

## Does analgesia mask diagnosis of appendicitis among children?

Rudy Bromberg Ran D. Goldman, MD

### ABSTRACT

**QUESTION** Can analgesia be given safely to patients with suspected appendicitis prior to surgical evaluation without masking physical signs and symptoms?

**ANSWER** Withholding analgesia from patients with acute abdominal pain and suspected appendicitis is common. **This practice, however, is not supported by published literature. Although a few trials have noted some changes in abdominal examination with analgesia, this has not been associated with any changes in patient outcome.** If patients are in pain, analgesia is warranted. Larger multicentre trials are needed to establish practice guidelines.

### RÉSUMÉ

**QUESTION** Peut-on administrer des analgésiques à des patients chez qui on soupçonne une appendicite, avant l'évaluation chirurgicale, sans danger de masquer les signes et les symptômes physiques?

**RÉPONSE** Il est fréquent que l'on s'abstienne d'administrer des analgésiques à des patients présentant une douleur abdominale aiguë. Par ailleurs, les ouvrages scientifiques publiés n'étaient pas cette pratique. Même si, dans quelques études, on a constaté certains changements dans l'examen abdominal après l'administration d'analgésiques, cette pratique n'est pas associée à des changements dans les résultats chez le patient. Si les patients souffrent, les analgésiques s'imposent. Il faudrait des études multicentriques de plus grande envergure pour établir des lignes directrices pour la pratique.

Acute appendicitis is the most common indication for urgent surgery; it has a lifetime incidence of 7%, and 250 000 appendectomies are performed annually in the United States.<sup>1</sup> Characteristic presentation of acute appendicitis includes periumbilical pain, nausea, and right lower quadrant pain, followed by vomiting and fever.<sup>1,2</sup> This presentation is seen in only half of adults, however, and even less commonly in children.<sup>2</sup>

### Current practice

Current medical practice follows the belief that analgesia might mask physical signs and, therefore, interfere with examination of patients; hence, analgesia should not be given before surgical consultation is available.<sup>3</sup> Several reports suggest that these guidelines are followed and that analgesia is withheld from patients with suspected appendicitis.<sup>4-6</sup> A mailed survey found that among emergency physicians who chose not to give analgesia, 87% were concerned about the "surgeon disapproving."<sup>4</sup> In another mailed survey, **76% of emergency physicians reported that they did not administer opiates before patients were assessed by surgeons and that 25% of patients received no analgesia at all,** although 85% of respondents felt administration of analgesia would not change physical findings.<sup>5</sup> A retrospective review of 626 patients with acute appendicitis confirmed by pathology

found that 40% of patients seen in the emergency department (ED) received analgesia of some form; **42% of patients treated by emergency physicians received analgesia compared with only 29% of patients treated by private physicians seeing patients in the ED** ( $P = .014$ ).<sup>6</sup> A telephone survey of 60 emergency physicians found that 98% reported giving analgesia before surgical consultation, but only 15% always informed the surgeon prior to administering the medication.<sup>7</sup>

Another Canadian retrospective review of patients in a tertiary ED found that only half the children for whom there was a high suspicion of appendicitis received analgesia.<sup>8</sup> Thirty percent of them received acetaminophen and ibuprofen from triage nurses even before being seen by a pediatrician, probably as an antipyretic rather than an analgesic. Furthermore, when opioids were administered by treating physicians, almost a quarter of children were underdosed, limiting the analgesic effectiveness of the drugs.<sup>8</sup>

### Literature review

Decisions to administer analgesia should be supported by clinical evidence that analgesia does not interfere with accurate diagnosis. In a study from the United Kingdom, 100 consecutive age-controlled patients with clinically significant abdominal pain who were admitted for urgent

appendectomies received either intramuscular papaverine or placebo.<sup>9</sup> Although abdominal tenderness decreased in the medicated group, localization of pain was unaffected. An incorrect decision to operate or observe was noted in 2 patients who received papaverine compared with 9 patients who received placebo, and there were fewer unnecessary appendectomies in the trial group, showing that diagnosis was not affected.<sup>9</sup>

In a study among adult patients,<sup>10</sup> patient- and examiner-perceived pain scores were lower with analgesia. There were no adverse events or delays in patient care because of analgesia. More recently, 350 patients older than 16 years presenting to the ED with abdominal pain in the right lower quadrant received either intravenous morphine or placebo.<sup>11</sup> Diagnostic performance of ultrasound was not altered in the group treated with morphine, suggesting that analgesia did not improve or interfere with the ability to diagnose appendicitis. Decision to operate was not significantly different between the 2 groups, and decision to discharge patients without surgery was appropriate in all cases in both groups.<sup>11</sup> In a prospective, double-blind trial from Boston, Mass, patients 18 years and older with undifferentiated abdominal pain received either morphine or placebo.<sup>12</sup> No significant changes were noted in either severity or localization of abdominal tenderness or in diagnostic accuracy.

Two other studies examined the use of analgesia for young patients. In a randomized, double-blind, controlled trial from Milwaukee, Wis, 60 children 5 to 18 years old received either intravenous morphine or placebo.<sup>13</sup> There was no significant change in the area of tenderness or in diagnostic accuracy. In a Canadian study of 108 children 5 to 16 years old presenting to the ED with acute abdominal pain, morphine administration did not increase the rate of missed appendicitis.<sup>14</sup> While the diagnostic accuracy was not affected by giving opioids, morphine was found to decrease pain scores significantly, both statistically and clinically ( $P < .0001$ ). The rate of perforated appendicitis was unchanged by treatment with morphine.<sup>14</sup>

Currently, there is no evidence that early analgesia interferes with diagnosis of appendicitis, although a clear positive effect on ease of diagnosis has not been shown. Treating pain is humane, however, and it has been consistently demonstrated that a substantial reduction in perception of pain occurs with analgesia among both pediatric and adult patients.<sup>9-13</sup>

### Limitations of the literature

Reaching a clear resolution to the question is rather complicated, as previous reviews of the literature suggest,<sup>7,15,16</sup> owing to design flaws in all the previous trials. Criticisms

fall under 3 broad categories. First, although physicians and patients are blinded as to whether patients have received analgesia or placebo, they are aware that they are participating in a study and, therefore, might not react as they would in an uncontrolled setting. Specifically, physicians might be more meticulous in their examinations when they are looking for changes caused by analgesia, and patients might report their pain differently. Also, the studies require that administration of analgesia and examination of patients be done at carefully timed intervals. Second, use of varying doses of different drugs makes it difficult to determine which analgesic is most appropriate.

In the United States, opiate drugs are currently the most common choice of both pediatric emergency physicians (64%) and pediatric surgeons (70%) rather than meperidine or fentanyl.<sup>4</sup> The ideal drug and dosage, however, are currently unknown.<sup>16</sup> Last, there is concern that current studies have not enrolled enough patients to allow a statistical estimate of the adverse outcome

rate with analgesia.<sup>5,7,12,17</sup> One prospective study followed patients with abdominal pain severe enough to require opioid analgesics.<sup>17</sup> Patients were followed up at 3 weeks after treatment and adverse outcomes were recorded, including obstruction, perforation, ischemia, hemorrhage, peritonitis, sepsis, and death. The adverse outcome rate was estimated by logistic regression; based on this rate, the authors suggested that more than 1500 patients would be needed to compare the adverse outcome rates of opioids and placebo.<sup>16</sup> Despite these limitations, it seems that analgesia is safe, reasonable, and humane.<sup>15,16</sup>

### Conclusion

There is no evidence to support the notion that early pain relief for patients with suspected appendicitis will interfere with diagnosis. Earlier hypotheses that pain management would increase patient compliance, and therefore improve diagnosis, have not been substantiated. Larger trials are needed to establish that analgesia does not carry a significant adverse outcome and to create guidelines for clinical practice. At the same time, there is a clear decrease in patients' perception of pain and it is therefore advisable to give analgesia when the environment is safe and controlled. ✱

### References

- Shelton T, McKinlay R, Schwartz RW. Acute appendicitis: current diagnosis and treatment. *Curr Surg* 2003;60(5):502-5.
- Rothrock SG, Pagane J. Acute appendicitis in children: emergency department diagnosis and management. *Ann Emerg Med* 2000;36(1):39-51.
- Silen W. *Cope's early diagnosis of the acute abdomen*. 19th ed. New York, NY: Oxford University Press; 1996.
- Kim MK, Galustyan S, Sato TT, Bergholte J, Hennes HM. Analgesia for children with acute abdominal pain: a survey of pediatric emergency physicians and pediatric surgeons. *Pediatrics* 2003;112(5):1122-6.
- Wolfe JM, Lein DY, Lenkoski K, Smithline HA. Analgesic administration to patients with an acute abdomen: a survey of emergency medicine physicians. *Am J Emerg Med* 2000;18(3):250-3.

6. Bazuro RK, Frei SP, Bond WF, Sierzega GM, Richardson DM, Koenig KE, et al. Pain management patterns and computed tomography utilization in patients with acute appendicitis [abstract]. *Ann Emerg Med* 2003;42(4 Suppl):S68-9.
7. Nissman SA, Kaplan LJ, Mann BD. Critically reappraising the literature-driven practice of analgesia administration for acute abdominal pain in the emergency room prior to surgical evaluation. *Am J Surg* 2003;185(4):291-6.
8. Goldman RG, Crum D, Bromberg R, Rogovik A, Langer JC. Analgesia administration for acute abdominal pain in the pediatric emergency department. *Pediatr emerg care* 2006;22(1):18-21.
9. Attard AR, Corlett MJ, Kidner NJ, Leslie AP, Fraser IA. Safety of early pain relief for acute abdominal pain. *BMJ* 1992;305(6853):554-6.
10. LoVecchio F, Oster N, Sturmann K, Nelson LS, Flashner S, Finger R. The use of analgesics in patients with acute abdominal pain. *J Emerg Med* 1997;15(6):775-9.
11. 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(3):639-43.
12. Thomas SH, Silen W, Cheema F, Reisner A, Aman S, Goldstein JN, et al. Effects of morphine analgesia on diagnostic accuracy in emergency department patients with abdominal pain: a prospective, randomized trial. *J Am Coll Surg* 2003;196(1):18-31.
13. Kim MK, Strait RT, Sato TT, Hennes HM. A randomized clinical trial of analgesia in children with acute abdominal pain. *Acad Emerg Med* 2002;9(4):281-7.
14. Green RS, Bulloch B, Kabani A, Hancock BJ, Tenenbein M. Safety of early analgesia in children with acute abdominal pain: a randomized, double-blind, placebo-controlled trial [abstract]. *Ann Emerg Med* 2003;42(4 Suppl):S87.
15. Thomas SH, Silen W. Effect on diagnostic efficiency of analgesia for undifferentiated abdominal pain. *Br J Surg* 2003;90(1):5-9.
16. McHale PM, LoVecchio F. Narcotic analgesia in the acute abdomen—a review of prospective trials. *Eur J Emerg Med* 2001;8(2):131-6.
17. Lee JS, Stiell IG, Wells GA, Elder BR, Vandemheen K, Shapiro S. Adverse outcomes and opioid analgesic administration in acute abdominal pain. *Acad Emerg Med* 2000;7(9):980-7.

Pediatric Pearls is produced by the Pediatric Research in Emergency Therapeutics (PRETx) program at the Hospital for Sick Children in Toronto, Ont. Mr Bromberg is a member and Dr Goldman is Director of the PRETx program. The mission of the PRETx program is to promote child health through evidence-based research in therapeutics in pediatric emergency medicine.

Do you have questions about the effects of drugs, chemicals, radiation, or infections in children? We invite you to submit them to the PRETx program by fax at 416 813-5043; they will be addressed in future Pediatric Pearls. Published Pediatric Pearls are available on the College of Family Physicians of Canada website ([www.cfpc.ca](http://www.cfpc.ca)) and on the PRETx program website ([www.PRETx.org](http://www.PRETx.org))