Syntax Literate: Jurnal Ilmiah Indonesia p–ISSN: 2541-0849 e-ISSN: 2548-1398
Vol. 9, No. 11, November 2024

OPIOID FREE ANESTHESIA DURING SECTIO CAESAREA SURGERY IN PREGNANT PATIENTS WITH DENGUE HEMORRHAGIC FEVER (A CASE REPORT)

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Abstract

This study aims to evaluate the effectiveness of Opioid-Free Anesthesia (OFA) in maintaining hemodynamic stability and reducing side effects in emergency cesarean section patients. The background of this research lies in the high risk of opioid addiction and the rising death toll from opioid overdoses in the United States, along with common opioid-related side effects such as respiratory depression, ileus, and postoperative nausea and vomiting (PONV). The patient in this study is a 22-year-old woman at 38 weeks of pregnancy, in the latent phase of labor, with a history of fever due to Dengue infection without warning signs. The method used was general anesthesia without opioids, employing a multimodal pain management approach with non-opioid analgesics aimed at preemptively inhibiting pain receptors along the complex pain pathway, both centrally and peripherally. Results showed that OFA provided consistent hemodynamic stability from induction through to post-operation without any pain complaints, use of additional analgesics, or PONV. OFA effectively provides stable anesthesia and reduces the common side effects of opioids in patients, while supporting safe and efficient pain control without the risk of addiction. The study suggest that OFA with a multimodal approach is a viable option for perioperative anesthesia, reducing opioid dependency and associated side effects, and promoting patient safety in surgical procedures.

Key Word: Anesthesia, opioid free anesthesia, opioid, pain

Introduction

Opioids are the most commonly used analgesics in the perioperative period. Opioids are very effective in relieving somatic pain, but they are not very effective in relieving neuropathic pain and have a high potential for causing addiction (Christian et al., 2019). Opioid addiction is currently a national pandemic in the United States, and overdose fatalities from synthetic opioids have surged dramatically in the last ten years (Jones et al., 2020; Pardo et al., 2019). After further research, it was shown that individuals receiving opioids as an analgesic in hospitals frequently develop an opioid addiction (Stoicea et al., 2019). The United States' opioid problem is a remarkable public health emergency that started at least two decades ago and has become worse during the last ten years (Manchikanti et al., 2012; Pickard & Lee, 2021; Wilkerson et al., 2016). The population of Americans is seeing an unparalleled drop in life expectancy, mostly due to this (Hedegaard et al., 2017). In 2017 alone, 47,600 people died from opioid overdoses in the United States. Short-term or long-term exposure to opioids provides opportunities for long-term opioid abuse, leading to addiction in patients who receive opioid prescriptions. Over the past 25 years, opioid abuse, overprescribing, and illegal distribution of opioids have become difficult to control, ultimately leading to increased

How to cite: Dwipayana, I. M. A. Y., & Pradhana, A. P. (2024). Opioid Free Anesthesia During Sectio Caesarea Surgery in Pregnant Patients with Dengue Hemorrhagic Fever (A Case Report). *Syntax Literate. (9)11.* http://dx.doi.org/10.36418/syntax-literate.v9i11
E-ISSN: 2548-1398

opioid abuse and dependency disorders, non-medical opioid use, and overdose death rates.

The Centres for Disease Control report that between 1999 and 2014, the prevalence of opioid use disorders during pregnancy more than quadrupled. One newborn with Neonatal Abstinence Syndrome (NAS) is born every 30 minutes as a result of the five-fold rise in NAS caused by maternal opiate usage between 2002 and 2009. Opioid usage is associated with undesirable side effects such as respiratory depression, ileus, urine retention, postoperative nausea and vomiting (PONV), immunosuppression, and opioid-induced hyperalgesia in addition to the issue of opioid misuse and overdose (Olausson et al., 2022).

This study aims to evaluate the effectiveness of Opioid-Free Anesthesia (OFA) in maintaining hemodynamic stability and reducing side effects in emergency cesarean section patients.

Case Report

A 22-year-old female is scheduled for emergency caesarean section surgery. The patient is diagnosed with G1P0000 at 38 weeks and 5 days, latent phase of labour, plus fever observed 7 days ago due to Dengue Infection Without Warning Signs.

Anamnesis

The patient was referred consciously from RS Balimed Karangasem with complaints of abdominal pain since 5 days ago (since April 25, 2024). The abdominal pain is intermittent with accompanying fever. Examination at RS Balimed found a 1 cm opening of cervix and low platelet count of 55,000, and was referred to RSUP Prof Ngoerah on April 27, 2024. The fever is not improved and decreases with antipyretic medication. Complaints of bleeding gums, nose bleeds, red spots, nausea, vomiting, and shortness of breath are currently denied. Appetite for food and drink is good. The patient underwent ANC at the health center. History of cough, cold, and breath disorder in the last 2 weeks is denied. History of hypertension, diabetes, asthma, heart disease, and other systemic diseases denied. No history of food allergies or drug allergies. No history of surgery. Last meal and drink were 10 hours before surgery. The patient is currently working as a cleaning service and can still perform moderate to heavy physical activities without complaints of breath disorder or chest pain.

Physical Examination

The patient weighs 67 kg and is conscious (compos mentis). Respiratory rate is 18 breaths per minute, heart rate is 78 beats per minute with regular rhythm, blood pressure is 110/60 mmHg, and oxygen saturation is 98% on room air. Abdominal examination reveals no tenderness in the abdominal area, and there is no distension observed. Peripheral extremities are warm to touch with a capillary refill time (CRT) of less than 2 seconds.

Results of Laboratory Tests

In the complete blood count examination, it was found that WBC 9,20 x 10^3/µL (4,1-11,0); HGB 11,7 g/dL (12,0-16,0); HCT 35,2% (36,0- 46,0); PLT 42,00 x 10^3/µL (140-440); MCV 89,30 fL (80,0-100,0); MCH 29,70 pg (26,0 -34,0); MCHC 33,20 g/dL (31-36). In the serology examination Anti DHF IgM Negative, Anti DHF IgG positive. In the hemostasis function test, it was found that PPT 12,8 (10,8-14,4); APTT 37,2

seconds (24-36); INR 0,89 (0,9-1,1). and SGOT 42 U/L (5.00 - 34.00); SGPT 21 U/L (< 55); BUN 3.9 mg/dL (7.0 - 18.7); creatinine 0.63 mg/dL (0.57 - 1.11); e-LFG 127.32 0 (>= 90); K 3.54 mmol/L (3.50 - 5.10); Na 141 mmol/L (136 - 145); Cl 111.3 mmol/L (94 - 110); GDS 71 mg/dL (70 - 140); Albumin 3.4 g/dL (3.40 - 4.80)

Anesthesia management

Based on the anamnesis, physical examination, and supporting tests, the patient is concluded to have ASA (American Society of Anesthesiologists) physical status III E, with the issue of 38 weeks pregnant in latent phase with thrombocytopenia due to Dengue infection, and stable hemodynamics. Before surgery, informed consent regarding the general anesthesia technique to be performed was obtained. Additionally, the patient had two large-bore (18G) intravenous lines placed on both right and left hands, with Ringer's lactate fluid administered at 110 ml/hour. The patient was also fasted in preparation for surgery. Postoperative care for the patient is planned in the intermediate care unit.

Anesthesia management Intraoperative

During the intraoperative period, monitoring was conducted using non-invasive blood pressure measurement, 5-lead electrocardiogram (ECG), end-tidal CO2, and pulse oximetry. The patient was premedicated with intravenous dexamethasone 10 mg, diphenhydramine 10 mg, and dexmedetomidine loading dose of 1 mcg/kg body weight over 10 minutes. Subsequently, lidocaine 100 mg IV, ketamine 7.5 mg IV, and magnesium sulfate 2 grams IV were administered as analgesic agents. Anesthesia induction was achieved using propofol 150 mg IV in combination with 1% sevoflurane. Atracurium 30 mg IV was used for neuromuscular blockade, followed by endotracheal intubation using a size 7.5 cuffed endotracheal tube (ETT), positioned at a depth of 20 cm at the lips, confirmed by bilateral equal breath sounds in the lungs and absence of gastric sounds, and secured in place.

Anesthesia maintenance during surgery included oxygen and compressed air, continuous propofol infusion via syringe pump at a rate of 50–150 mcg/kg/hour, continuous dexmedetomidine infusion at a rate of 0.2-0.7 mcg/kg/minute, and lidocaine titrated at 1–2 mg/kg/minute. The patient also received intravenous tranexamic acid 1000 mg, paracetamol 1000 mg, and ondansetron 8 mg. Vital signs during the operation showed blood pressure ranging from 106–130 / 68–75 mmHg, heart rate 74–88 beats per minute, respiratory rate 16–18 breaths per minute, and oxygen saturation maintained at 98–99%, controlled with ventilation and end-tidal CO2 levels ranging from 32–36 mmHg. The surgery lasted 45 minutes with a total blood loss of 300 ml and total fluid input of 600 ml Ringer's lactate. Subsequently, the patient was extubated.

Management Postoperative

After the surgery, the patient was transferred to the intermediate care unit for close monitoring of vital signs. Postoperative analgesia included ketamine 300 mg in 20 ml of 0.9% NaCl solution at a rate of 0.8 ml/hour infusion; ketorolac 30 mg every 8 hours intravenously; and paracetamol 500 mg every 6 hours orally. Postoperative complete blood count revealed WBC 8.25 x 103/µL (4.1 - 11.0); HGB 10 g/dL (12.0 - 16.0); HCT 33 % (36.0 - 46.0); PLT 41 x 103/µL (140 - 440); MCV 88.2 fL (80.0 - 100.0); MCH 29.4 pg (26.0 - 34.0); MCHC 33.3 g/dL (31 - 36). During postoperative care, the patient did not complain of pain, nausea, or vomiting, and did not require rescue analgesia. The patient was discharged on the third day of treatment.

Results and Discussion

Opioid free anesthesia (OFA) is defined as an anesthesia technique where opioids are not used during the perioperative period (systemic, neuraxial, or intracavitary). With OFA, non-opioid analgesics are used in place of opioids during the intraoperative and postoperative phases of general anaesthesia, marking a novel approach to the field (Mauermann et al., 2017). The best medication to prevent sympathetic reactions to postoperative pain is opioids. Using a combination of systemic medications and local anaesthetics, multimodal analgesia aims to minimise side effects while enhancing their combined benefits. Opioids are currently essential for managing pain during surgery. Effective opioid usage, however, may result in a range of adverse consequences before and after surgery. Opioids are not included in Enhanced Recovery After Surgery (ERAS) protocols primarily due to these negative effects. In addition, opioids induce hyperalgesia and rapid tolerance. According to recent research, opioid-induced immunosuppression can have an impact on surgical results, raise the risk of infection, and raise the chance of metastasis in cancer patients. Nowadays, there are several medications available for sympathetic blocking. With β-2 agonists, such as dexmedetomidine, central or peripheral sympathetic blocking can be directly accomplished. It is recommended to use multimodal pain treatment to minimise opioid use. Both cerebral and peripheral pain pathways can have preemptive receptor blockage by the use of intraoperative multimodal non-opioid analgesics. Analgesics other than opioids and sympatholytic medications can be used in a multimodal manner to provide stable anaesthesia (Christian et al., 2019; Olausson et al., 2022).

Paracetamol primarily works by inhibiting the cyclooxygenase enzyme (COX), particularly COX-2, which is involved in prostaglandin production. The analgesic effect of 1 gramme of intravenously given paracetamol for moderate to severe postoperative pain is comparable to that of 30 mg of ketorolac, 75 mg of diclofenac, and 10 mg of morphine (Olausson et al., 2022). The most widely accessible non-selective NSAID in intravenous form is ketorolac. By blocking the cyclooxygenase enzymes (COX-1 and COX-2), ketorolac acts. Arachidonic acid is converted by the enzymes COX-1 and COX-2 into prostaglandins, which act as mediators of pain and inflammation. Strong NSAID ketorolac has a short half-life of elimination and works well as an analgesic for a variety of surgical operations. It also has antipyretic and anti-inflammatory qualities. Peak plasma concentrations are reached 30–60 minutes following a single ketorolac dosage (oral, rectal, subcutaneous, or intramuscular administration) (Olausson et al., 2022).

Corticosteroid dexamethasone has potent anti-inflammatory, immunosuppressive, and antiemetic effects. It works best when administered as a premedication at a dosage of 50 mcg/kg. Using 100 mcg/kg of dexamethasone can lessen the requirement for analgesics during and after surgery. Its anti-inflammatory properties on the surgical site itself cause this to happen, minimising wound oedema and thereby lowering postoperative discomfort. The only intravenous anaesthetic with analgesic effects is ketamine hydrochloride. As part of its analgesic and maybe depressive effects, ketamine can also interact with opioid receptors and increase the release of neurotransmitters including dopamine, serotonin, and norepinephrine. Preoperative administration of low-dose ketamine (0.1–0.2 mg/kg) lowers the need for intraoperative opioids and the VAS pain score over the first 24 hours following surgery (Bell & Kalso, 2018; Olausson et al., 2022).

Lidocaine hydrochloride, often known as lidocaine, is an amide-type local anaesthetic with anti-inflammatory, anti-hyperalgesic, and intravenous analgesic

properties. It works by blocking sodium channels in neuronal pathways. Up to six hours after surgery, intraoperative and postoperative pain control are improved by perioperative lidocaine infusion. Lidocaine lessens the need for opioids, which minimises the negative effects of opioids. Along with promoting a quicker (within 24 hours) recovery of gastrointestinal function, it also decreases the rate of postoperative nausea and vomiting (PONV) and shortens hospital stays. Lidocaine can be infused continuously at a rate of 1-2 mg/kg/hour or as a bolus dose of 1-2 mg/kg (Eipe et al., 2016; Ibrahim et al., 2018; Olausson et al., 2022).

Magnesium sulfate activates NMDA receptors, leading to calcium influx into cells and triggering central sensitization. Similar to how ketamine receptors stop potassium release, magnesium blocks NMDA receptors by preventing calcium and sodium ions from entering cells, which stops depolarization and the transmission of pain impulses. In one trial, magnesium led to decreased PONV, fewer intraoperative neuromuscular blocking agent (NMBA) needs, and lower pain levels within the first 48 hours. Before treatment, a bolus dosage of 3-5 grammes of magnesium can be given over the course of 5 minutes. A continuous infusion of 1-2 grammes of magnesium per hour can then be started (Noland, 2019).

Opioid-free anesthesia (OFA) has been implemented in many places around the world and is now routinely practiced in several countries. An infusion of ketamine 100 mg + dexmedetomidine 100 mcg + lidocaine hydrochloride 100 mg + magnesium sulphate 5 g in 1 L of saline was suggested for postoperative infusion at a recent presentation at the American Association of Anesthesiologists (ASA) meeting in New Orleans. By lowering opioid-related adverse effects, enhancing sleep on the night following surgery, and lowering postoperative pain, the usage of opioid-free anaesthesia and analgesia in Bruges, Belgium, has improved patient satisfaction. Multimodal analgesia uses a variety of medications and methods to improve pain control, lower the use of opioids, and lessen the negative effects associated with them. By using a variety of analgesics to modify the pathophysiological mechanisms behind nociception, balanced multimodal analgesia aims to produce intraoperative analgesia that is more successful and has fewer adverse effects (Baboli et al., 2020; Olausson et al., 2022).

Conclusion

In this case, opioid-free anesthesia (OFA) provides hemodynamic stability from induction, intubation, through to postoperative period. Furthermore, there have been no reports of postoperative nausea and vomiting, postoperative pain, or the need for rescue analgesics. Through a multimodal strategy utilising sympatholytic medications and non-opioid analgesics, OFA decreases adverse effects associated with opioid usage, such as respiratory depression, constipation, and addiction risks. It also shortens hospital stays and preserves hemodynamic stability.

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