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Intravenous acetaminophen in bariatric surgery: effects on opioid requirements

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ABSTRACT

Background: Opioids are commonly used after bariatric surgery for pain control because of their potent analgesic effects. Nevertheless, the morbidly obese patient has increased risk for developing adverse effects produced by opioids (such as sedation, apnea, hypoxemia, ileus, and vomiting). Intravenous acetaminophen (IVA) has been evaluated in some specialties showing a reduction in opioid consumption. The purpose of this study was to evaluate the effect on opioid consumption when IVA is administered in bariatric surgery patients.

Material and methods: A retrospective study was performed in patients who underwent bariatric surgery. Group A included those patients who received IVA perioperatively and group B those who did not. The amount of opioids administered was calculated and compared for each group.

Results: Group A included 38 cases (44.7%) and group B included 47 cases (55.3%). A comparison was performed in terms of age ($P = 0.349$), body mass index ($P = 0.311$), gender ($P = 0.890$), American Society of Anesthesiologist score ($P = 0.438$), total surgical time ($P = 0.497$), perioperative complications ($P = 0.786$), number of procedures per surgeon ($P = 0.08$), and type of surgical procedure ($P \leq 0.01$). Group A had a mean 24-h total opioid dose of 99.5 mg, whereas group B of 164.6 mg ($P = 0.018$). Group A received 39.5% less opioids than group B. A *post hoc* analysis determined a statistical power of 0.74.

Conclusions: IVA used perioperatively can decrease opioid consumption in patients after bariatric surgery. Randomized trials are needed to corroborate these results.

1. Introduction

General recommendations related to bariatric surgery include multimodal analgesic therapy, early mobilization, elevation of the head, infiltration of local anesthetics, and avoidance of sedatives [1]. Opioids are a class of drugs frequently used for pain control because of their potent analgesic effects. Despite these benefits, opioids are associated with a number of adverse effects, such as: sedation, dizziness, nausea and/or vomiting, physical dependence, tolerance, and respiratory depression [2]. The morbidly obese patient who receives opioids has increased risk for developing adverse effects related to postoperative pulmonary complications such as atelectasias and impaired gas exchange [3]; hypoxemia related to obstructive sleep apnea [4], apneic episodes precipitating heart block [5], postoperative ileus, which represents the

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single largest factor influencing length of stay [6], and complicated recovery due to nausea and/or vomiting [7]. Thus, since 2006, the American Society of Anesthesiologists (ASA) has recommended minimizing or avoiding perioperative opioid administration to the bariatric patients using a multimodal form of pain control to include local and/or regional anesthetics, nonsteroidal anti-inflammatory drugs (NSAIDs), cyclooxygenase 2, and acetaminophen administration routinely to reduce opioid use [8].

Acetaminophen is a widely used analgesic and antipyretic. In November 2010, the Food and Drug Administration approved an intravenous formulation of acetaminophen (ofirmev) for the management of postoperative pain [9]. This encouraged some physicians to evaluate intravenous acetaminophen (IVA) in different surgical specialties. Since then, multiple studies have demonstrated the analgesic efficacy of IVA and its ability to reduce opioid administration [10–14]. Based on this information, we propose that in patients having bariatric surgery, the perioperative administration of IVA will assist in adequate pain control and reduce opioid consumption.

2. Material and methods

The Institutional Review Board approved the study to retrospectively review data on 92 patients who underwent bariatric surgery from December 2010–November 2011 at our facility (South Miami Hospital within Baptist Health South Florida). Procedures included gastric bypass, sleeve gastrectomy, adjustable gastric banding, and revisional bariatric surgery. Two surgeons, with experience of performing more than 500 bariatric procedures each, operated on all reported cases. The following baseline variables were analyzed: age, preoperative body mass index (BMI), gender, ASA score, total surgical time, perioperative complications, number of procedures per surgeons, and type of surgical procedures. Perioperative complications included those that occurred during the first 72 h or during the hospitalization. Two surgical platforms were used, robotic and laparoscopic. During the robotic cases, the DaVinci Surgical System (Intuitive Surgical Inc, Sunnyvale, CA) was used.

In addition, we reviewed the amount and type of opioid administered in every case. Acetaminophen (ofirmev acetaminophen injection, Cadence Pharmaceuticals Inc) was provided intravenously in single 1000 mg doses intraoperatively, during the induction (preventive analgesia). Patients in the IVA group also continued to receive IVA 1000 mg every 6 h for the first 24-h period. Intraoperative opioid administration by anesthesia (fentanyl) was also collected and included in the results. Patients who received IVA were compared with those that did not (group A and group B respectively). All the patients in both groups had available to them opioids (rescue medications) for pain control. The medication used for pain control were intravenous hydromorphone (Dilaudid Purdue Pharma). Hydromorphone was administered 0.5–1.0 mg by the floor nurse and fentanyl 25 μg by the recovery room nurse according to the pain scale. If the pain continued, the medication was repeated every 3 h until it was controlled. Pain was measured using a Wong–Baker pain scale [15] by the bedside nursing staff.

For this study, opioid consumption was evaluated within the first 24-h postoperative period. A cumulative dose for opioid administration was calculated using conversion factors for hydromorphone and fentanyl based on a standard of morphine sulfate (1 mg) (dilaudid: morphine = 1 mg: 6.67 mg and fentanyl: morphine = 1 mg: 100 mg).

2.1. Statistical analysis

Descriptive statistics were presented as average, (±) standard deviation, and range for numeric variables and proportions for categorical variables. Comparisons between groups were performed using chi-squared test for proportions variables and Student *t*-test for comparison of continuous variables or a Mann–Whitney *U*-test when the distributions were significantly asymmetrical or the numeric variables were ordinal. $P < 0.05$ was considered to indicate statistical significance. To compare differences in opioid consumption, a nonparametric Mann–Whitney *U*-test was used. The Figure was built with polynomial trendlines, based on the Mann–Whitney *U*-test. All analyses were done using SPSS 19.0 (Chicago, IL).

3. Results

The 92 patients were divided in two groups, group A, which included 42 patients who received IVA, and group B, which included 50 patients and did not receive IVA. Because it was not a prospective study, placebo was not administered to group B. Seven patients were excluded because of missed data, resulting in a final total of 85 patients. For our sample size ($N = 85$), a *post hoc* analysis determined a medium effect size of 0.57 with an actual power of 0.74. Group A had 38 cases (44.7%) and group B had 47 cases (55.3%). The procedures included 19 band placements (22.3%), 26 gastric bypasses (30.6%), 34 sleeve gastrectomies (40%), and 6 revisions (7.1%).

When groups were compared, no statistically significant differences were found in terms of age ($P = 0.349$), BMI ($P = 0.311$), gender ($P = 0.890$), and ASA score ($P = 0.438$; Table 1).

Also, no differences were found in terms of total surgical time ($P = 0.497$), perioperative complications ($P = 0.786$), or number of procedures per surgeon ($P = 0.081$). Groups were not similar when type of surgical procedures was compared ($P \leq 0.01$), such differences were because of the higher number of sleeve gastrectomies (57.9% *versus* 25.5%) and fewer number of gastric bands (5.3% *versus* 36.1%) in group A (Table 2).

Those that received IVA (group A) had a mean 24-h total opioid dose of 99.5 mg, whereas those that did not receive IVA (group B) had a mean 24-h total opioid dose of 164.6 mg. When comparison was performed, statistical differences were found ($P = 0.018$). Group A received 39.5% less opioids than group B. (Figure).

A logistic regression was performed to determine whether procedure type (bypass, sleeve, band, and revision), surgeon, patient age, BMI, and ASA score predicted the administration of IVA during the perioperative period. All independent variables were entered into the model simultaneously. Results indicated that the overall model with all six predictors was statistically reliable in distinguishing between those who