

SEE Question

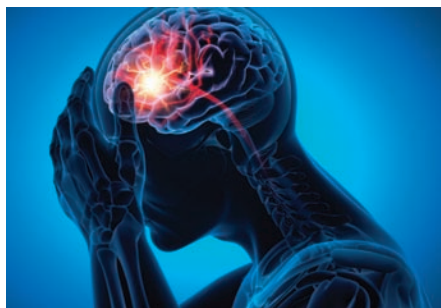
A 20-year-old man presents to the emergency department with a severe headache. Upon evaluation, he is found to have a large intracranial mass and is scheduled to undergo craniotomy for resection. According to a recent meta-analysis comparing scalp nerve blocks, scalp infiltration, and placebo, which of the following statements is MOST likely true regarding regional techniques using ropivacaine for 24-hour postoperative pain control?

- (A) A scalp nerve block was more effective than scalp infiltration to control pain
- (B) A scalp nerve block was only effective to control pain if performed preoperatively versus postoperatively
- (C) A scalp nerve block increased opioid consumption compared to placebo

Craniotomy frequently causes moderate to severe pain and chronic headaches. Although opioids are the primary pain relief option, their adverse effects can complicate neurological assessments and hide potential intracranial problems. The adoption of regional techniques such as scalp nerve blocks and scalp infiltration has introduced new strategies alongside opioid analgesics for pain control. Scalp nerve blocks encompass the blockade of superficial sensory nerves across the scalp at multiple locations, whereas scalp infiltration involves the subcutaneous administration of local anesthetics at a specific incision site. Many randomized controlled trials and meta-analyses have analyzed scalp nerve block or infiltration separately but have not compared the various methods and drugs used.

A recent systematic review and network meta-analysis compared scalp nerve blocks, scalp infiltration, and controls in adult patients undergoing craniotomy. In these studies, control groups received saline-mimicking scalp nerve blocks, scalp infiltration, or intravenous analgesics. Various local anesthetic doses and timing (i.e., before and after surgery) were considered. The primary outcome was 24-hour postoperative pain scores (0-10). The secondary outcome was opioid consumption within the first 24 hours postoperatively (intravenous morphine equivalents).

A systematic database search was conducted from inception to February 18, 2022,



and updated on March 5, 2022. The mean difference, 95% CI, and 95% credible interval were used to estimate the efficacy of different treatments. Overall treatment ranks were estimated using surface under the cumulative ranking curve (SUCRA) scores. The SUCRA score allocates one number to each treatment score, ranging from 0% to 100%, with a higher SUCRA score signifying the treatment is likely to be more useful and a lower SUCRA score signifying the treatment is likely to be less useful. The overall quality of evidence was assessed using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) guidelines.

Of 24 eligible studies, 13 studies with 718 patients compared scalp nerve blocks to controls, seven studies with 428 patients compared scalp infiltration to controls, and four studies with 215 patients compared scalp nerve blocks to both scalp infiltration and controls. In terms of timing, scalp nerve block or infiltration was administered before surgery in 11 studies,

after surgery in 12 studies, and both before and after surgery in one study. A total of 23 studies reported 24-hour postoperative pain as the primary outcome. These trials consisted of 51 treatment groups distributed across 10 distinct nodes representing various treatment options.

Scalp nerve block with ropivacaine, compared to the control, reduced 24-hour postoperative pain scores (mean difference, -2.04 ; 95% credible interval, -3.13 to -0.94 [low quality]). Also, 24-hour postoperative pain scores were reduced with scalp nerve block with ropivacaine compared to scalp infiltration with ropivacaine (mean difference, -1.77 ; 95% credible interval, -3.04 to -0.51 [low quality]) and scalp infiltration with bupivacaine (mean difference, -1.96 ; 95% credible interval, -3.65 to -0.22 [low quality]). Scalp nerve block with ropivacaine was found to be the most effective approach for pain reduction (SUCRA, 91%). Based on the comprehensive SUCRA rankings, the scalp nerve block appeared to be more effective than the scalp infiltration and control methods.

In addition, a subgroup analysis considering the timing of block or infiltration administration revealed that, compared to the control group, both preoperative and postoperative scalp nerve blocks with ropivacaine lowered 24-hour postoperative pain scores (preoperative mean difference, -2.07 ; 95% credible interval, -3.61 to -0.46 ; postoperative mean difference, -1.96 ; 95% credible interval, -3.74 to -0.13).

For the secondary outcome, opioids consumed within the first 24 hours postoperatively were analyzed in 19 studies with 41 treatment groups that were assigned to nine different nodes representing various treatments. Compared to the control group, scalp nerve block with ropivacaine reduced opioid consumption (mean difference, -11.91 ; 95% credible interval, -22.42 to -1.40 [low quality]). However, scalp infiltration did not show a reduction in opioid consumption compared to the control group. The addition of epinephrine did not influence opioid usage.

In summary, the authors of a recent systematic review and network meta-analysis found that scalp nerve block with ropivacaine, compared to other methods such as scalp infiltration or no intervention, was likely the most effective method for controlling 24-hour postcraniotomy pain and reducing opioid consumption. However, the overall quality of the evidence was low, primarily because of study heterogeneity and limitations such as lack of blinding or incomplete outcomes. ■

Reference:

- Luo M, Zhao X, Deng M, et al. Scalp nerve block, local anesthetic infiltration, and postoperative pain after craniotomy: a systematic review and network meta-analysis of randomized trials. *J Neurosurg Anesthesiol* 2023;35:361-74. doi:10.1097/ANA.0000000000000868

Answer: A

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