

Research Article

Anesthesia for Laparoscopic Cholecystectomy in Sickle Cell Patients: Experience of a Hospital Implementing Laparoscopic Digestive Surgery in Central Africa

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Submitted: 28 September 2022

Accepted: 25 October 2022

Published: 28 October 2022

ISSN: 2333-6641

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OPEN ACCESS**Keywords**

- Anesthesia
- laparoscopic cholecystectomy
- Sickle cell patients

Abstract

Objective: The aim of this study was to evaluate the anesthetic management of SS homozygous sickle cell patient, candidate for laparoscopic cholecystectomy.

Methods: This was a single-center, retrospective descriptive study that took place in the anesthesia department of the Essos hospital center over a period of 5 years (January 2015 to December 2020). We included all the records of SS homozygous sickle cell patients who received anesthesia for laparoscopic cholecystectomy during the above-mentioned period. The variables studied were the sociodemographic characteristics, anesthetic procedure and postoperative complications.

Results: During the survey period, 72 patients met our inclusion criteria. The median age was 19.4 years. The sex ratio was 1.4 in favor of the female gender. Preoperative blood transfusion was performed in 5 patients (6.9%). The anesthetic induction procedure was classic in all participants with thiopental or propofol or ketamine associated with fentanyl and vecuronium. Intraoperative fluid resuscitation was done with ringer's lactate (61%), isotonic saline (39%). Sixty-five patients (90.3%) were extubated on the operating table. The postoperative analgesic strategy began in the operating room. We did not find any major complications in the first 24 postoperative hours.

Conclusion: Anesthesia for cholecystectomy in sickle cell patients can be performed under optimal safety conditions in an environment hostile to the practice of general anesthesia.

INTRODUCTION

Sickle cell disease has the highest prevalence rates in Africa, where there are between 150,000 and 300,000 homozygous births per year [1,2]. Despite the progress recorded in recent years in the management of these patients, the anesthetic procedure in emerging countries remains laborious, with high perioperative mortality [3]. The aim of this study was to evaluate the anesthetic management of SS homozygous sickle cell patient, candidate for laparoscopic cholecystectomy in a difficult environment for the practice of anesthesia.

METHODS

This was a single-center, retrospective descriptive study that took place in the anesthesia department of the Essos hospital center over a period of 5 years (January 2015 to December 2020). It's a high reference hospital, located in the political capital of Cameroon in central Africa. After approval by the ethics committee, the data was collected anonymously and used for exclusively scientific purposes. We included all the records of SS homozygous sickle cell patients who received anesthesia for laparoscopic cholecystectomy during the above-mentioned period. We used anesthesia records and resuscitation

records of hospitalized patients. The variables studied were the sociodemographic characteristics, biological and ultrasound data, the preanaesthetic evaluation, the installation, the monitoring, the anesthetic technique (the anesthetic agents, the induction, the maintenance and the awakening of the anesthesia, extubation), postoperative orientation and complications occurring in the first 24 postoperative hours. The data collected was analyzed using IBM SPSS statistics 20 software.

RESULTS

During the survey period, 72 patients met our inclusion criteria for a total of 6003 patients operated on at the Essos-Yaounde Hospital Center during the same period, i.e. a frequency of 1.2%. These patients were operated on electively by the same surgeon. The characteristics of the study population are shown in Table 1. The median age was 19.4 years with extremes ranging from 11 to 30 years. The sex ratio was 1.4 in favor of the female gender. The participants mostly belonged to ASA class 2 (93.1%). General anesthesia was the only anesthetic modality; it was not associated with locoregional anesthesia.

The age group of 18 to 25 years was the most represented in our sample (36.1%). Abdominal ultrasound performed in all patients allowed the diagnosis of cholelithiasis in 60 patients (83%) and acute cholecystitis in 12 patients (12.5%). All the patients had benefited from a Rhesus blood grouping, a complete blood count, a haemostasis assessment. Anemia was noted in 58 patients (80.5%). Hemoglobin levels ranged from 5.2 to 10.3 g/dl with an average of 7.1 ± 1.1 g/dl; hematocrit levels between 15.6 and 30.9% with an average of 23.2%. Preoperative blood transfusion was performed in 5 patients (6.9%). The premedication was psychological in all cases. The anesthetic induction procedure was classic (Table 2), in all participants with thiopental (5 mg/kg) or propofol (3 mg/kg) or ketamine (3mg/kg) associated with fentanyl (3 µg/kg) and vecuronium (0.1 mg/kg). Maintenance of narcosis was ensured by halothane, isoflurane or sevoflurane (Table 3).

Antibiotic prophylaxis was based on the combination amoxicillin-clavulanic acid in the majority of cases (85%), and cefuroxime for the rest. This antibiotic prophylaxis was instituted in all patients before the surgical incision. The coordination of the installation on the operating table was done by the anesthetist and the surgeon for all patients. Intraoperative fluid resuscitation was done with ringer's lactate (61%), isotonic saline (39%). Intraoperative transfusion was performed in 8 patients, i.e. 11.1%. The average duration of surgery was 55.5 minutes with extremes of 45 and 110 min, that of anesthesia was 80 min (extreme 88 and 135 minutes). Sixty-five patients (90.3%) were extubated on the operating table and three patients (9.7%) in intensive care. The majority of patients were transferred to intensive care for postoperative monitoring (95.8%). The postoperative analgesic strategy began in the operating room, before the end of the surgical procedure and was based on the combination of paracetamol and tramadol (26.4%), paracetamol, nefopam and niflumic acid (62.5%), paracetamol and tramadol (11.1%). Morphine titration was applied to all patients upon admission to intensive care. The length of stay in intensive care varied from 1 to 3 days with an average of 1.5 ± 1.2 days. We did not find any major complications in the first 24 postoperative hours.

Table 1: Sociodemographic characteristics of the study population.

Variables	Number (n)	Percentage (%)
Gender		
Male	32	44.4
Female	40	55.6
Total	72	100
Age group (years)		
<18	23	31.9
[18-25]	26	36.1
]25-64]	18	25.0
≥65	5	7.0
Total	72	100
ASA classification		
ASA 2	67	93.1
ASA 3	5	6.9
Total	72	100
Anesthetic technique		
General anesthesia (GA)	72	100
GA + Locoregional anesthesia	-	-
Total	72	100

Table 2 : anesthesia drugs and anesthetic induction

Anesthetic drug	Number (n)	Percentage (%)
Propofol	56	77.8
Thiopental	10	33.9
Kétamine	6	8.3
Total	72	100

Table 3 : Inhalative hypnotics and maintenance of anesthesia

Inhalative hypnotics	Number (n)	Percentage (%)
Sevoflurane	67	93.0
Halothane	3	4.1
Isoflurane	2	2.8
Total	72	100

DISCUSSION

The general anesthesia procedure in a patient with sickle cell disease, to prevent vaso-occlusive complications and sickling, must meet several requirements: prevention of hypoxia, hypovolemia, hypothermia and acidosis. In this study, 72 patients were included and operated on by the same surgeon. Digestive laparoscopic surgery is in full development in Cameroon. The lack of specialized practitioners for this minimally invasive surgery remains the main factor limiting its popularization in Africa [4-6]. Local solutions are set up with the opening of specialized Masters in laparoscopic surgery in the universities of Cameroon. Anesthesiologists are gradually adapting to this evolution. The only basics of anesthesia in laparoscopic digestive surgery come from the general education received during their basic specialized training. The median age was 19, with a female predominance. Cholelithiasis is rarer in children than in adults, but it can occur at any age and indifferently in both gender [7,8]. Its complications are difficult to differentiate from painful abdominal vaso-occlusive crises and they can sometimes

threaten the patient's vital prognosis. More than ¾ of the patients 80.5% (n=58) presented anemia in the preoperative period, but a small proportion benefited from a preoperative blood transfusion 8.6% (n=5). Chronic hemolysis exposes sickle cell patients to the development of pigmentary lithiasis and anemia [9,10]. The formalized recommendations of experts from many scientific societies are in favor of preoperative blood transfusion. Preoperative blood transfusion is necessary to optimize the hemoglobin level between 9 to 10 g/dl and reduce the HbS level, while reducing the risk of perioperative complications [11-13]. Reducing postoperative morbidity and mortality also requires a good preoperative transfusion strategy [14-16]. In our cohort, the psychological approach of premedication was the option adopted by the anesthetic team for all participants. The quality of information on the conduct of the anesthetic and surgical procedure aims to reduce preoperative anxiety. Modern premedication is part of a non-drug approach that aims for overall satisfaction. Anesthetic induction was standard for all patients, as these were elective surgical procedures. Propofol (77.8%) was the most used hypnotic for anesthetic induction, followed by thiopental (13.9%) and ketamine (8.3%). Fentanyl represented the only morphine used in all cases, vecuronium bromide the only curare used to facilitate intubation. Sevoflurane (93%) was the halogen most used for the maintenance of narcosis. These observations could be explained by the availability of these drugs at the pharmacy of the Essos hospital center. All anesthetic agents (narcotics, morphine and muscle relaxants) can be used in sickle cell patients according to the usual prescription rules [17-19]. The combination of amoxicillin and clavulanic acid was the molecule of choice for antibiotic prophylaxis in our study. Infection is a risk for any surgical procedure [20]. Pathogenic bacteria are found in more than 90% of surgical wounds, during closure, whatever the surgical technique and whatever the environment [20]. Antibiotic prophylaxis must include in its spectrum of action the bacteria most commonly encountered in surgical site infection [20,21]. Antibiotic prophylaxis should always be administered before the procedure within approximately 30 minutes. The latest recommendations from the French anesthesia-resuscitation society do not recommend antibiotic prophylaxis for laparoscopic biliary tract surgery in patients without risk factors. But, in sickle cell patients particularly, there is a vulnerability to infections [1,3,7]. This would justify the use of surgical antibiotic prophylaxis in these patients in an environment unfavorable to the practice of general anesthesia, to prevent severe infections. Infection, a potential cause of fever, metabolic acidosis and dehydration, can promote vaso-occlusive crises. It is also this fragility that justifies specific preventive measures such as continuous antibiotic prophylaxis with penicillin and anti-pneumococcal and anti-haemophilus vaccinations [1]. The installation of the sickle cell patient on the operating table is important in the anesthetic management. At the Essos hospital center, this action is coordinated by the anesthetic and surgical team with the anesthetist at the center to avoid complications related to posture. The installation of the sickle cell patient on the operating table is important in the anesthetic management. At the Essos hospital center, this action is coordinated by the anesthetic and surgical team with the anesthetist at the center to avoid complications related to posture. The installation of the patient with sickle cell disease on an operating table is likely to

lead to functional but also vital complications if the intervention is prolonged. An uncomfortable installation can generate transient damage, causing pain and therefore discomfort in the immediate postoperative period, including vaso-occlusive crisis. Repositioning of risk sites, treatment of hypothermia and hypotension, use of viscoelastic gels are essential measures for the prevention of cutaneous lesions in sickle cell disease. Intraoperative fluid resuscitation was provided by crystalloids, preferably ringer's lactate solution (61%). The choice of vascular replacement solution for intraoperative resuscitation seems to be random in our cohort, the main thing for the anesthetist being to ensure the prevention of hypovolemia. At the end of the anesthetic procedure, the majority of patients were extubated on the operating table and transferred to intensive care for postoperative management. Pain management was essentially based on the multimodal analgesia strategy for all patients. Morphine titration had an important place in this postoperative analgesic strategy. It was applied to all patients with sickle cell disease as soon as they were installed in intensive care. Early diagnosis, treatment, and prevention of a vaso-occlusive crisis are critical to the management of patients with sickle cell disease. Indeed, postoperative pain causes activation of the sympathetic system with increased release of circulating catecholamines, the consequence is an increase in heart rate, blood pressure and oxygen consumption. Post-operative pain management in sickle cell patient is complex and requires multiple interventions such as pharmacologic, nonpharmacologic, and preventive therapeutic interventions. Pharmacologic treatment involves the use of non-opioid and opioid analgesics, and adjuvants - either singly or in combination - depending on the severity of pain [23]. Waking up from anesthesia in patients with sickle cell disease is delicate, but does not involve any specificities [24]. The conditions to be met for optimal awakening are normoxia, normothermia, the absence of signs of morphinization and curarization [24,25]. Extubation is done after recovery of sufficient effective spontaneous ventilation, cough and swallowing reflexes [25]. The management of postoperative pain also contributes to the achievement of these objectives [23-25]. Nous n'avons pas trouvé de complications postopératoires dans les 24 premières heures de réanimation. Djomo et al. [24], found in work on postoperative complications in sickle cell patients and the factors favoring their occurrence that, the surgical technique for the abdominal procedures had a significant impact on the occurrence of post-operative complications $p < 0.05$. The type of surgery ($p = 0.198$) and the anaesthesia technique ($p = 0.225$) did not show a significant impact on the occurrence of post-operative complications [24].

CONCLUSION

Anesthesia for cholecystectomy in sickle cell patients can be performed under optimal safety conditions in an environment hostile to the practice of general anesthesia. Specific preparation for surgery, management of the pre- and intra-operative periods should focus on the prevention of hypoxia, hypothermia, acidosis and hypovolemia. Postoperative care in the intensive care unit would prevent the occurrence of postoperative complications.

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