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Original Research Article

Intraoperative Complications Related to Anesthesia for Laparoscopic Sleeve Gastrectomy at Essos Hospital Center (Cameroon)

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Abstract: ***Background:*** Obesity is defined as an abnormal or excessive accumulation of body fat that may impair health. Body mass index expressed (BMI) in kg/m2 is a simple measure of weight for height used to estimate obesity in adults. For adults, the World Health Organization defines obesity when the body mass index is greater than or equal to 30. Africa is faced with the growing problem of obesity and overweight, due to new habits food and new lifestyles. Obesity surgery has come to impose itself in our environment as a mechanical and metabolic aid to fight against this scourge which has become a public health problem. It is in this perspective that we proposed to study the intraoperative complications Related to Anesthesia for laparoscopic sleeve gastrectomy at Essos Hospital Center. ***Patients and Methods:*** This was a descriptive, retrospective and analytical study that took place over a period of 3 years, from January 2017 to December 2019, in the anesthesiology department of the Essos hospital center. All the files of the obese patients who underwent laparoscopic sleeve gastrectomy during the above-mentioned period were included in the study. The variables studied were: socio-demographic data, intraoperative anesthetic complications. The results obtained were subjected to univariate and bivariate analysis using the CSPRO and SPSS software. ***Results:*** A non-probability convenience sampling allowed us to obtain 16 patients. The age group that was mostly represented was those 36 to 55 years (81%). The sex ratio was 0.1. A body mass index > 40 kg/m^2 of body surface area was found in 38% of cases (morbid obesity). Arterial hypertension was the comorbidity frequently associated with obesity (37.5%). The surgery was long, > 6 hours in all cases. The main anesthetic intraoperative complications were difficult intubation (62.5%), arterial hypotension (43.7%) and hypothermia (75%). ***Conclusion:*** Obesity is a public health problem in sub-Saharan Africa, which remains neglected. The sleeve gastrectomy is a surgical procedure regularly performed at the Essos hospital center for several years. It is the only level 1 health facility in Cameroon that performs full-time obesity surgery. The results of this study show that complications related to anesthesia for this type of surgery exist and can be prevented. Large cohort studies should be conducted to consolidate our results.

Keywords: Intraoperative complications, anesthesia, laparoscopic sleeve gastrectomy.

INTRODUCTION

New lifestyles and eating habits in Sub-Saharan Africa expose people to obesity [1]. Obesity is defined as an abnormal or excessive accumulation of body fat that may impair health [2, 3]. Body mass index expressed in kg/m2 is a simple measure of weight for height used to estimate obesity in adults [4]. For adults, the World Health Organization defines obesity when the body mass index is greater than or equal to 30. This is a major neglected public health problem in many African countries. Among the multiple solutions brought to this new scourge which weakens the health of African populations, surgery, particularly sleeve

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gastrectomy, is positioned as the one that brings a better result. The Essos hospital center is a high reference hospital in Central Africa which regularly performs this surgical procedure. Obesity exposes the patient to anesthetic problems proportionally related to overweight [5, 6]. It increases the effect of general anesthesia on respiratory function, and represents a risk factor for cardiovascular disease and deep vein thrombosis in the postoperative period [5, 6]. Fat mass alters the pharmacokinetics of most general anesthetic agents, and their effect is less predictable and more prolonged [7]. Upper airway control is a major problem that is dominated by difficulties in tracheal intubation [7]. It is in this perspective that we proposed to study the accidents and incidents related to anesthesia for laparoscopic sleeve gastrectomy at the Essos-Cameroon Hospital Center.

PATIENTS AND METHODS

This was a descriptive, retrospective and analytical study that took place over a period of 3 years, from January 2017 to December 2019, in the anesthesiology department of the Essos Hospital Center-Cameroon. All the files of the obese patients who underwent laparoscopic sleeve gastrectomy during the above-mentioned period were included in the study. The variables studied were: socio-demographic data (age, gender, body mass index), past medical history, the clinical characteristics of the study population, characteristics related to anesthesia (ASA classification, premedication agent used, technique of anesthesia, induction agent used, maintenance agent used, duration of surgery, anesthetic complications). The dependent variable will be the occurrence of complication related to anesthesia for laparoscopic sleeve gastrectomy. Tracheal intubation was considered difficult when it required more than 10 minutes and/or more than two laryngoscopies, in the modified Jackson position, with or without external laryngeal manipulation. Anesthesia records were used to collect data on accidents and incidents related to anesthesia. The results obtained were subjected to univariate and bivariate analysis using the CSPRO and SPSS software. The main limitation of the study is the monocentric character.

RESULTS

We analyzed 3600 patient files corresponding to the number of digestive surgery operations during the recruitment period. We selected 16 files that met the inclusion criteria, i.e. a frequency of 0.4%. The age group that was mostly represented was those 40 to 65 years (81%). The sex ratio was 0.1 in favor of the female gender. A body mass index > 40 kg/m2 was found in 38% of cases (morbid obesity), the rest of the study population had a body mass index of between 35 and 40 associated with comorbidity. Three-quarters of the workforce belonged to ASA class 3. Table 1 presents the socio-demographic and clinical characteristics of the study population. Arterial hypertension was the comorbidity frequently associated with obesity (37.5%), followed by diabetes (25%) and obstructive sleep apnea syndrome (18%). Premedication was based on the IV administration of 2 mg of midazolam to all participants, in the operating room.

All study participants received the same anesthetic induction. It consisted of the administration of fentanyl (3 µg/kg), propofol (3 mg/kg) and vecuronium bromide (0.1 mg/kg). Ketamine at an antihyperalgesic dose (single bolus of 0.5 mg/kg IV) was administered in 68.8% of cases. Maintenance of analgesia was ensured by reinjection of fentanyl; narcosis was maintained by halogens in all participants. Reinjection of vecuronium was done in 87.5% of cases to ensure better muscle relaxation. Sevoflurane was the halogen preferentially used to maintain narcosis (93.8%) followed by sevoflurane (6.2%). The surgery was long, > 6 hours in all cases. All patients were extubated on the operating table and transferred to intensive care for postoperative management. The most frequent respiratory complication was difficulty in accessing the airways (table 2).

Table 1: Socio-demographic characteristics of the study population

Variable	Number (n)	Percentage (%)
Gender		
Male	1	6.3
Female	15	93.7
Total	16	100
Age Group in years		
[18 - 40]	2	12.5
[40-65[	13	81.3
≥ 65	1	6.2
Body Mass Index (kilogram/m ^{2})		
Obesity Class 1 (30-34.9)	-	
Obesity Class 2 (5-39.9)	-	
Extreme Obesity Class 3 (>40)	10	62.5
Super-obesity (IMC > 50 kg/m^2)	6	37.5
ASA Classification		
ASA 2	4	25

ASA 3	12	75
Past medical history		
High blood pressure	6	37.5
Diabetes	4	25.0
Obstructive sleep apnea	3	18.8

Table 2: Intraoperative respiratory complications

Intraoperative respiratory complications	Number (n)	Percentage (%)
Difficult intubation	10	62.5
Hypoxia	2	12.5
Hypercapnia	2	12.5
Bronchospasm	2	12.5
None	6	33.3

About cardiovascular complications, arterial hypotension was found intraoperatively in 45% of participants intraoperatively (Table 3). L'hypothermie était présente en peropératoire dans 87.5% de cas (n=14). The outcome of peroperative complications was favorable in all cases.

Table 3: Peroperative cardiovascular complication

Peroperative cardiovascular complications	Number (n)	Percentage (%)
Hypotension	7	43.7
Bradycardia	4	25
Tachycardia	4	25
Hypertension	1	6.3
None	1	6.3

DISCUSSION

Obesity is increasingly common in Africa. It is the consequence of socio-economic development and changes in lifestyle, with high consumption of caloric foods. It is a real neglected public health problem in Sub-Saharan Africa. When severe or associated with other comorbidities, it can alter the quality of life and lead to sudden death. Longitudinal gastrectomy or sleeve gastrectomy is a technique of so-called restrictive surgery which consists of removing 2/3 of the stomach, in particular the part which contains the cells which secrete the hormone stimulating the appetite. Sleeve gastrectomy is the most performed surgical procedure in the world for the treatment of morbid obesity. Anesthesia of the morbidly obese patient, especially for laparoscopic sleeve gastrectomy, is a challenge for anesthetists in developing countries, because laparoscopy is recently introduced in this working environment. Associated comorbidities, pharmacokinetic modifications of anesthetic drugs, high probability of difficult intubation, complications during the operative period and constraints related to posture and CO2 insufflation in the abdominal cavity are parameters to consider in the obese patient during the sleeve gastrectomy procedure.

In our study, we included 16 patients, mostly young and female. Studies relating to anesthesia for sleeve gastrectomy in sub-Saharan Africa are rare, probably due to an environment that is not very favorable to the practice of safe general anesthesia, and the lack of material and human resources. Lubbe J *et al.,* conducted research in 2019 that related to obesity surgery in South Africa [8]. This was a single center retrospective review of 57 metabolic surgery procedures performed from October 2011 to September 2017 at Tygerberg Hospital, Cape Town, South Africa. The primary outcome was safety including mortality and adverse events. Secondary outcomes included effect of surgery on weight and diabetes resolution. Of a total of 57 patients included in their study, the female sex predominated 81% (n=44). Sleeve gastrectomy was rarely performed [8]. Fifty-six patients (98%) underwent Roux-and-Y gastric bypass and one (2%) had a sleeve gastrectomy performed [8]. The comorbidities found in their cohort were arterial hypertension (59.6%), Type 2 Diabetes (42.1%), and dyslipidaemia (36.8%). The strong predominance of obesity in women could be explained by cultural habits, lifestyle and overweight generated by maternity in African women. Indeed, in African culture, hard work is reserved for men. The woman mainly devotes herself to activities that do not require a large energy expenditure. Moreover, in some African communities, there are practices that encourage overweight in women to guarantee marriage.

As part of weight loss surgery, the gastric bypass procedure is not performed at the Essos Hospital Center. The first experiences of obesity surgery at the Essos Hospital Center date back to 2012. It essentially involved the placement of adjustable gastric bands. The high rate of secondary ablation of these ¾ rings quickly led to this technique being abandoned in favor of the sleeve gastrectomy technique [9, 10]. In the United States and Switzerland, gastric bypass is offered as

first-line therapy, the French strategy is different and linked to the patient's body mass index. In the world two main procedures currently dominate the panel of weight loss surgery. Sleeve gastrectomy is technically easier and the most widely performed in the world [12-14]. It shows slightly inferior results and is also associated with a slightly lower morbidity compared to gastric bypass [11]. This is counterbalanced by its irreversibility and a high prevalence of postoperative gastroesophageal reflux. For this reason, gastric bypass remains the dominant procedure in Switzerland, thanks to its good long-term weight and metabolic results. But Sleeve gastrectomy still retains an important place in bariatric surgery, with some specific indications.

Among the comorbidities found in patients undergoing bariatric surgery, the majority of authors report that arterial hypertension comes first, followed by diabetes [15-18]. Choukem *et al.,* demonstrated on a work on the association of obesity and arterial hypertension in the Cameroonian population, that there is a linear correlation between the mass of adipocytes and arterial hypertension [19]. In their work on obesity and the association of cardiovascular risk factors in Lomé (Republic of Togo), Pessinaba *et al.,* showed that obesity was associated in varying proportions with other cardiovascular risk factors [20]. These were sedentary lifestyle (82%) compared to 50% in the non-obese ($p < 0.0001$), arterial hypertension (54.8% vs 39.2% $p = 0.0000002$), alcohol consumption (50.9% vs 43.9% $p = 0.04$), dyslipidemia (34.5% vs 20% $p = 0.0000001$), diabetes (30.9% 10.7% $p < 0.0001$) and tobacco (14.1% vs 20.3% $p = 0.006$) [20]. The mechanisms that explain arterial hypertension are multiple, but all contribute to increasing either cardiac output directly or peripheral vascular resistance. The discovery of the secretory capacities of the adipocyte underlines the active role of visceral adipose tissue in the genesis of arterial hypertension [21, 22]. Leptin but also adiponectin play a role in this sense [21]. Other mechanisms are involved, such as activation of the sympathetic system, inflammatory phenomena, activation of the renin-angiotensin-aldosterone system (RAAS), endothelial dysfunction or the presence of a sleep apnea syndrome. Type 2 diabetes results from insulin resistance and a reduced capacity for insulin secretion by the β cells of the islets of Langerhans. Indeed, with tissue insulin resistance, carbohydrate homeostasis is maintained through increased insulin secretion. When the β cells can no longer increase their production of insulin, blood sugar rises. Eventually, the secretory capacity is impaired and then exhausted, sometimes requiring patients to be put on insulin.

Difficult intubation was the most frequent respiratory complication, arterial hypotension and cardiac arrhythmias the most common cardiovascular complications during the intraoperative period. Very few studies report anesthetic complications during sleeve gastrectomy in sub-Saharan Africa. Mandal *et al.,* report in their work on anesthetic management for laparoscopic Gastric Bypass procedure in morbid obesity that bronchospasm was the most frequent complication in the perioperative period, followed by difficult intubation [24]. But these authors do not differentiate between complications of the operative period and complications of the postoperative period. Oxygenation maintenance is the cornerstone of airway management in the obese patient related to anatomic and pathophysiologic issues [25]. Anesthetic complications in weight loss surgery are related to physiological and pharmacological changes in the obese, and to changes induced by insufflation of carbon dioxide into the peritoneal cavity for laparoscopy. During laparoscopic surgery, carbon dioxide insufflation may produce significant hemodynamic and ventilatory consequences such as increased intra-abdominal pressure and hypercarbia [26, 27]. Hemodynamic insults secondary to increased intra-abdominal pressure include increased afterload and preload and decreased cardiac output, whereas ventilatory consequences include increased airway pressures, hypercarbia, and decreased pulmonary compliance [27]. Laparoscopic weight loss surgery procedures are recent introduction procedures in sub-Saharan Africa. The anesthetist's experience in performing laparoscopic procedures is probably an important factor correlating with the frequency of complications during this procedure [26, 28].

We found a high frequency of intraoperative hypothermia, i.e. 2/3 of the study population. Intraoperative accidental hypothermia is a classic complication of general anesthesia which promotes the occurrence of perioperative infections, bleeding and cardiovascular events, and is responsible for excess perioperative mortality [29]. Despite the documentation of means of prevention, it remains very common in sub-Saharan Africa. The aim is to maintain a core body temperature as close as possible to 36.5°C by using the warming devices in an appropriate manner. Active skin warming techniques are recommended before and during anesthesia as well as in the post-procedure monitoring room [29, 30]. Warming of perfusion fluids, labile blood products and surgical fluids is recommended [29].

CONCLUSION

The intraoperative complications of obesity surgery, in particular sleeve gastrectomy, are a reality at the Essos hospital center. They are dominated by difficult intubation, hemodynamic instability and hypothermia. The increase in the prevalence of obesity in sub-Saharan Africa and the development of obesity surgery, in particular sleeve gastrectomy, pose real problems in the management of patients with morbid obesity for intensive care anesthesiologists. In a difficult environment for the practice of general anesthesia, a good preoperative evaluation is necessary to analyze the comorbidities linked to obesity and to

anticipate the intraoperative complications of sleeve gastrectomy.

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