

Do we predict postoperative pain well? (And can we improve the prediction?)

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Background: The common practice of opioid administration toward the end of a surgery does not always provide adequate analgesia. Anaesthetists lack a direct indicator of nociception. (Seitsonen. 2005).

Methods: Our aim was to review the adequacy of postoperative analgesia in adult patients, and investigate the relationship between the EEG and nociception in the opioid-naive patient. Anaesthesia was induced as per routine, according to individual anaesthetist preference. The anaesthetist was able to either titrate their anaesthetic according to the entropy value, or to ignore this information. We collected trend and waveform (ECG, pulse oximetry and EEG) information from the Datex monitor using the S/5 Collect program, and recorded pain and opioid use in the PACU. The patients were classified into 2 groups: "comfortable" (pain = none or mild) or "uncomfortable" (pain = moderate or severe) in PACU.

Results: 101 adult patients were recruited. 52 of these patients experienced moderate-severe pain on awakening from surgery. We examined the relationship between 5 possible predictor variables and pain. These were surgery type, depth of volatile anaesthesia (MAC), EEG signs (state entropy (SE), spindles and delta waves) and intra-operative morphine administration. We found surgery type to be a predictor of postoperative pain ($p=0.016$). The EEG was analysed at the midpoint and 30 minutes prior to the end of surgery. We found no association between EEG segments at midpoint of surgery; but near the end of surgery, SE was lower ($p=0.035$) and spindles higher ($p=0.016$) in the postoperatively uncomfortable group. Using SE, EEG spindles, and operation type as explanatory variables in a logistic regression model, we achieved a 72% correct classification of postoperative pain group.

Conclusions: Our observations suggest that while anaesthetists correctly identify which surgical procedures create more pain, we only accurately predict analgesia requirements 50% of the time. This concurs with national survey results published by Apfelbaum et al (2003). Even though we give more morphine to patients undergoing more painful surgical procedures, we still underdose our patients intraoperatively. Is the increase to 72% prediction obtained from our model strong enough for clinical use?

References

Seitsonen, E. R., I. K. Korhonen, et al. (2005). "EEG spectral entropy, heart rate, photoplethysmography and motor responses to skin incision during sevoflurane anaesthesia." *Acta Anaesthesiol Scand* **49**(3): 284-92.

Apfelbaum J. L., Chen C, et al (2003) "Postoperative Pain Experience: Results from a National Survey Suggest Postoperative Pain Continues to be Undermanaged" *Anesth Analg* 2003; **97**: 534-40