

# Nebulized Dexmedetomidine in the Treatment of Obstetric Post-Dural Puncture Headache: A Case Report

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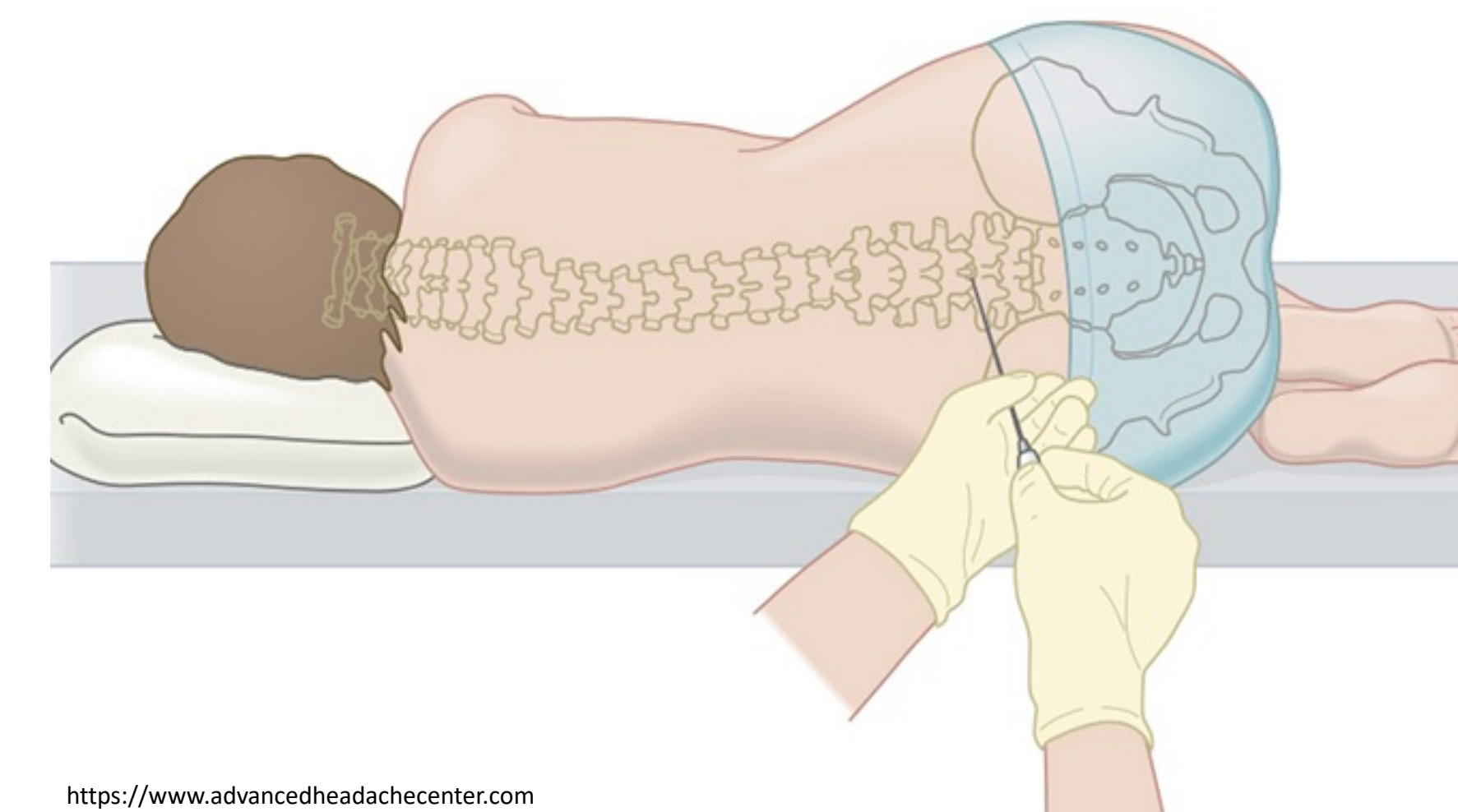
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## Background

- Post-Dural Puncture Headaches (PDPH) remain difficult to treat in the peripartum period with debilitating effects to mother and newborn
- PDPH complications include subdural hematoma, venous sinus thrombosis, difficulty tending to newborn, pain with breastfeeding upright, prolonged hospital stay, and additional Emergency Room visits
- Conservative treatments include psychological support, hydration, positioning changes
- Pharmacologic treatments studied include acetaminophen, NSAIDs, caffeine, gabapentin, pregabalin, hydrocortisone, theophylline, sumatriptan, adrenocorticotrophic hormone, and cosyntropin among other less popular medications
- Invasive treatments include epidural and intrathecal injections of various medications and solutions
- Epidural blood patches remain gold standard
- Increasing amounts of risk as treatments become more invasive
- Nebulized dexmedetomidine as a noninvasive treatment

## Pathophysiology

- Loss of cerebral spinal fluid (CSF) creates downward pressure gradient, stimulated nociceptive fibers
- Removal of CSF contributes to PDPH symptoms as demonstrated with resolution of symptoms when equal volume is replaced with saline<sup>1</sup>
- Cerebral autoregulation causes cerebral vasodilation and increased blood flow from in the setting of decreased CSF volume or pressure
- Middle cerebral artery (MCA) blood flow is inversely proportional to transcranial Doppler pulsatile index (PI)
- Postpartum women with PDPH symptoms found to have lower pulsatile indices compared to those with unintended dural puncture and no symptoms<sup>2</sup>



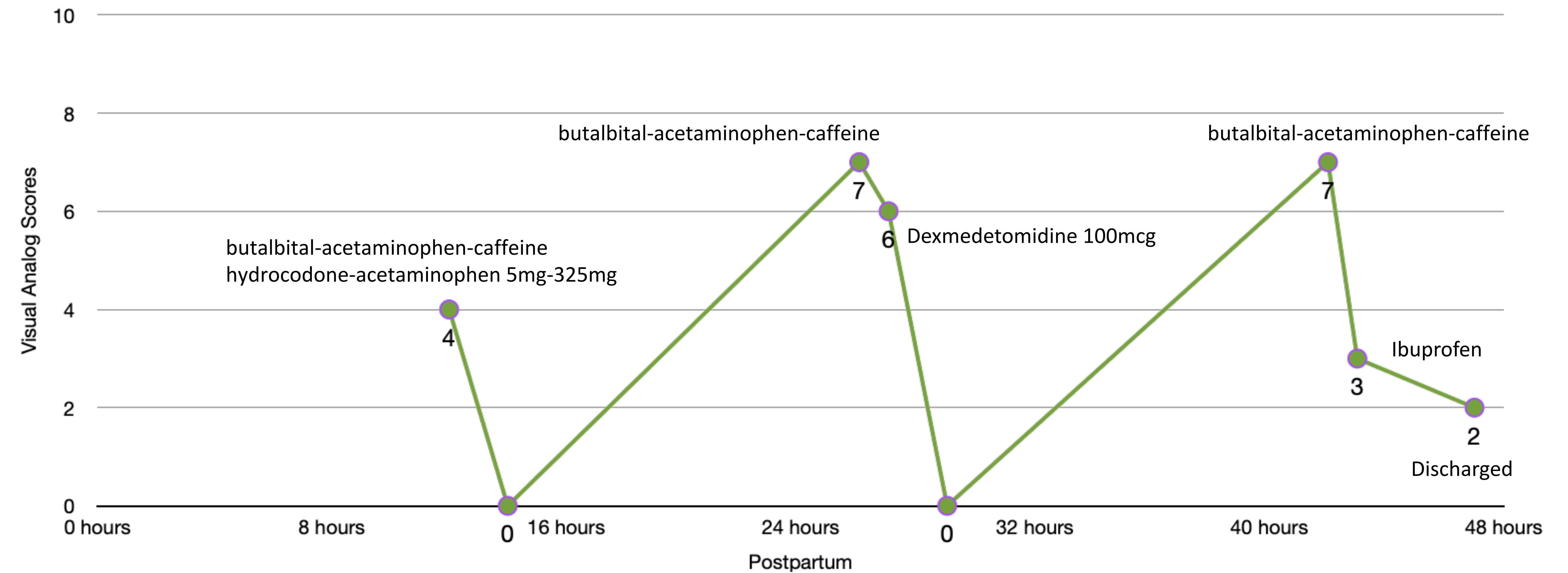
<https://www.advancedheadachecenter.com>

## Case Report

- 29-year-old G2P1 female at 38w0d scheduled for repeat cesarean section
- Gestational diabetes with secondary fetal macrosomia, class 1 obesity, migraines. No reported history of scoliosis or lumbosacral pathology
- Prior uncomplicated midline labor epidural at L4/L5 with loss of resistance (LOR) at 4.5cm. Prior cesarean section with single shot spinal at L3/L4 without difficulty per chart review
- Multiple attempts at L4/L5 and L3/L4 without CSF return
- Ultrasound assessment found intrathecal space at a depth between 4.5 to 5.0cm
- Wet tap with LOR at 4.5cm with combined spinal-epidural
- 12mg hyperbaric bupivacaine & 20mcg fentanyl injected via Touhy needle
- Surgical anesthesia achieved initially, but loss of levels after prepping, draping, and testing by OB team
- Converted to general anesthesia with uneventful surgery.
- 12 hours postoperatively with characteristic PDPH

## Dexmedetomidine

- Selective  $\alpha_2$ -agonist favoring  $\alpha_2$ -receptors to  $\alpha_1$ -receptors 1600:1
- $\alpha_{2B}$  &  $\alpha_{2C}$  located in brain and spinal cord, vasoconstrictors
- CBF velocity of MCA via transcranial Doppler decreases with increasing doses of dexmedetomidine<sup>3</sup>
- Decreased CSF reuptake causing increased CSF pressure
- Randomized double-blind study with dexmedetomidine vs conservative management for 43 patients with PDPH<sup>4</sup>
- Nebulized dexmedetomidine 1  $\mu\text{g}/\text{kg}$  every 12h
- Significant improvements in Visual Analog Scores and Lybecker scores at 24, 48, and 72h
- Decreased mean velocity of MCA and increased PI at 24, 48, 72h
- No incidence of hypotension in dexmedetomidine group



## References

1. KUNKLE EC, RAY BS, WOLFF HG. EXPERIMENTAL STUDIES ON HEADACHE: ANALYSIS OF THE HEADACHE ASSOCIATED WITH CHANGES IN INTRACRANIAL PRESSURE. Archives of Neurology & Psychiatry 1943;49(3):323-358. DOI: 10.1001/archneurpsyc.1943.02290150011001.
2. Vadhera RB, Babazade R, Suresh MS, Alvarado MC, Cruz AL, Belfort MA. Role of transcranial Doppler measurements in postpartum patients with post-dural puncture headache: a pilot study. Int J Obstet Anesth 2017;29:90-91. DOI: 10.1016/j.ijoa.2016.10.010.
3. Bekker A, Sturaitis MK. Dexmedetomidine for neurological surgery. Neurosurgery 2005;57(1 Suppl):1-10; discussion 1-10. DOI: 10.1227/01.neu.0000163476.42034.a1.
4. Mowafy SMS, Ellatif SEA. Effectiveness of nebulized dexmedetomidine for treatment of post-dural puncture headache in parturients undergoing elective cesarean section under spinal anesthesia: a randomized controlled study. J Anesth 2021;35(4):515-524. DOI: 10.1007/s00540-021-02944-6.