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Paraincisional Subcutaneous Infusion of Ropivacaine after Open Abdominal Vascular Surgery Shows Significant Advantages

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Background: Opiates are widely used for postoperative pain relief. Unfortunately, their side effects such as inhibited gastrointestinal motility and respiratory depression may compromise or delay postoperative recovery after laparotomy. We used paraincisional subcutaneous catheters (PSCs) and applied 0.25% ropivacaine infusion to improve pain relief and decrease postoperative morphine consumption in patients after open surgery for aortic aneurysm.

Methods: A retrospective single-center study including 58 patients treated by open surgery for aortic aneurysm between October 2006 and June 2012. Overall, 28 patients (control group) received standard postoperative pain management including opiates, and 30 patients (PSC group) were treated with paraincisional continuous local analgesia with 0.25% ropivacaine administrated via bilateral subcutaneous catheters along with additional ad libitum opiates administration, at first intravenously and then orally.

Results: Patients characteristics as well as perioperative and postoperative outcomes were comparable between the groups during the first 5 days after surgery. Patients of the PSC group received significantly less morphine, although the patients in both groups reported a similar pain intensity. Neither wound-healing disorder nor catheter-associated subcutaneous infection was reported. High serum concentration of ropivacaine was detected in 2 patients (6%) with end-stage renal disease, who developed temporary neurologic symptoms. Length of intensive care unit (ICU) stay was significantly shorter in the PSC group (2 [0−23] vs. 4.5 [0−32] ICU days).

Conclusions: This is the first report about PSCs for analgesia after laparotomy. This case/control study shows that continuous paraincisional subcutaneous infusion of 0.25% ropivacaine after open surgery for aortic aneurysm repair is a feasible method of postoperative analgesia. This technique allows sustained pain relief with significant reduction of opiate requirement and faster recovery after surgery. Prospective randomized controlled trial is necessary for the assessment of safety and efficacy of this method.

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INTRODUCTION

Safe and well-tolerated analgesia that provides an optimal postoperative pain relief is very important. Patients with aneurysmal and occlusive vascular disease are prone to tissue ischemia because of reduced angiogenic ability and impaired wound healing[4] and may therefore require higher doses of analgesics for sufficient postoperative pain management. Opiate analgesics remain a standard for relief of acute postoperative pain[5] despite their well-known and frequent side effects such as nausea, vomiting, impairment of gastric emptying, decreased gastrointestinal motility, somnolence, and respiratory depression.[6–8] Morphine-induced side effects, namely intestinal hypomotility and constipation, are even more frequent in patients with ischemic bowel disease,[9] frequently associated with advanced atherosclerosis. Multimodal analgesia with nonsteroidal antiinflammatory drugs (NSAIDs) is frequently contraindicated because of secondary adverse effect on cardiovascular and renal,[11] as well as liver,[12,13] functions because of frequent preexistent renal or liver dysfunction in patients with diseases of the vascular system. Therefore, alternative methods of safe and sufficient analgesia that would allow reduction of postoperative opiate administration are welcome especially in vascular surgery. In this regard, we hypothesized that paraincisional continuous subcutaneous infusion of local anesthetics could ameliorate pain control and reduce consumption of opiates in patients undergoing open surgery for repair of aortic aneurysm. Our aim was to obtain preliminary data on paraincisional continuous subcutaneous infusion of local anesthetics before a randomized controlled trial for the assessment of safety and efficacy of this method.

METHODS

Study Design

Single-center retrospective study on 58 consecutive patients who underwent laparotomy for open surgical treatment of aortic aneurysm between October 2006 and June 2012. Thirty patients in the paraincisional subcutaneous catheter (PSC) group received continuous paraincisional infiltration of 0.25% ropivacaine in addition to standard postoperative pain management with opiates ad libitum. Twenty-eight patients of the control group did not receive PSC and were managed with systemic analgesia. Pain intensity was recorded in a standardized fashion using visual analog scale. Records of 58 patients were reviewed for subjective pain intensity and morphine administration during the initial 5 postoperative days. Moreover, catheter-based complications, incidence of wound infection, postoperative ileus, respiratory failure, and side effects of ropivacaine such as neurologic symptoms, reintroduction of enteral liquid and solid intake, and time to the first bowel movement after surgery were studied.

Surgery and Catheter Positioning

All 58 patients underwent a midline laparotomy or a flank incision in case of retroperitoneal surgical approach under general anesthesia.

After closing the wound, Soaker catheters (ON-Q Soaker catheter expansion kits: Soaker 10 in (25 cm), T-Peel Needle 8 in PM040 and Soaker 2.5 in (6.5 cm), and T-Peel Needle 3.25 in PM010 were ordered by I-Flow, LLC, a Kimberly-Clark Health Care Company) were inserted subcutaneously ~5 cm lateral and parallel to the surgical incision using trocars with peel-away sheaths. The needles were removed, leaving the peel-away plastic sheaths allowing introduction of catheters (Fig. 1). In cases in which laparotomy wounds were too long to be covered with 1 catheter, 2 catheters were used on each side to cover the whole length of the incision. Finally, subcutaneous catheters were attached and secured solely to the skin surface with Tegaderm (3M; St. Paul, MN).

Local Anesthesia Protocol

Each catheter was initially primed with 5 ml of 0.25% ropivacaine (Naropin®; APP Pharmaceuticals, LLC) before being attached to a continuous perfusion system in the intensive care unit (ICU). Continuous infusion of ropivacaine was administrated using a pump-syringe (''Perfusor''®; B. Braun Melsungen AG). PSC were kept in place for at least 5 days. In 4 patients, hand injection of saline in catheter was required to unblock it.

In case of initial perioperative and early postoperative epidural analgesia, PSCs were installed under the local anesthesia in patients with intractable pain after the epidural catheter was removed, generally on the first or second postoperative day; ropivacaine was then administrated through the PSC. These 7 patients were analyzed in the PSC group after the paraincisional catheters were inserted.

Pain Assessment

Visual analog scale was used for the assessment of the pain intensity.[23] The patients were asked 4 times a day about the highest pain intensity during the respective time interval. They were also asked to

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