.**
**The evidence is insufficient to provide**
**a strong recommendation.**

- Epidural Saline administration
- Intrathecal Saline administration

**Current evidence fails to show prophylaxis effect.**

Next time when you perform Epidural block,

**Beware of ADP**

# If the ADP does happen… consider these prophylaxis methods

## Conservative

- ✗ Hydration
- ✗ Bed rest
- **Prophylactic drugs**
  - ✓ – Epidural Morphine
  - ✓ – IV Cosyntropin
  - ✓ – IV Caffeine
  - ✓ – IV Aminophylline

## Invasive

- ✗ Epidural blood patch
- ✓ Intrathecal catheter placement
- ✓ Saline (intrathecal or epidural)

**Need more evidence**

# If PDPH occurs

## Conservative

- Non-phamarcologic
  - Bed rest
  - Hydration
- Pharmacologic
  - Caffeine
  - Theophylline
  - Gabapentin, pregabalin
  - Corticosteroids
  - Sumatriptan
  - Cosyntropin

## Invasive

- Epidural blood patch
- Epidural colloids
- Sphenopalatine ganglion block
- Greater occipital nerve block

# Thank you