European Practices in the Management of Accidental dural Puncture in Obstetrics
(EPiMAP Part I)

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Aims of EPiMAP - Obstetrics

- **Primary aims**
  - → To describe European* practices in the management of accidental dural puncture (ADP) in the Obstetric population
  - → To identify risk factors for failure of epidural blood patch (EBP) for management of post dural puncture headache (PDPH)

** Includes Turkey and Israel*

Background

- **PDPH (Not ONLY the patient's Headache, even the Physicians!)**
  - → ≈ 2 000 000 SPA/EDA/CSE in USA in 2012
  - → ≈ 20 000 PDPH postpartum in USA/year (1%)
  - → ≈ >10 000 PDPH postpartum in EU/year (estimated)
  - → **≈ ca 350/year in Sweden**
  - → EDA: If wet tap, 50 - 80% develop PDPH
  - PDPH: Should be < 1% in a good Obstetrics practice

PDPH is a HUGE **iatrogenic** problem worldwide and tragically, very few large, randomized studies have been published

Incidence in Nordic countries

Table 1

Accidental dural puncture.

	Denmark	Finland	Iceland	Norway	Sweden	Total
Deliveries	66,100	55,193	4038	55,317	105,997	286,645
EDA	14,300 (22%)	26,205 (47%)	1725 (43%)	15,662 (28%)	32,479 (31%)	90,371 (32%)
ADP	158 (1.1%)	183 (0.7%)	4 (0.2%)	212 (1.4%)	354 (1.1%)	911 (1.0%)
EBP*	157 (99%)	208 (114%)	4 (100%)	150 (71%)	261 (74%)	780 (86%)

Values are numbers of women from each country and the total number for the Nordic countries. The EDA rate = EDA/deliveries (%), ADP rate = ADP/EDA (%) and EBP rate = EBP/ADP (%).
*Some parturients received more than one EBP.
EDA, epidural analgesia; ADP, accidental dural puncture; EBP, epidural blood patch.

Darvish et al. AAS 2010

Post-dural puncture headache

- **Diagnostic criteria – always clinical (all four must be fulfilled):**

1. Headache fulfilling criteria for "*Headache attributed to low cerebrospinal fluid (CSF) pressure*"
   *2004 (ICHD 3): headache that **worsens within 15 min of sitting/standing and improves within 15 min of lying down**
   ** 2018 (ICHD 4): **Orthostatic headache** - ***usually, but not invariably*** improves within 15 min of lying down

2. Epidural has been performed

3. Headache has developed **within 5 days** of the dural puncture

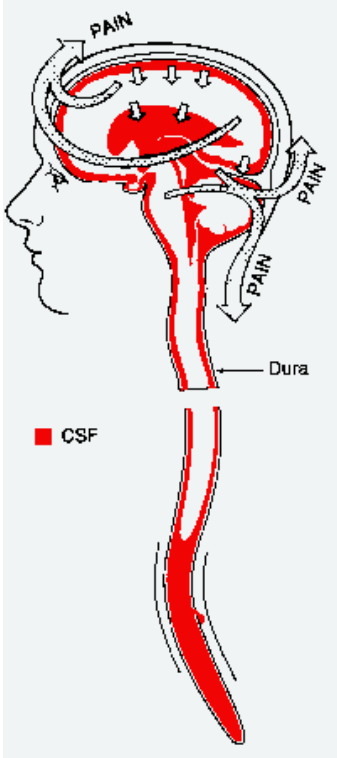
4. Not better accounted for by another ICHD-3 diagnosis.

and caused by low cerebrospinal fluid (CSF) pressure (either spontaneous or secondary), or CSF leakage, ***usually accompanied by*** neck pain, tinnitus, changes in hearing, photophophia and/or nausea. It remits after normalization of CSF pressure or successful sealing of the CSF leak.

Causes of Headache

- Decrease in ICP due to leakage of CSF*
  - → **If due to decrease in ICP, why do patients improve dramatically immediately after EBP?*
- Tension on pain-sensitive structures in the meninges?
- Release of Adenosine and vasodilation?

Precise cause of PDPH still remains unclear



Conservative Management

- Bed rest – transient relief of headache. Mobilize if possible
- Fluids: No evidence that IV fluids are beneficial but hydration must be maintained
- Pharmacological management:
  - → Oral analgesics: Yes
  - → Morphine: Only if oral analgesics ineffective
  - → Caffeine: Limited evidence for benefit; do not exceed recommended doses
  - → Gabapentin, steroids, tryptans etc: limited number of studies in obstetrics

Epidural blood patch has been the standard of care for severe headache

Russel, IOJA 2018

Complications (of a complication - ADP)

- Early treatment with EBP
  → risk of failure and
  → need for a new EBP ⟶ ?risk of new ADP
- Late treatment of PDPH
  → risk of i/c bleeding (sub-dural hematoma*) *Moore (JAMA Neurology 2020)*

* *Refers to treatment of PDPH after discharge, and following readmission*

Optimal patient and optimal time for EBP are a Physician challenge

Major Neurologic Complications Associated With Postdural Puncture Headache in Obstetrics: A Retrospective Cohort Study

Jean Guglielminotti, MD, PhD,* Ruth Landau, MD,* and Guohua Li, MD, DrPH*†

Table 3. Adjusted Odds Ratio and Associated E-value for the Risk of Maternal Complications Associated With PDPH in the 1,003,803 Women Who Received Neuraxial Anesthesia During Labor and Delivery in New York State Hospitals, Between January 2005 and September 2014

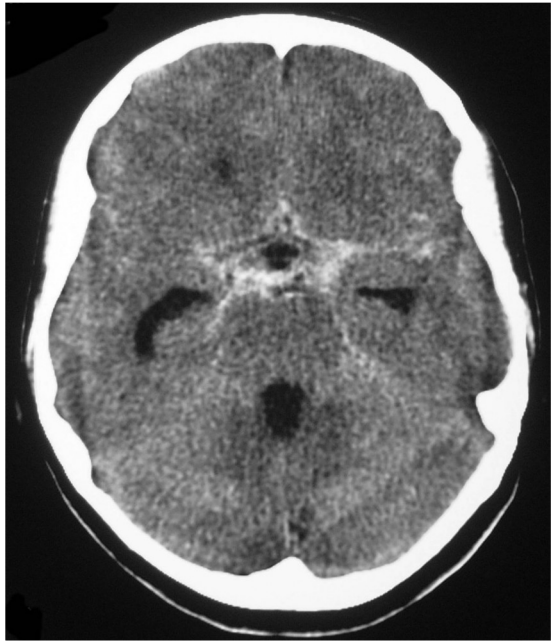
	Adjusted Odds Ratio (95% CI)[a]	*P* Value[b]	E-value (Lower Limit of the 95% CI)[c]
Major neurologic complications			
Cerebral venous thrombosis and nontraumatic subdural hematoma	18.98 (11.21–32.15)	<.001	37.43 (21.91)
Cerebral venous thrombosis	11.39 (5.63–23.06)	<.001	22.27 (10.76)
Nontraumatic subdural hematoma	76.72 (32.25–182.50)	<.001	152.80 (63.90)
Bacterial meningitis	39.70 (13.64–115.54)	<.001	78.90 (26.77)
Other complications			
Depression	1.88 (1.37–2.58)	<.001	3.17 (2.08)
Headache and migraine	7.66 (6.49–9.05)	<.001	14.80 (12.44)
Low back pain	4.58 (3.34–6.29)	<.001	8.63 (6.14)

1. Incidence of cerebral venous thrombosis and subdural hematoma: 1:320 PDPH
2. Epidural blood patch will not necessarily reduce incidence by restoring CSF pressure

Anesth Analg 2019

Complications of PDPH

Subdural hematoma/Cerebral thrombosis



6/100,000 epidurals

Bateman et al. Anesthesiology. 116: 324-33 (2012)

3.1/1000 PDPH

Guglielminotti et al. Anesth Analg 2019

Sweden ca 350 PDPH/year

I/C complication = 1 patient/year

Br J Anaesth 2020: 125: 1045-1055.

EPiMAP* I

Management practices of post-dural puncture headache in obstetrics

A prospective, international, cohort study

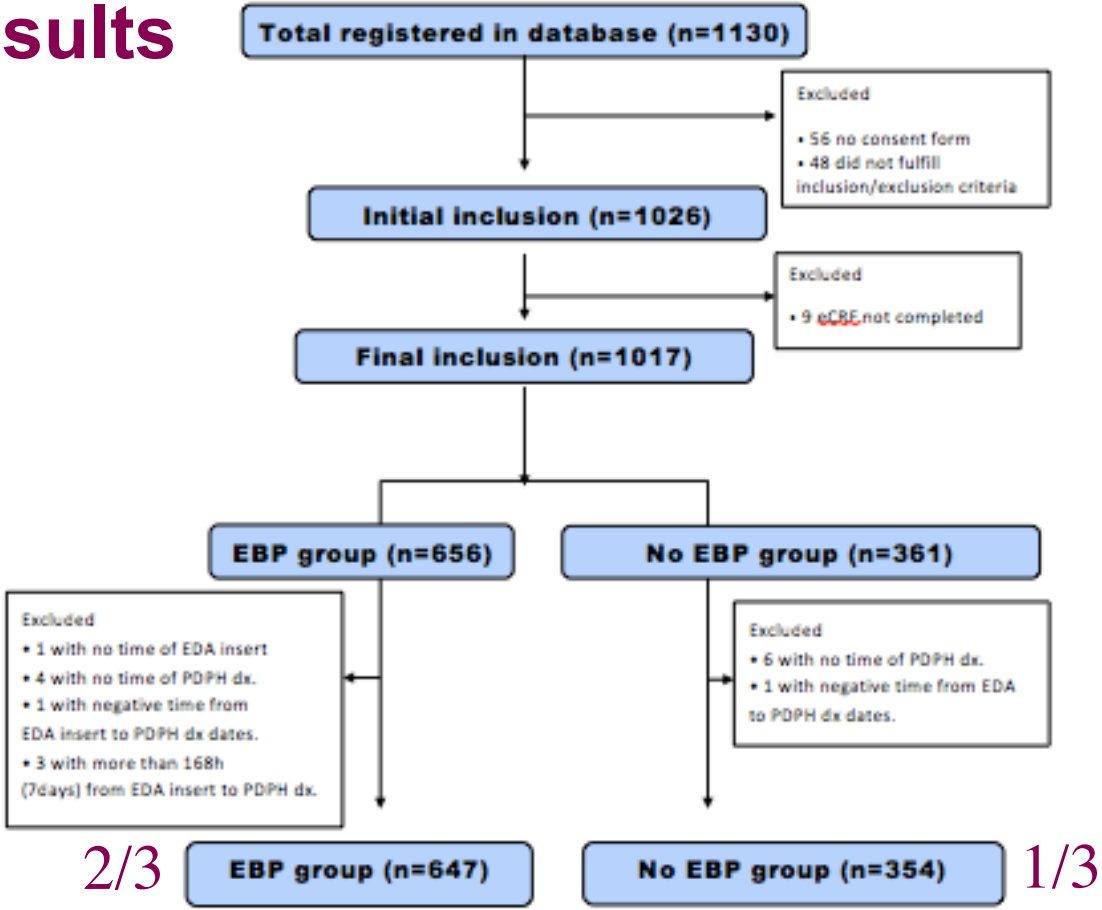
Anil Gupta[1*], Christian von Heymann[2], Anders Magnuson[3], Seppo Alahuhta[4], Roshan Fernando[5], Marc Van de Velde[6], Frédéric J Mercier[7] Alexandra MJV Schyns-van den Berg[8]; and the EPiMAP collaborators*

***European Practices in the Management of Accidental dural Puncture in Obstetrics*

EPiMAP - Methodology

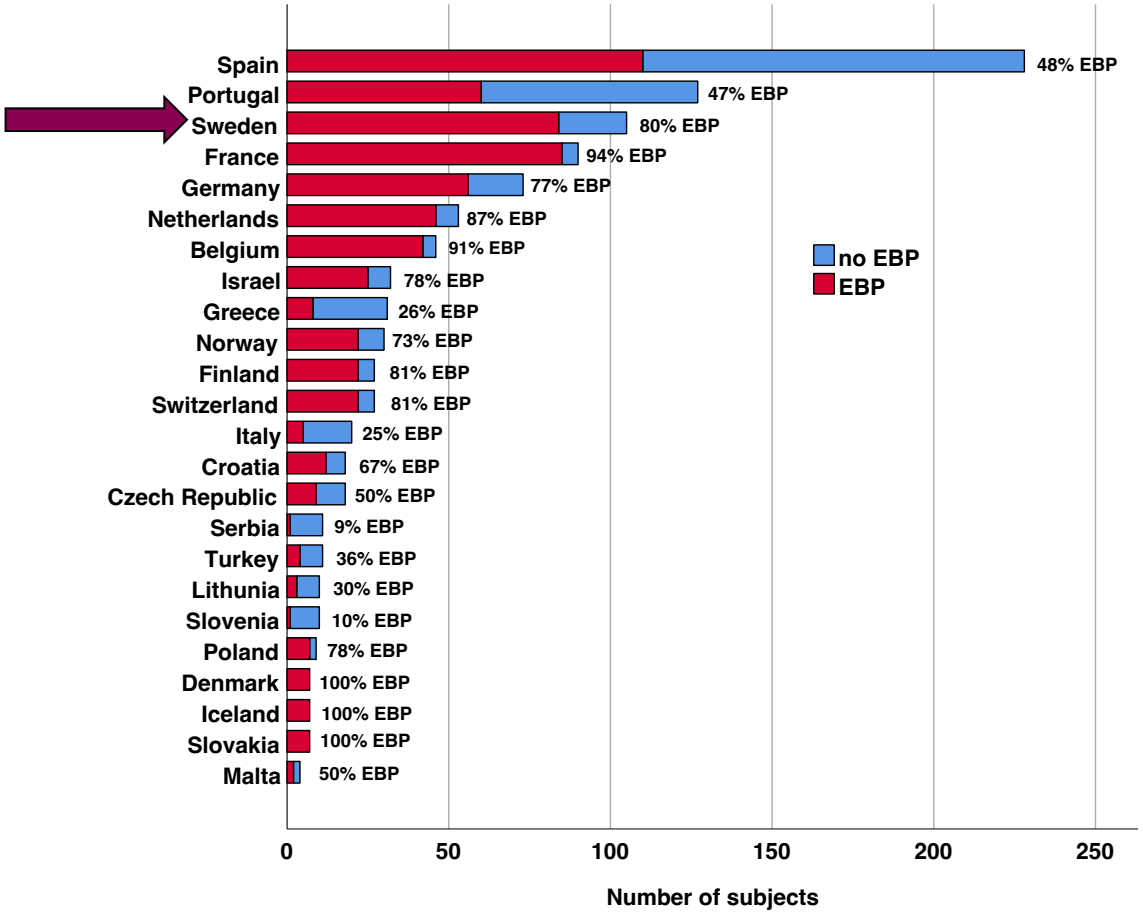
- Observational study, sponsored by ESAIC – CTN
- International steering committee (Chair: A Gupta)
- Europe (+ Turkey/Israel), not UK
- 2016 – 2018 (approx. 3 years)
- Electronic data captured via OpenClinica®
- Statistical analysis in Sweden
- 24 countries, 125 centres, 9 from Sweden

Results



Largest study ever in the obstetric population

Total included: 1001



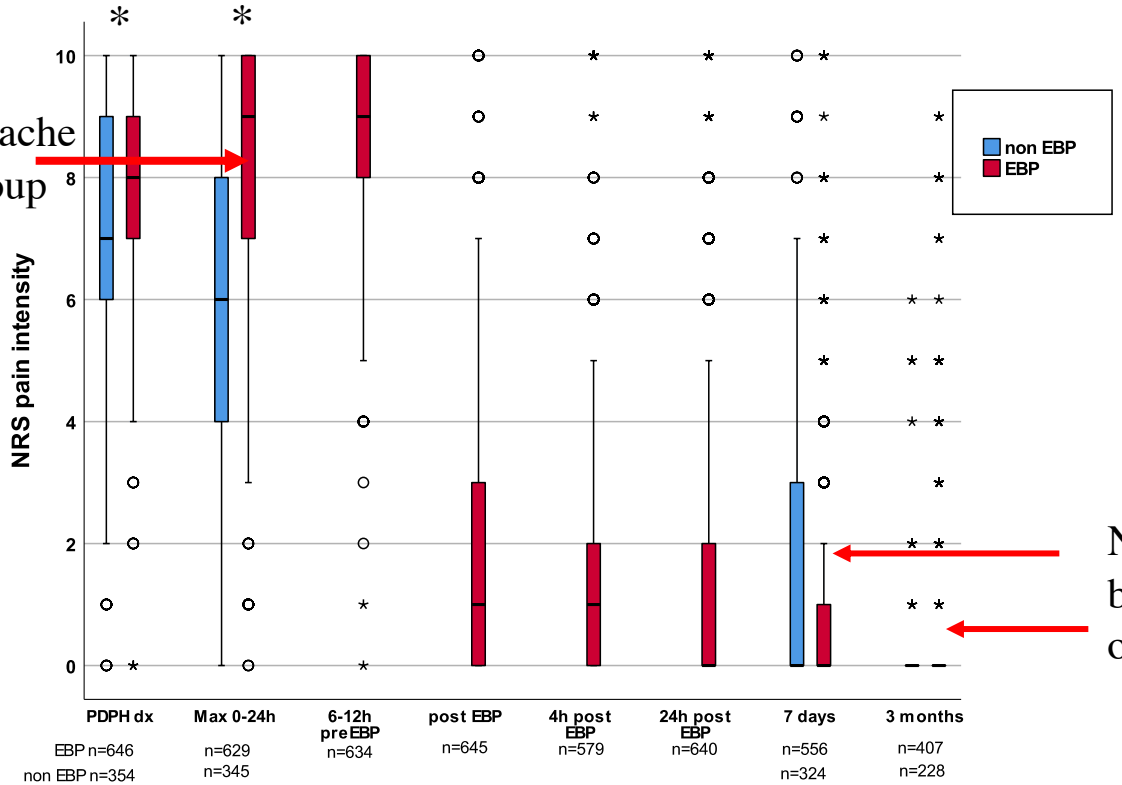
Country differences
(No-EBP *vs*. EBP)

Some southern European countries (Spain, Italy, Portugal and Greece) used conservative management (No-EBP) more often than EBP

Sweden = 80% EBP

Headache intensity (sitting) (NRS 0 – 10)

More severe headache (NRS) in EBP group



No statistical difference between groups at 7 days or 3 months

Summary of independent factors favouring (or not) use of EBP by anaesthesiologists

- ***Favouring EBP***
  - More analgesics used
  - Higher NRS scores (headache)
  - Presence of auditory symptoms
  - Multipara
  - Pain location – frontal, temporal, neck
  - Epidural at L2-3 (compared to L3-4)
- ***Favouring No-EBP***
  - Use of air for LOR
  - Use of intrathecal catheter
  - Can continue breast feeding
  - Lower educational status

OBS! This is an observational study – only associations, not causations!

Other results

- **PDPH with only a minimal orthostatic component** (< 2 NRS pain difference between sitting and lying):
  → 6.4% patients (8.8% *vs*. 5.1% in No-EBP vs. EBP group, p = 0.024).
- The **overall mean headache intensity at diagnosis** (NRS, 0-10) was significantly higher in the EBP group
  → 8.0 (SD 1.8) *vs.* No-EBP group 6.9 (SD 2.3).
- **Spontaneous recovery of headache** after PDPH diagnosis and within 24 h
  → 5.8% patients (12.2 *vs*. 2.2, No-EBP vs. EBP group, p < 0.001).

Follow-up

- At follow-up, **persistent backache** was the commonest symptom reported by **14% (17% *vs.* 8.8%** in the **EBP** and **No-EBP group,** respectively**, p = 0.004)**
- **Persistent headache (NRS ≥ 3) at 3 months** was reported by **5.0% patients (6.9 % *vs.* 1.7%** in the **EBP** and **No-EBP group** respectively**, p < 0.001).**
- In all, **10.1% patients were receiving medication (12.0%** in **EBP group** and **6.6%** in **No-EBP group, p = 0.028)** for either headache or backache **at 3 months.**

Possible indications for inserting an EBP

<u>No objective criteria available today</u>, depends on attending staff (midwife, obstetrician and anesthesiologist), and patient

- Factors that may be taken into account when deciding on EBP
  - → Characteristics of headache:
    - Very severe headache
    - Cranial nerve involvement (auditory symptoms – tinnitus, hearing loss, ?optic nerve involvement – diplopia, photophobia, visual changes) – may result from “sagging” (severe I/C hypotension)
  - → Characteristics of the patient
    - Inability to feed the baby
    - Previous h/o PDPH or Migraine, multipara
    - Motivated patient

Decision to perform EBP often taken due to lack of beds!

Indications for “early” CT/MR

- Uncharacteristic headache
  - → Severe, continuous
    (6% patients present with non-orthostatic headache)
  - → Non-resolving despite medication
  - → Persistent nausea and/vomiting
- Focal neurological signs

- Evidence of “brain sagging” on CT/MR suggests severe I/C hypotension, not necessarily “other neurological conditions”

Factors Associated with Failed Epidural Blood Patch following Accidental Dural Puncture in Obstetrics.

A prospective, international cohort study

Anil Gupta, Marc Van de Velde, Anders Magnuson, Christian von Heymann, Emilia Guasch, Seppo Alahuhta, Frédéric J. Mercier, Alexandra Schyns-van den Berg

and the EPiMAP investigators*

Br J Anaesth 2022 (revised version re-submitted)

Aim

- The main aim of this observational study was to determine factors associated with failed Epidural blood patch (EBP)*

Definition of failed EBP*

A composite endpoint with:

- ✓ a headache intensity with NRS ≥ 7 in the upright position at 4 h, 24 h *or* 48 h after application of EBP
- ✓ and/or the need for a second EBP

** Frequency of failed EBP varies (ca 20-30% require a new EBP)*

Methods and Results

- eCRF was used for online data entry (OpenClinica®)
- Logistic regression (unadjusted and adjusted) was used.
- Odds Ratio (OR) and Adjusted risk differences (ARD) were calculated
- Multiple imputation (MI) was performed using logistic and multi-nominal regression with chained equations
- Sensitivity analyses was also performed
- Data from 647 patients receiving EBP (24 countries, 125 centres) was analysed

Results

- Will be presented later

Future

- Secondary analysis of data
  - → Does intrathecal catheter inserted at ADP reduce EBP frequency
  - → Association of chronic pain (headache/backache) with EBP
  - → Analysis of data from Swedish sites
- Future studies
  - → Can use of oxygen via oxymask after ADP reduce the frequency of EBP?

Future studies

American Journal of Emergency Medicine 38 (2020) 2625–2628

High-flow oxygen and pro-serotonin agents for non-interventional treatment of post-dural-puncture headache

Carlos J. Roldan [a,b,*], Matthew Chung [a], Correa MC [c], J. Cata [d], Huh B [a]

[a] Department of Pain Medicine, The University of Texas MD Anderson Cancer Center, Houston, TX, United States of America

Conclusion: Our series suggests that combining high-flow oxygen and pro-serotonin agents such as metoclopramide. in the ED might be a feasible option as effective as the invasive methods used in treating PDPH.

Swedish Network for Management of PDPH?

- Register all cases of PDPH on SFOAI-sponsored home page
- Evaluate treatment strategies, outcomes, risks
- 350 patients/year with PDPH
- Register one-several PhD students using this database!

Thank you