The Incidence of Post-Dural Puncture Headache is Lower in Patients Undergoing Posterior Spinal Fusion that Receive IT Morphine Compared to Patients in the General Population.

Introduction:
Spinal fusion is associated with significant postoperative pain, which can be extremely difficult to manage, especially in the pediatric population. One modality that has been shown to improve this pain, without increasing side effects, is with intrathecal (IT) morphine [1-3]. One known risk of IT analgesia is postdural puncture headache (PDPH), which was described after the first spinal anesthetic and is often severe in nature [4]. Incidence of PDPH in children in the current literature varies widely, with some studies citing 1-2% and others as high as 30%. It is highly likely that these variations are due to differences in both reporting, as it is commonly understood that adolescent PDPH is often underreported, and caretakers' ability to recognize symptoms [4-5]. A recent study noted the PDPH rate to be three times higher in teenagers when compared to adults [6]. The purpose of study was to determine the incidence of PDPH after spinal anesthesia for adolescent idiopathic scoliosis surgery, as it is currently not well defined. Our hypothesis was that PDPH incidence would be lower than the currently published rates since the patients are largely in the prone position for the surgery and intrathecal morphine is administered. These two factors may be protective against PDPH.

Methods:
After Institutional Review Board approval from our institution, we retrospectively reviewed all adolescent (ages 13-18) patients that underwent primary posterior spinal fusion with spinal analgesia between January 1, 2018, and December 31, 2021. We utilized EPIC for data retrieval as well as REDcap for data storage and basic analysis. Patients were excluded if no block report was documented at the time of the procedure, had known allergies to morphine, or if the case was aborted before completion of surgery. A diagnosis of PDPH was considered positive in our analysis if there was a formal diagnosis in the record from an anesthesiologist at our institution. Current data was compared to the PDPH rate from a previous investigation on patients who underwent ambulatory lower limb surgery (3.4%) [6]. Due to the low PDPH rates in both groups, Bayesian analysis was utilized. Prior distributions were modelled as non-informative Jeffrey beta priors while PDPHs were modeled as binomial random variables. Thus, the posterior distributions for the PDPHs were also beta-distributed [7]. Posterior PDPH rates and the rate difference between the two groups were summarized using the posterior median and 95% credible intervals (CIs) where summaries of the rate difference were computed using a Monte-Carlo method with 100000 samples. The R statistical software was employed in this analysis.

Results:
A total of 398 patients were included in analysis. Of these patients, we found that 4 (1%) had PDPH associated with their procedure. The average age of the PDPH group was 14.50 years (compared to 14.29 for the non-PDPH group) and of these 4, 3 (75%) were female, and only 1 patient had a past medical history of migraines. All patients (100%)

received conservative treatment (caffeine, fluid, NSAIDs, acetaminophen), 3 (75%) received cosyntropin, and none received a blood patch, occipital nerve blocks, or sphenopalatine blocks. 1 (25%) patient required readmission. The mean length of stay for all patients was 3.81 days (StDev: 1.12, median: 4). Amongst those with PDPH, the mean length of stay was 7.25 days (Median: 7, StDev 2.22). The size of the spinal needle ranged from 18 gauge to 27 gauge (G) with the most common size being 25 G (72.2%, 268/371). Within the PDPH group, 75% (3/4) were with a 25 G needle and 25% (1/4) was with a 22 G needle. Compared to the Delpizzo study, patients in our cohort had a 99.8% lower likelihood of developing PDPH with a rate difference posterior median of -2.3% and rate difference posterior distribution 95% CI of -4.1% to -0.6% (Figure 1).

Conclusions:
PDPH incidence amongst adolescents receiving intrathecal morphine during primary posterior spinal fusion surgeries was about 1%, which is lower than currently reported rates (4.9% in adolescents receiving spinal anesthesia for supine procedures). PDPH incidence was higher in females than males (75%), which is consistent with current literature. All the patients that had PDPH had resolution with conservative management, and none required an epidural blood patch.

Abstract references

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