

# Is an opioid-free anaesthesia possible without using alpha-2 agonists?

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**Submitted:** 12-Sep-2019

**Revised:** 29-Oct-2019

**Accepted:** 17-Jan-2020

**Published:** 01-May-2020

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## ABSTRACT

Opioid-free anaesthesia (OFA) is an anaesthetic technique where non-opioid drugs are used in the intraoperative period. It can be successful without using alpha-2 agonists, which are main drugs used in this multimodal anaesthesia. We are presenting seven different cases where OFA was used in different abdominal surgeries (laparoscopic cholecystectomy, colon cancer operation, and laparoscopic inguinal hernia repair) alone or in a combination with epidural anaesthesia and peripheral nerve block. Prior induction to general anaesthesia all patients received dexamethasone and paracetamol. Induction of general anaesthesia consisted of giving midazolam, lignocaine, propofol, ketamine, and rocuronium. After tracheal intubation anaesthesia was maintained with sevoflurane and continuous infusion with lignocaine, magnesium sulphate, and ketamine (in some patients). At the end of the surgery, all patients received metamizole. The postoperative pain scores were reduced in most of the patients without giving opioids.

**Key words:** Abdominal surgery, analgesia, opioid free anaesthesia, postoperative pain

<b>Access this article online</b>
Website: <a href="http://www.ijaweb.org">www.ijaweb.org</a>
DOI: 10.4103/ija.IJA_664_19
Quick response code


## INTRODUCTION

Opioid-free anaesthesia (OFA) is an anaesthetic technique where no opioids are given in the perioperative operative period during anaesthesia.<sup>[1]</sup> In OFA, many drugs can be used which can block the sympathetic nervous system directly or indirectly: lignocaine, ketamine, magnesium sulphate, dexamethasone, alpha-2 agonists, beta-blockers, nonsteroidal anti-inflammatory drugs (NSAID), gabapentanoides, paracetamol, and metamizol. These OFA agents have anaesthetic or analgesic properties and administered together in subanaesthetic doses can achieve the desired effect.<sup>[2]</sup>

We report cases of OFA in abdominal operations, without using alpha-2 agonists.

## CASE REPORTS

### Case 1

A 39-year-old female patient (weight 116 kg) was scheduled to undergo laparoscopic cholecystectomy.

She had history of hypertension, chronic obstructive pulmonary disease (COPD) successfully treated with bronchodilators and obesity (BMI 44.9 kg/m<sup>2</sup>). Before anaesthesia induction, 11.6 mg dexamethasone and 1 gm paracetamol were given intravenously (IV). Anaesthesia was induced with IV 0.04 mg/kg midazolam, 1 mg/kg lignocaine hydrochloride, 1.5 mg/kg propofol, 0.5 mg/kg ketamine, and 0.6 mg/kg rocuronium bromide. After tracheal intubation general anaesthesia was maintained with sevoflurane (MAC 0.7-1) and continuous intravenous infusion of magnesium 25 mg/kg/h and lignocaine 2 mg/kg/h. At

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**How to cite this article:** Toleska M, Dimitrovski A. Is an opioid free anaesthesia possible without using alpha-2 agonists? Indian J Anaesth 2020;64:428-31.

the end of the surgery 2.5 gm metamizole was given intravenously. VAS score 1 and 4 h after surgery was 5/10 at rest and 6/10 on coughing, and 100 mg ketoprofen was given. After surgery 8, 12 and 24 h pain was 2/10 at rest and on coughing.

### Case 2

A 56-year-old male patient (weight 83 kg) was scheduled to undergo laparoscopic cholecystectomy. Previously, he underwent two open thoracic operations but postoperatively he could not awake easily from anaesthesia, had severe pain, was sedated and suffered from delirium. Six months after these surgeries he still had concentration difficulties, memory deficits, and pain. Previous anaesthetic charts showed high amount of fentanyl used during surgery, without using thoracic epidural anaesthesia. The same regime for OFA was performed with continuous infusion with 0.2 mg/kg/h ketamine, 2 mg/kg/h lignocaine, and 40 mg/kg/h magnesium. After removal of gallbladder, intraperitoneal instillation of 20 ml 0.5% bupivacaine for postoperative analgesia was performed and 1 gm metamizole was given. Patient awoke smoothly from anaesthesia and VAS score of pain was 0 at rest and 1 on coughing. Two and eight hours after surgery VAS pain scores were 2/10 at rest and on coughing. Eleven hours after surgery patient reported pain at rest 4 and 5 on coughing and 1.5 gm metamizole was given.

### Case 3

A 74-year-old woman was scheduled for laparoscopic cholecystectomy and previous history of hypertension, COPD, chronic cardiomyopathy, supraventricular extrasystole, and insulin dependent diabetes mellitus. Spirometry tests revealed predicted value of FVC was 35%, FEV1 was 29%, results from capillary blood sample were pO<sub>2</sub> 62mmHg, and pCO<sub>2</sub> 46 mmHg. OFA was used with continuous infusion of magnesium 35 mg/kg/h and lignocaine 2 mg/kg/h. At the end of the surgery, 1.5 gm metamizole was administered. She complained of having pain 1 and 24 h after surgery and VAS pain score was 3/10 and 4/10 at rest and 5/10 and 5/10 on coughing respectively, without any respiratory and cardiovascular complications in the postoperative period.

### Case 4 and 5

A 68-year-old woman (weight 68 kg) and 57-year-old man (weight 86 kg) were scheduled for open colectomy to remove colon cancer. A thoracic epidural anaesthesia (at level Th9-Th10) together with OFA was used in both patients (with continuous infusion with

lignocaine 2 mg/kg/h and magnesium 25 mg/kg/h). Total amount of bupivacaine given into epidural catheter during surgery was 25 mg and 27.5 mg of bupivacaine in two patients, respectively. They remained haemodynamically stable during surgery. At the end of the surgery 2.5 mg metamizole was given. Female patient reported pain score 0/10 at rest and on coughing, 2 h after surgery and was transferred to the department. During 72 h after surgery she reported higher pain scores only 6 h after surgery. Pain was 7/10 at rest and 8/10 on coughing and 2 mg morphine was given via epidural catheter with 7 ml of saline. After 24 and 36 h pain was 5/10 at rest and 6/10 on coughing (1 gm paracetamol was given). After 12 h, 48 h, and 72 h no pain was reported. Male patient reported pain 5/10 at rest and 6/10 on coughing, 2h after surgery (1 gm paracetamol was given). During 72 h after surgery he reported higher pain scores 6 h after surgery, pain 8/10 at rest, and 9/10 on coughing and was treated with 2 mg morphine through epidural catheter. Twelve hours and 36 h after surgery pain scores were 5/10 at rest and 6/10 on coughing and paracetamol 1 gm was given. No analgesic was given 24 h, 48h, and 72 h after surgery—pain at rest was 1-2/10 and 2-3/10 on coughing.

### Case 6

A 68-year-old male patient was scheduled for laparoscopic colectomy (removal of colon cancer). He refused having thoracic epidural anaesthesia, but accepted to have transversus abdominis plane block (TAPB). Continuous infusion contained lignocaine 2 mg/kg/h and magnesium sulphate 35 mg/kg/h. Ultrasound-guided bilateral TAP block was performed with 20 ml 0.25% bupivacaine on each side. During surgery they changed from laparoscopic to open and lasted for 3:15 h. At the end, 2.5 gm metamizole was given and he was transferred to PACU with no pain. After 2 h he reported pain 3/10 at rest and on coughing. He reported higher pain scores 8 h after surgery, 7/10 at rest and on coughing and 100 mg tramadol was given. Thirty-six hours and 60 h after surgery pain was 4/10 at rest and on coughing and 1 gm paracetamol was given. After 12 h, 24 h, 48 h, and 72 h, he did not complain of having pain (1/10 at rest and on coughing).

### Case 7

A 28-year-old male patient was scheduled for laparoscopic herniorrhaphy and from previous history he used to consume narcotics 4 years ago. Considering the fact for narcotic abuse relapse in the postoperative

period, he received OFA with bilateral TAP block. Protocol for OFA was the same, but i.v. infusion contains lignocaine 2 mg/kg/h, magnesium sulphate 40 mg/kg/h, and ketamine 0.2 mg/kg/h. At the end of the surgery bilateral TAP block was performed with 20 ml 0.25% bupivacaine on each side and 2.5 gm metamizole was given. After extubation patient was taken to the PACU and stayed there for 2 h. Two hours after surgery he reported having pain 5/10 at rest and 6/10 on coughing and 100 mg ketoprofen (NSAID) was given. He received 1 gm paracetamol and 100 mg ketoprofen given every 4 h alternately. Tramadol 100 mg was given 28 h after surgery because of persistence of severe pain. He was discharged home 40 h after surgery with prescribed oral analgesics paracetamol.

## DISCUSSION

OFA is a new concept of anaesthesia connected to multimodal anaesthesia. In OFA, non-opioid drugs together with regional anaesthesia and peripheral nerve blocks can be used. OFA can be safely used in obese patients, pulmonary disease (asthma, COPD, respiratory insufficiency), history for chronic pain, oncologic surgery, history of acute or chronic opioid addiction, hyperalgesia, immunodeficiency, and inflammatory diseases.<sup>[3]</sup>

Non-opioid drugs which are used in our case series are: lignocaine, ketamine, magnesium sulphate, dexamethasone, NSAID, paracetamol, and metamizol. Dexamethasone given before induction to general anaesthesia in dose 0.1 mg/kg has antiemetic effect<sup>[4]</sup> and can reduce opioid consumption in the first 24 h.<sup>[5]</sup> Paracetamol has analgesic and antipyretic effect and given preemptively has shown to be effective in the postoperative treatment of pain with less opioid consumption in the first 24 h after surgery and less nausea and vomiting.<sup>[6]</sup> Together with the NSAID is the first analgesic of choice for treatment of acute pain. Analgesic doses of lignocaine needed in the perioperative period are 1–2 mg/kg as a bolus dose, continuing with intravenous continuous infusion from 1–2 mg/kg/h, which are clinically effective.<sup>[7]</sup> One meta-analysis of 45 randomized clinical trials for open and laparoscopic abdominal operations showed that perioperative infusion with lignocaine reduces postoperative pain immediately after surgery, even 24 h patients had less nausea and hospital stay was shortened.<sup>[8]</sup> Ketamine and magnesium sulphate are both N-methyl D-aspartate (NMDA) antagonists. Ketamine is most effective given as a bolus dose

0.5 mg/kg during induction to general anaesthesia and to be continued in the peri- and postoperative period in dose 0.25 mg/kg up to 48 h in major abdominal operations, with reduction on postoperative opioid consumption.<sup>[9]</sup> Magnesium sulphate given as a continuous i.v. infusion potentiates analgesia after surgery and reduces the need for opioids in the postoperative period.<sup>[10]</sup> In the literature there are a few case reports and studies for opioid anaesthesia without using alpha-2 agonists. Some studies indicates using OFA in obese patients,<sup>[11]</sup> patients with opioid-induced delirium,<sup>[12]</sup> oncologic surgery<sup>[13]</sup> and in opioid addicted.<sup>[14]</sup>

## CONCLUSION

OFA is new anaesthetic approach that can be safely used and can successfully eliminate opioid-related side effects. OFA is also effective without using alpha-2 agonists and can be used in combination with epidural anaesthesia and peripheral nerve blocks and pain scores are reduced in the postoperative period.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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