Egyptian Journal of Anaesthesia (2016) **32**, 375–383

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Egyptian Society of Anesthesiologists

Egyptian Journal of Anaesthesia

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Research Article

Postoperative analgesia of ultrasound guided rectus sheath catheters versus continuous wound catheters for colorectal surgery: A randomized clinical trial ☆

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Received 13 November 2015; revised 14 January 2016; accepted 2 February 2016
Available online 9 March 2016

KEYWORDS

Rectus sheath catheters;
Continuous wound catheters;
Postoperative analgesia;
Colorectal surgery

Abstract *Purpose:* The purpose of this study was to evaluate the postoperative analgesia and morphine requirements of ultrasound guided rectus sheath catheters versus continuous wound catheters in midline open colorectal surgery patients.
Methods: Sixty patients of both sexes aged 40–65 years were randomized into 2 equal groups to receive postoperative analgesia through either a wound catheter continuous infusion (group I) or rectus sheath catheters (group II). The trial is registered in the Australian New Zealand Clinical Trials Registry: ACTRN12615000636550.
Results: Heart rate and mean arterial blood pressure increased significantly in group I at 12 and 24 h as compared to time 0 and 48 h ($P < 0.05$). There was a significant increase in heart rate and mean arterial blood pressure in group I as compared to group II at all-time intervals ($p < 0.05$). There was a significant decrease in Visual analogue score at rest and with movement and in group II as compared to group I at all-time intervals ($p < 0.05$). Concerning the need for rescue analgesia, 8 patients (26%) in group I required rescue analgesia; 7 patients of them required only one dose and one patient required two doses. In group II two patients (6.6%) required rescue analgesia, and both required one dose. The total morphine consumption was lower and the patient satisfaction was better in group II compared with group I ($p = 0.005$). There were no serious complications in the two groups.

☆ ***IRB***: The Research Ethics Committee of the Faculty of Medicine, Tanta, Egypt, approval code: 2474/03/14.

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[1] ***Contribution***: Study design and manuscript preparation.
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[3] ***Contribution***: Conduct of the study and data collection.

Peer review under responsibility of Egyptian Society of Anesthesiologists.

http://dx.doi.org/10.1016/j.egja.2016.02.001

Conclusion: Ultrasound-guided rectus sheath catheters provided better postoperative analgesia compared with wound catheter continuous infusion for colorectal surgery without undesirable side effects.

1. Introduction

Extended midline abdominal incisions are associated with severe postoperative pain. Many multimodal analgesia techniques are used to provide effective analgesia for such incisions with the aim of limiting the perioperative use of morphine and its side effects [1].

Wound infiltration (WI) with local anesthetic (LA) inhibits nociceptive impulse transmission from the site of injury thus modulating pain at the peripheral level. The main limitation for use of a single dose is short-term analgesic effect (usually 2–6 h) [2]. Although there are multiple studies evaluating use of continuous wound catheters in different surgical procedures, there are conflicting reports of its efficacy [3–6].

Modified rectus sheath block was first described at the turn of the last century [7], it was infrequently used till long acting local anesthetics agents, and small caliber infusion catheters and a small portable ultrasound machine are recently available [8]. These developments have resulted in renewed interest in rectus sheath catheters for postoperative pain management after midline abdominal incisions [7,9,10]. Ultrasound allows accurate visualization of the position of the needle tip, and placement of catheters to provide continuous postoperative analgesia [10] and reduces the risk of puncture of the posterior rectus sheath, peritoneum and bowel [9].

However, to the best of our knowledge, there is no clinical trial comparing the analgesic effect of both wound catheter continuous infusion and ultrasound guided rectus sheath catheters. So, the aim of the present study was to evaluate the postoperative analgesia and morphine requirements of ultrasound guided rectus sheath catheters versus continuous wound catheters in patients scheduled for open colorectal surgery through midline incision.

2. Patients and methods

This randomized prospective clinical trial was carried out at the General Surgical department, Tanta University Hospital, from April 2014 to April 2015 on 60 patients of both sexes aged (40–65) years, and ASA physical status class I and II scheduled for elective open colorectal surgery via midline abdominal incision after obtaining an institutional board approval with approval code: 2474/03/14. A written informed consent was obtained from every patient and all the data in the study were confidential; every patient had a secret code and the results were used for scientific purpose only. The trial is registered in the Australian New Zealand Clinical Trials Registry: ACTRN12615000636550.

Patients were excluded from the study if they presented with coagulopathies, impaired platelet functions, cardiovascular instability, cerebral strokes, renal or liver disease. Patients with local infection at the block site or with history of allergy to local anesthetics were also excluded.

The sample size calculation was found to be $N > 27$ for each study group based on the following criteria: 95% confidence limit, 80% power of the study, ratio of cases to control is 1:1, expected outcome ranging between 70 and 95%. Preoperatively, 70 patients were assessed for eligibility: of them 10 were excluded; 3 patients refused to participate in the trial and 7 were not meeting the inclusion criteria (3 had hepatic dysfunction, 2 were suffering from cardiovascular instability and 2 had infection at the site of the block). So, 60 patients were randomized preoperatively using closed envelops and computer generated random numbers into 2 equal groups, each of 30 patients to receive postoperative analgesia through either a wound catheter continuous infusion or rectus sheath catheters. A blinded nurse, not participating in data collection read the patient's number. The participants and people analyzing the data were also blinded. All the randomized patients completed the trial, Fig. 1.

For all patients clinical examination was performed, and routine laboratory investigations were assessed including the following: complete blood picture, fasting and postprandial blood glucose, prothrombin time and activity, liver and renal functions. Intra-operatively the patients were monitored continuously for oxygen saturation, end tidal CO_2, heart rate (HR) and rhythm using electrocardiogram (ECG). Arterial blood pressure (systolic, diastolic and mean) was measured non-invasively every 5 min and a urinary catheter was inserted for collection of urine output.

2.1. Anesthesia

After preoxygenation with 100% oxygen for 3–5 min, anesthesia was induced with I.V fentanyl (1 μg/kg) and propofol (2 mg/kg) followed by rocuronium (0.6 mg/kg), to facilitate endotracheal intubation. Patients' lungs were ventilated to maintain end tidal CO_2 at 35–40 mmHg. Anesthesia was maintained by isoflurane 1.5% with incremental doses of rocuronium (0.2 mg/kg) when needed (guided by train-of-four test; adequate surgical relaxation was achieved with 1 or 2 twitches present in train-of four-test that correlates with greater than 80% twitch depression) and intraoperative analgesia was provided by 0.5 μg/kg IV fentanyl every 30 min.

2.2. Recovery

After the end of surgery and study procedures (according to the patients' group) the isoflurane was discontinued and the muscle relaxant was reversed by neostigmine (0.05 mg/kg) with atropine (0.01 mg/kg) I.V and the patients were extubated when they were fully awake.