Not all patients with a postdural puncture headache should receive an epidural blood patch

Dr Matt Rucklidge
Royal Devon and Exeter Hospital
..and if Kate should get a headache, do give me a call Ma’am
PDPH

- Is unpleasant
- Is associated with complications
- Treatment options are limited
- Epidural blood patch is appropriate at times
PDPH – mysterious science…..

- Quality of scientific literature is poor
- Retrospective studies, case series, case reports..
- Few adequately powered RCTs
Epidural Blood Patch

- Scientific knowledge even more questionable

- The few RCTs
  - underpowered, un-blinded, prolonged recruitment…

- *Practice-based* rather than *evidence-based* knowledge and management

  - “*Trust me, I’ve done loads….*”
Exeter 20 year experience

Accidental dural puncture

Number
EBP needed
Exeter 20 year experience

Accidental dural puncture

Number
EBP needed
Exeter 20 year experience

Accidental dural puncture

- Blue bars represent 'Number'
- Red bars represent 'EBP needed'

Graph shows the number of accidental dural punctures and the need for evidence-based practice (EBP) over the years from 1992 to 2012.
Exeter 20 year experience

Accidental dural puncture

- 144 dural taps
- 50 EBP
PDPH and EBP

- PDPH is complex and variable
- EBP for all is not the best approach
XVI.

Aus der Königlichen chirurgischen Klinik zu Kiel.

Versuche über Cocainisierung des Rückenmarkes.

Von

Prof. Dr. August Bier.

Die Schleich'sche Infiltrations- und die Oberst'sche regionäre Cocainanästhesie haben die gefährliche allgemeine Narkose in sehr wesentlicher und erfreulicher Weise beschränkt. Aber für „grosse“ Operationen sind beide Verfahren doch nur im geringen Grade verwendbar. Ich habe den Versuch gemacht, durch Cocainisierung des Rückenmarkes grosse Strecken des Körpers unempfindlich gegen Schmerz zu machen. Dies wurde in folgender Weise ausgeführt:


Die Lumbalpunktion wird unter Schleich's Infiltrationsanästhesie schmerzlos ausgeführt. Zuerst wird die Haut, dann werden mit einer langen Nadel die übrigen Weichtheile bis auf die Wirbelsäule infiltrirt.
“After performing these experiments on our own bodies, we proceeded to dine, drink wine and smoke cigars. I awoke the next morning, hale and hearty and went for an hours walk. Towards the end of the walk I developed a headache. I felt perfectly well as long as I remained horizontal. I was forced to take to my bed and remained there for nine days...”
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Headache after an epidural or spinal injection

What you need to know

* PDPH resolves…
Headache after an epidural or spinal injection

What you need to know

How can I get rid of the headache?
Headache after an epidural or spinal injection

What you need to know

How can I get rid of the headache?

Bed rest and simple painkillers (such as paracetamol or diclofenac [Voltarol]) may be the only treatment you need. You should drink plenty of fluid (some people find coffee or tea especially helpful) and avoid lifting heavy weights or straining. The headache usually gets better in a few days, but if it does not, your anaesthetist may offer you a treatment called an epidural blood patch (this is described later).
Headache after an epidural or spinal injection

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Is there harm from not patching?
Is there harm from not patching?

- Prolonged hospital stay
- Greater costs
- Chronic headache
- Subdural haematoma
Is there harm from not patching?

- Prolonged hospital stay
- Greater costs


- PDPH increases length of stay
- No evidence EBP shortens stay in these patients
Is there harm from not patching?

- Prolonged hospital stay
- Greater costs
- Chronic headache
- Subdural haematoma
Is there harm from not patching?

- Chronic headache
- Subdural haematoma

Chronic headache is increased following accidental puncture
- 28% vs 5%

No significant difference whether treated with EBP or not
Is there harm from not patching?

- Prolonged hospital stay
- Greater costs
- Risk of DVT
- Chronic headache
- Subdural haematoma
Subdural haematoma is associated with PDPH

- Does epidural blood patch reduce risk?
CASE REPORT AND REVIEW

Does postdural puncture headache left untreated lead to subdural hematoma? Case report and review of the literature

A. Zeidan, O. Farhat, H. Maaliki, A. Baraka

- 25 cases post spinal
  - 6 parturients
  - Presented 6h – 30days
- 21 cases post Tuohy puncture
  - 19 parturients
  - Bilateral SDH common (11/21)
  - 1 died
  - Presented 2 days – 5 months
Does early EBP reduce risk of subdural haematoma?

Evidence is lacking
Can EBP cause a subdural haematoma?

Yes
37 yr old parturient

25G spinal

Postural headache 6 h later

Epidural Blood Patch 12 h later

Developed -
  - Excruciating neck pain radiating to buttocks, waist and thighs…
Subdural hematoma after an epidural blood patch

L.A. Verduzco, a S.W. Atlas, b E.T. Riley a
a Department of Anesthesiology, b Department of Radiology, Stanford University Medical Centre, Stanford, CA, USA

• MRI
  – Spinal subdural haematoma: L1 – S3
Epidural Blood Patch
EBP efficacy through the ages

1960

Dr James Gormley
*Anesthesiology* 1960; 21: 565-6

6 cases
2-3 ml blood
100% success
EBP efficacy through the ages

Ostheimer GW et al.
Anesthesiol 1974; 41: 307-8
EBP efficacy through the ages

Banks S et al.
IJOA 2001: 10; 172-6
EBP efficacy through the ages

Paech MJ et al
A & A 2011: 113; 126-33
Volume of Blood?

Blood Volume (ml)

- 1960s
- 1970s
- 1980s
- 2000s
The Volume of Blood for Epidural Blood Patch in Obstetrics: A Randomized, Blinded Clinical Trial

Michael J. Paech, DM,* Dorota A. Doherty, PhD,†‡ Tracey Christmas, FRCA,§ Cynthia A. Wong, MD,|| and Epidural Blood Patch Trial Group

- 121 EBP with PDPH after epidural needle
- Compared EBP efficacy with:
  - 15ml
  - 20ml
  - 30ml
- No significant difference
• Permanent relief in 27 of 121 (22%)

• Mean time of return of headache – 100h

• Repeat blood patch in 30%
Why the falling efficacy?

• Older studies
  – Mix of small and large gauge needles

• Exaggerated outcomes:
  – bias
  – limited assessment
  – inadequate follow up
Blood Patch Timing

• The longer the delay the more success

• EBP unsuccessful if performed within 24h of puncture
  – Banks et al. IJOA 2001:10;172-6

• Risk of failure doubled if EBP within 4 days of tap

• EBP within 4 days of tap is an independent risk factor for failure
Safety and complications
Safety and complications

- RCTs not powered to identify complications
- Observational and retrospective studies
- Case reports
CASE REPORT

A subdural abscess and infected blood patch complicating regional analgesia for labour

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SUMMARY. We report two very unusual cases of infection complicating labour analgesia. The first case was a subdural abscess presenting with deep-seated backache seven days after combined spinal-epidural analgesia for labour. The second was a painful lumbar swelling and septicemia that presented three days after a blood patch for a postdural puncture headache. Because of their complicated and unusual presentation, the diagnosis and management of both were initially delayed.

INTRODUCTION

Infection of the neuraxial space is a rare complication, and the two cases described here are unusual in that they were associated with subdural collections and septicaemia.

CASE ONE

A 38-year-old para 2 mother requested regional analgesia in advancing labour. She had had an uneventful pregnancy and was well apart from a mild chronic dermatitis thought to be associated with latex allergy, and an allergy to penicillin. She was admitted to the delivery suite

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Subdural abscess and infected blood patch
Severe, Acute Meningeal Irritative Reaction After Epidural Blood Patch

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Epidural blood patch (EBP) is considered to be a safe and effective treatment for the symptomatology of postdural puncture headache (PDPH) (1). Adverse sequelae of this treatment are infrequent, with transient low back pain the most common complaint. Infectious complications are rare, and reports of aseptic meningitis after EBP are lacking. We present a case of acute, severe meningeal irritation that occurred after an EBP.

Case Report

Epidural anesthesia was difficult, requiring an 8.89-cm, 25-gauge Whitacre needle. Ultimately, a 22-gauge Quincke point needle was inserted at the L2-L3 spinal interspace, and a mixture of 12 mg of hyperbaric bupivacaine (8.23% dextrose), 10 µg of fentanyl, and 200 µg of epinephrine was injected. A bilateral sensory level to T4 was obtained. Cesarean delivery was uncomplicated, and a male infant was delivered with Apgar scores of 8 and 9.

On Postoperative Day (POD) 1, the patient complained of a headache that worsened when standing and eased, although did not completely resolve, in the supine position. Conservative therapy was initiated, consisting of bed rest, IV fluid hydration, and oral oxycodone and acetaminophen for pain. The intensity of headache decreased somewhat with therapy, but symptoms persisted into PODs 2 and 3, increasing in intensity without neurologic symptoms except for the complaint of occasional black spots moving before the patient’s eyes. At this time, an EBP was offered as treatment; but the patient refused, recalling discomfort from her previous experience during a difficult spinal anesthesia placement. On POD 3, symptoms had not changed; on POD 4, the patient finally agreed to have an EBP.

One hour before the EBP, the patient’s oral temperature was 99.6°F with no other signs of infection. The surgical incision was healing well, and there were no other signs of infection. Deep venous thrombosis, or respiratory infections were noted. Blood cultures were negative.

Approximately 45 h after EBP the patient had a fever of 100.5°F and complained of worsening headache, photophobia, and nasal stuffiness. She was nauseated and appeared to be tremulous and anxious. No focal neurologic signs could be elicited. Fundoscopic examination by an ophthalmologist showed no evidence of increased intracranial pressure. A diagnosis of acute meningitis was considered. Lumbar puncture using a 22-gauge, 3-inch Quincke needle was performed with moderate difficulty (because of the patient’s obesity), and cerebrospinal fluid samples and blood and urine cultures were sent for analysis before initiating a regimen of IV antibiotics consisting of vancomycin and cefotaxime, as well as the analogues ibuprofen and oxycodone and acetaminophen. The serous white cell count was 9.3 × 10⁶/µL.

Twelve hours after EBP, her oral temperature was 101.1°F. The headache was gone in the supine position, although it was present mildly when she stood up. Her neck stiffness was nearly resolved. Subsequently, the patient continued to improve and was discharged home on POD 8. Cerebrospinal fluid (CSF) analysis showed 2601 white blood cells and 19500 red blood cells in the first tube, and 2000 white blood cells and 14000 red blood cells in the fourth tube. The final CSF and urine cultures were negative for bacterial growth. Gram staining of CSF showed no evidence of bacteria. One of four blood culture bottles grew Staphylococcus aureus, and the patient was continued on IV antibiotics at home.
Subdural hematoma after an epidural blood patch

L.A. Verduco, a S.W. Atlas, b E.T. Riley a
Department of Anesthesiology, b Department of Radiology, Stanford University Medical Centre, Stanford, CA, USA

ABSTRACT
We report the case of a 37-year-old postpartum patient who developed a contained subacute spinal subdural hematoma causing mass effect on the cauda equina and severe spinal stenosis after undergoing an epidural blood patch for postdural puncture headache. Recovery occurred following administration of oral steroids.

Keywords: Spinal; Anesthesia; Postdural puncture headache; Blood patch; Subdural

Introduction
The incidence of postdural puncture headache (PDPH) after spinal anesthesia using pencil-point needles ranges from 0.66% to 4% in patients undergoing elective caesarean delivery. 1-3 An epidural blood patch (EBP), first described by Gormley in 1960, 1 is the most effective treatment with a reported cure rate of 33-66% in one study. 2-4 EBP is a low-risk, reported complications include headache, neck stiffness, and fever. 5-7

Case report
A healthy 37-year-old G2P2 woman with an uncomplicated pregnancy at 38 weeks of gestation presented with premature rupture of membranes and was admitted for oxytocin augmentation of labor. She had an uncomplicated vaginal delivery without neuraxial analgesia and underwent postpartum tubal ligation (PPTL) under spinal anesthesia 12 h after delivery. Spinal anesthesia was uneventful: a single needle insertion was performed at L3-4 in the sitting position using a Pencath 25-gauge needle (B. Braun, Bethlehem, PA, USA). An intrathecal injection of 0.75% hyperbaric bupivacaine 12 mg with

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Spinal subdural haematoma
Spinal subdural haematoma as a complication of immediate epidural blood patch

**Purpose:** The authors report a case of a patient who developed spinal subdural haematoma after a series of epidural blood patches to alter anaesthesia to this rare complication.

**Clinical Features:** The patient was a 35-year-old woman without coagulopathy and was initially treated elsewhere for chronic pain by repetitive epidural phenol injections. When the dura was inadvertently punctured during subsequent attempts to inject phenol, immediate epidural blood patch was performed to treat or prevent headache. The patient developed cauda equina syndrome after six epidural blood patches. The clinical diagnosis was confirmed by magnetic imaging and the intradural haematoma was treated before irreversible changes occur, spinal intradural haematoma can result in complete recovery.

**Objectif:** Décrire un cas d’hématome rachidien sous-dural après des injections péridurales répétées de sang autologue (« blood patch ») et faire part à l’anesthésiste de la gravité de cette complication rare.

**Caractéristiques cliniques:** Il s’agit d’un patient de 35 ans consultant pour des douleurs thoraciques et des céphalées. Un hématome rachidien a été observé au niveau cervical après six injections de sang autologue. Le diagnostic a été confirmé par imagerie par résonance magnétique et l’hématome a été traité chirurgicalement. La patiente a récupéré complètement.

**Conclusions:** Le « blood patch » n’est pas exempt de complications. Une lombalgie transitoire avec ou sans radiculopathie peut survenir chez les tiers des patients. Si les signes et symptômes persistent ou s’aggravent, un hématome sous-arachnoïdien ou épidural devrait être suspecté et un avis neurochirurgical est nécessaire. Le traitement consiste à identifier l’espace épidural est important pour prévenir l’injection sous-durale de sang. L’aiguille doit être retirée après une ponction de la dure-mère et un nouveau niveau identifié dans l’espace épidural. Le blood patch peut comporter un risque de complications graves plus important après des injections répétées de phenol à cause de la fibrose et de l’inflammation de l’espace épidural. La résonance magnétique illustre fidèlement l’étendue de la pathologie. S’il est diagnostiqué et traité avant l’apparition de lésions irréversibles, l’hématome rachidien intradural ne devrait pas laisser laissé de séquelles.

**Key words**

**Anaesthetic Techniques:** epidural; complications: haematoma, subdural, blood patch; headache.

**Pain:** chronic.

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Recurrent post-partum seizures after epidural blood patch

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There are many causes for headaches after childbirth. Even though postdural puncture headache (PDPH) has to be considered in a woman with a history of difficult epidural anaesthesia, pre-eclampsia should always be excluded as an important differential diagnosis. We report a case with signs of late-onset pre-eclampsia where administration of an epidural blood patch (EBP) was associated with eclampsia. A hypothetical causal relationship between the EBP and seizures was discarded on the basis of evidence presented in this report.

Br J Anaesth 2003; 90: 247–50

Keywords: anaesthetic techniques, epidural; anaesthetic techniques, regional; complications,
CORRESPONDENCE

There are few reported cases of seventh nerve palsy following an EBP\(^2\) with differing opinions on the likely aetiology. We feel that the timing of the two EBPs was relevant and that an increase in intracranial pressure secondary to a blood patch\(^5\) may have compromised the blood supply to the seventh nerve whilst it traversed the long and tortuous facial canal within the petrous temporal bone. The choroid plexus, which conveys taste impulses from the anterior 2/3 of the tongue, leaves the seventh nerve at the level of the facial canal. Swollen nerves during pregnancy are susceptible to injury. Ischaemic stretch on intracranial nerves secondary to a persistent CSF leak should also be considered here, while the prevalence of idiopathic Bell's palsy is increased during pregnancy.

We can only conjecture on this case but:

Facial nerve paralysis

REFERENCES
Intrathecal haematoma & arachnoiditis
Permanent spastic paraparesis and cauda equina syndrome
Overall incidence of back pain: 85%
Exeter 20 year experience

Accidental dural puncture

- 144 Dural taps
- 50 EBP
Conclusion

• PDPH is complex
• PDPH resolves
• Treating all exposes some to unnecessary risk
  – Impossible to quantify those risks
  – Breeds complacency
• The treatment is not as good as we thought
• Use this invasive treatment wisely, cautiously and appropriately
Try and avoid in the first place!
Not all patients with a postdural puncture headache should receive an epidural blood patch
• Natural history of PDPH
• Is there harm from not patching?
• The efficacy of EBP
• Safety of EBP
Epidural analgesia post-EBP

- Little info about atypical spread after EBP
- Cases of uneventful epidural analgesia
- A small proportion may result in scarring of the epidural space

A recent case.....

- CSE for elective Caesar
- Dural Tap with 16G Tuohy
- Typical PDPH 30 hr later
- ‘Conservative’ management
- Day 6 “desperate” for blood patch
- EBP performed
- Headache resolved
- Day 7: Temp 39° C, HR 125, CRP 238
A recent case.....

- CSE for elective Caesar
- Dural Tap with 16G Tuohy
- Typical PDPH 30 hr later
- ‘Conservative’ management
- Day 6 “desperate” for blood patch
- EBP\textsuperscript{not} performed
- Headache resolved
- Day 7: Temp 39° C, HR 125, CRP 238
- Gram –ve sepsis
Does untreated PDPH cause SDH?

- Clear association with PDPH
- Evidence lacking for reduction if early EBP
- SDH may present early
- Is the damage done at the time of the PDPH?
- ? Potential harm of EBP in presence of SDH?
- Be alert to non-classical symptoms
Physical Harm

- Thoracic epidural for nephrectomy
- Raised BP
- Dural tap
- “At least 20 mls CSF aspirated to confirm dural puncture”
- Headache
- Collapse 24h post op:
Synthetic ACTH

- “in a personal series of about 20 patients........ at least as good as blood patch”
  - Foster P. BJA. 1994; 73: 429

- ? Increased Na and fluid retention
- ? Hormonal or metabolic mechanism
Synacthen Depot® for the treatment of postdural puncture headache

M. W. M. Rucklidge, S. M. Yentis and M. J. Paech
“At present, except in the context of a randomised controlled trial, we believe that epidural blood patching should be reserved for exceptional cases only…..”
“…..headache complicated by subdural haemorrhage or disabling headache after one week or more”