

SELECTED ARTICLES

The impact of parenteral opioid analgesics on sonographic and clinical diagnostic accuracy for suspected acute appendicitis

Clinical question

In patients with suspected appendicitis, does the administration of opioid analgesics alter the sonographic or clinical diagnostic accuracy?

Article chosen

Vermeulen B, Morabia A, Unger PF, Goehring C, Grangier C, Skljarov I, et al. Acute appendicitis: influence of early pain relief on the accuracy of clinical and US findings in the decision to operate. A randomized trial. *Radiology* 1999;210:639-43.

Objective

To determine whether the administration of opioid analgesics influences sonographic diagnosis or surgical decision-making in cases of suspected acute appendicitis.

Background

Surgeons have long opposed the early use of opioid analgesics in patients with abdominal pain, fearing that these agents will mask the physical signs of a surgical abdomen and lead to delayed or missed diagnosis. This belief has been refuted by several studies, which show that diagnostic accuracy is the same¹⁻³ or better⁴ in patients who receive opioid analgesia.

Population studied

Patients over age 16 who presented to the emergency department (ED) with right lower quadrant pain were eligible for the study unless they had one of the following exclusion criteria: previous appendectomy, clinical presentation consistent with nonappendicular condition, renal, hepatic, or respiratory insufficiency, or the use of psychotropic medication. Of 488 eligible patients, 350 (72%) consented and were enrolled in the study. Ten were excluded — 7 because clinical or radiological information was missing, 2 because of loss to follow-up at 1 month, and 1 because the operation took place before the protocol was completed. Outcomes of patients who refused to participate were not reported.

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Study design

This was a randomized, double-blind clinical trial of single-dose intravenous morphine (0.1 mg/kg over 5 minutes) versus saline placebo. Visual analog (VAS) pain scores were recorded prior to, and 45 minutes after study drug administration. Radiology residents performed abdominal ultrasound (U/S) within 4 hours of drug administration. Following U/S, surgeons used clinical findings, laboratory results and the sonographic examination to decide whether to perform surgery. Final diagnosis was confirmed histologically in the operative group and by 1-month clinical follow-up in the non-operative group.

Outcomes measured

The primary outcome was U/S diagnostic accuracy in patients receiving morphine versus those receiving placebo. VAS pain scores and the clinical accuracy (“appropriateness”) of the surgeons’ decision whether or not to operate were reported for both groups.

Results

Overall, 175 patients received morphine and 165 received placebo. Of these, 205 underwent laparotomy and 171 had a final diagnosis of appendicitis. Ultrasound sensitivity was lower (71.1% vs. 80.6%; $p = 0.05$) and specificity was higher (65.2% vs. 53.8%; $p = 0.05$) in the morphine group, but there was no difference in the accuracy of surgical decision-making, regardless of whether patients received analgesics. Surgery was appropriate in 83.7% of placebo recipients vs. 83.2% of morphine recipients ($p = \text{NS}$). All discharged

patients in both groups were discharged appropriately and there were no delayed or missed diagnoses of appendicitis at 1-month follow-up.

Study conclusions

Opioid analgesia did not improve the diagnostic performance of U/S and had no apparent effect on the surgeons' ability to identify surgical pathology.

Commentary

This study is interesting from 2 perspectives. First, it suggests that opioid analgesia does not increase the risk of delayed or missed diagnosis of appendicitis and does not influence the rate of unnecessary laparotomy. Second, it suggests that U/S is less sensitive, less specific, and less accurate than clinical judgement. In this study, the positive and negative likelihood ratios for U/S were, respectively, 1.87 and 0.45. A test with these parameters is both a weak negative and a weak positive predictor. For example, given a hypothetical "grey-zone" patient with pre-test probability of 50%, a negative U/S would decrease (post-test) probability to approximately 30%, while a positive U/S would increase (post-test) probability to only 65%. In both cases, this offers little help to the clinician. These data suggest that greater dependence on U/S in this setting is likely to increase, rather than decrease diagnostic error.

These results are consistent with 3 other studies,¹⁻³ which found no change in diagnostic accuracy or morbidity in

patients receiving opioids; however, they contrast slightly with a fourth study, which also reported no missed diagnoses among opioid recipients, but found an increased rate of unnecessary laparotomy in the placebo group. The authors of this study⁴ calculated a number-needed-to-treat (with opioids) of 8.33 to prevent a negative laparotomy.

While all 5 studies combined include just over 600 patients, none have shown a trend toward missed diagnoses or significant diagnostic delays in patients receiving opioid analgesics. Therefore, the weight of the evidence supports judicious analgesic use in ED patients being evaluated for suspected surgical abdominal pain.

References

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