



Prevalence and Complications of Obesity in Surgical Patients: A Multicenter Study in Benin, a Sub-Saharan African Country

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Abstract

Objective: To provide characteristics of an obese population that underwent anesthesia and surgery in a Sub-Saharan African country.

Patients and methods: 3971 Consecutive patients presenting for surgery and anesthesia over a four months period were screened. Obesity was defined as a BMI of at least 30 kg/m². Obese patients were selected to determine the prevalence of obesity. Obese patients were followed from the intra operative period to at least the first 48 hours postoperatively. We analyzed demographic characteristics, anesthetic techniques and perioperative complications.

Results: BMI \geq 30 was found in 384 patients. The prevalence of obesity in this population was 9.67%. Prevalence of obesity was higher in women ($p < 10^{-6}$). The Mean age in obese patients was 41 years \pm 15. The mean BMI was 34.77 ± 3.38 . Mild obesity was found in 66% patients. Only 4% of obese patients had morbid obesity and there were no super-obese patients. Spinal anesthesia was used in 80% of the patients. Perioperative complications were observed in 67 patients (16%). There were cardiovascular complications (24 cases), respiratory complications (23 cases) or neurological complications (16 cases). Complications occurred more frequently during general anesthesia (26/75) than spinal (41/213). The difference was significant ($p < 10^{-6}$). The risk of complications increased with increased BMI ($p < 10^{-6}$). Conclusion: Obesity is a concern for anesthetists in Benin although severity is less than reported in occidental literature. Main risk factors for perioperative complications are increasing BMI, general anesthesia and obstetrics.

Keywords: Obesity; Anesthesiology; Surgery; Outcomes

Introduction

Obesity is a growing healthcare problem worldwide [1,2]. The anesthetic management of obese for surgery is no longer rare and has become frequent in the last two decades. Therefore, the challenges of anesthesia in this high-risk group will have to be met by all anesthetists. Obese patients may be more prone to complications in the perioperative period.

The increasing phenomenon of obesity exists in Benin, a Sub-Saharan African country [3]. However, no study has been performed in Benin to find out the prevalence, management and perioperative complications of obese patients requiring surgery and anesthesia. The aim of this study was to provide characteristics of an obese population that underwent anesthesia and surgery in a West African country.

Patients and Methods

This prospective and multicenter study was conducted in six teaching or regional hospitals in Benin. Consecutive patients presenting for surgery and anesthesia over a four months period (December 2010 to April 2011) were screened. The centers involved in the study were either public or private hospitals in Benin recognized for having a high volume of surgical activity. Bembereke hospital and Djougou hospital are located in the northern regions of Benin. Zou-Collines hospital is in the central region. Oueme-Plateau hospital, Mono-Couffo hospital and the teaching hospital of Cotonou are in the southern region. Local ethics committee of the hospitals approved this study.

Power analysis revealed that a sample size of about 3271 patients would be required to determine the prevalence of obesity using the Schwartz formula: $N = P(1-P)Z\alpha^2/i^2$.

N = sample size, P = prevalence of obesity in Benin (9.4%) [3], $Z\alpha = 1.96$, $i = 1\%$ (desired precision).

Size and weight of each patient were measured to determine the body mass index (BMI) which is equal to weight (in kg)/height² (in m²). For pregnant women, the BMI was calculated using prepregnant weight or the first weight measured at prenatal care. Obesity was defined as a BMI of at least 30 kg/m² [1]. The obese patients were classified into three groups: mild obesity (BMI = 30-34.9), severe obesity (BMI = 35-39.9) and morbid obesity (BMI > 40). Obese patients were followed during the first 48 hours postoperatively. We analyzed Age, sex, ASA physical status and Mallampati scales, anesthetic techniques and perioperative complications in obese patients. As defined by the American Society of Anesthesiologists [4]: ASA1 is a normal healthy patient, ASA 2 is a patient with mild systemic disease and ASA3 is a patient with severe systemic disease. We didn't include patients with ASA physical status 3 to 6.

Difficult intubation was defined as multiple attempts of

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laryngoscopy. Failed intubation was considered when the placement of endotracheal tube fails after multiple intubation attempts [5]. The follow up time covered intra operative period and at least the first 48 hours postoperatively. Difficult spinal was defined as at least three attempts before successful lumbar puncture. Statistical analysis was performed using Epi-info 3.2. Statistical significance was ascertained using the χ^2 -test and p value was set to $p = 0.05$.

Results

Prevalence of obesity

During the study period, 3971 required surgery and anesthesia. There were 2826 women and 1145 men. BMI ≥ 30 was found in 384 patients. The prevalence of obesity in this population was 9.67%. Prevalence of obesity was higher in women (11%) than in men (6%). The difference was significant ($p < 10^{-4}$).

Obese patient's demographics

The Mean age was 41 years \pm 15 with extremes from 17 to 75 years. The mean BMI was 34.77 ± 3.38 . Moderate obesity was found in 66% patients; severe obesity in 30% and morbid obesity in 4%. There were no super-obese patients.

Obese patients were operated for obstetrics (57%), for abdominal surgery (20%), for gynecologic surgery (13%), orthopedic surgery (8%), urologic surgery (1%) and ENT surgery (1%). Emergency cases were 55%. Bariatric surgery was not performed in any patients.

ASA2 score was found in 79% patients and ASA3 in 21%. Difficult intubation was predictable in 23% patients (Mallampati scale ≥ 3).

Anesthetic management in obese patients

Intra operative monitoring consisted of non invasive blood pressure for all patients. Pulse oxymeter was used in 97% patients. ECG monitoring was used only in 3% patients. Capnography and residual muscle paralysis were not monitored in any of the patients.

Spinal anesthesia was the most widely used technique (80%) (Table 1). Lumbar puncture was difficult in 15% patients and failure of spinal anesthesia was observed in 2% patients requiring conversion into general anesthesia.

Seventy five patients had general anesthesia and tracheal intubation was performed in 71 patients. Anesthesia was induced using Thiopental (76%), Ketamine (15%) or Propofol (9%). Intubation was facilitated by Suxamethonium (76%), Pancuronium (16%) or the Rocuronium (3%). Difficult intubation occurred in 20% patients. Among patients under general anesthesia, ventilation was either manual (67%) or spontaneous (21%). Only 12% patients under general anesthesia had controlled ventilation.

Postoperative care

Postoperatively, 46% of the patients were admitted in intensive care and 14% into recovery room. Forty percent of the obese patients were directly admitted into the surgical ward. Postoperative management consisted primarily of oxygen delivery to all patients, analgesia (84%). Venous Thromboembolism prevention consisted of early mobilization in 86% and low-molecular-weight heparin (LMWH) was used in 21%. Postoperative non invasive ventilation was used only in 2 patients after general anesthesia. No obese patient had postoperative respiratory physiotherapy.

Perioperative complications

Perioperative complications were observed in 67 patients (16%). There were cardiovascular complications (24 cases), respiratory complications (23 cases) or neurological complications (16 cases). The complications were more frequent during general anesthesia (26/75) than spinal (41/213) and difference was significant ($p < 10^{-4}$). Incidence of complications increased with increased BMI (Table 2).

We observed two intraoperative deaths all related to emergent obstetrical patients. The first death was due to a severe postpartum hemorrhage. The second death occurred after a failed intubation during a general anesthesia for an emergent cesarean section. General anesthesia was indicated because the patient was shocked and unconscious.

Discussion

This prospective observational study was not a national survey nor a comparative study in obese and non obese patients. However, it covered a representative sample of the anesthetic practice in Benin. The prevalence of obesity in surgical patients in our study was 9.67%. This prevalence was comparable with the prevalence of obesity in the general population in Benin [3]. The prevalence found in our study was lower than that found by Dindo et al. [6] in a study involving 6336 surgical patients. The prevalence of obesity was 13%. Irrespective of this finding, obesity may constitute an important concern for anesthetists in Benin.

The higher female prevalence of obesity seen in this study has been reported in many studies [1,7,8].

The severity of obesity was also less important than reported in occidental literature. Only 4% of the obese patients in our study had a morbid obesity and no patient had a super morbid obesity (BMI > 50). Sinha et al. [9] in Pennsylvania in the USA, found 8% of surgical

Characteristics	N (%)	
	Male	Female
Sex	74 (19)	310 (81)
BMI (kg/m ²)	30 - 34.9	255 (66)
	35 - 39.9	113 (30)
	40 - 49.9	16 (4)
	GATI	71 (18)
Anesthetic Techniques	GAFM	4 (1)
	Epidural	3 (1)
	Spinal	306 (80)

Data are shown as number (%)
GATI: General Anesthesia with Tracheal Intubation; GAFM: General Anesthesia with Facial Mask

Table 1: Patients demographic and anesthetic characteristics.

Characteristics	Complications		P
	Yes	No	
BMI			
30 - 34.9 n = 255	29 (11)	226 (89)	10^{-4}
35 - 39.9 n = 113	25 (22)	88 (78)	
40 - 49.9 n = 16	13 (81)	3 (19)	
Anesthetic techniques			
General anesthesia n = 75	26 (37)	49 (63)	10^{-4}
Regional anesthesia* n = 309	41 (13)	268 (87)	

*Regional anesthesia: spinal and epidural

Table 2: Relationship between BMI, type of anesthesia and complications.

patients with BMI higher than 40 kg/m² and 1.8% were super morbid obese. The less severity of obesity in our sample can be explained by the absence of bariatric surgery in the hospitals where the survey was carried out. Bariatric surgery may be performed in morbid or super morbid obese patients. Bariatric surgery is quite exceptional in Benin.

The predominance of obstetrics found in the study corresponds to the epidemiology of surgical operations in Benin where the majority of surgeries and anesthetics are performed in obstetrics. Therefore this finding may not be specific to obese population. Moreover, there is a high incidence of obesity in black African parturient having cesarean section [10].

The most widely used anesthetic technique was spinal anesthesia. It is the most frequently used regional anesthesia in Benin. The practice of the peripheral blocks is rarer. In our context of limited resources, the practice of regional anesthesia may offer more safety than general anesthesia. Thus, we observed twice more complications with general anesthesia compared to spinal anesthesia. The difference was significant ($p < 10^{-5}$).

Occurrence of complications was also correlated to BMI. Thus, the incidence of complications was three times higher in the group of the patients with a severe obesity when compare to the group of moderately obese patients. This incidence of complications was eight times higher among morbidly obese patients. The difference was significant ($p < 10^{-6}$).

Intubation seems to be a major concern in morbidly obese patients. Lundstrom et al. [11] in a cohort study of 91,332 consecutive patients scheduled for direct laryngoscopy registered in the Danish anesthesia database found that high BMI is a weak but statistically significant predictor of difficult and failed intubation. In this study, difficult intubation occurred in 20% of the patients and a failed intubation in one patient. Juvin et al. [12] found that difficult tracheal intubation is more frequent in obese than in lean patients. In their study, the rate of difficult intubation was 15.5% in the obese patients and 2.2% in the lean patients.

Obesity is a risk factor for anesthesia-related maternal morbidity and mortality. In the anesthesia chapter from "saving mothers' lives" [13], there were six women who died from problems directly related to anesthesia. Obesity was a factor in four of these women. In our study, the two deaths in obese patients occurred in obstetrics. One of the deaths was due to a failed intubation. Airway difficulty was not recognized before induction of general anesthesia for emergent cesarean.

Conclusion

Obesity is a concern for anesthetists in Benin although its severity may be less than that reported in literature. Perioperative complications are frequent. Main risk factors identified in this study were increasing BMI, general anesthesia and obstetrics.

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