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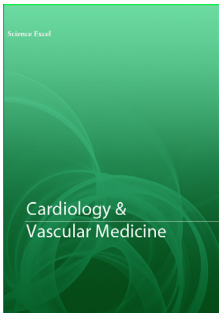

Cardiovascular Profile And Risk of Patients During Non-Cardiovascular Surgery Scheduled at Sylvanus Olympio University Hospital in Lome

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Abstract

Objective: To describe the cardiovascular profile and the preoperative cardiovascular risk stratification prior to scheduled non-cardiac surgeries at CHU SO.

Materials and methods: This is a retrospective and descriptive study on the records of patients received in consultation in the Cardiology and anesthesia departments of the CHU-SO of Lomé from March 2014 to October 2019.

Results: A total of 220 patient records were selected. The mean age was 57.1±14.4. In 81% of cases, these are minor predictors; intermediate predictors are found in 9.1% of cases and in 1.4% they are major factors. Patients were classified as ASA1 (50.0%), ASA 2 (39.1%), ASA 3 (9.6%), and ASA4 (41.3%). As age increased, patients had a major predictor factor or were classified as ASA3 and ASA4. The predictors of minor operative risk were hypertension (70.3%) followed by age correlated with sex (48.2%) in men, metabolic syndrome (21.8%), and left ventricular hypertrophy (LVH) (21.0 %). Intermediate predictors were dominated by diabetes (9.1%), chronic myocardial ischemia (6.8%), and RI (4.5%). Patients with diabetes (9.1%) or morbid obesity (7.7%) were classified as ASA3 Heart failure (1.4%) and renal failure (4.5%) classified patients as ASA4.

Conclusion: The predictors of cardiovascular risk for NCS are multiple and are observed in the same patients. The overall operative risk is moderate to medium.

Introduction

Cardiac complications remain the leading cause of morbidity after non-cardiac surgery (NCS) and are not exclusive to major surgeries [1]. About 3.9% of patients worldwide will develop a major perioperative cardiac event [2]. In Sub-Saharan Africa, the operative risk is reported to be 20 times higher than in Europe, and is related to a poor evaluation of cardiovascular and anesthetic risk» [3]. This perioperative risk increases with the patient's cardiovascular risk level [4]. However, cardiovascular diseases (CVDs) have become a public health problem throughout Africa. In Togo, early perioperative mortality was 5.49% for NCS in 2008 and 70% of identified complications were cardiovascular [5].

The evaluation of the cardiac risk during preoperative explorations remains a real medical issue and is therefore essential. The objectives of this study were to describe the cardiovascular profile and to evaluate the preoperative cardiovascular risk of NCSs in the Cardiology and Anesthesia-Intensive care departments of the Sylvanus Olympio University Hospital (CHU SO).

Method

This was a cross-sectional study of the records of patients received in consultation in the Cardiology department of the CHU-SO over a period of 4 years 8 months (March 2014 to October 2019). Patients were referred by the Anesthesia- Intensive Care department. Included in this study were the records of patients of both sexes and aged over 18 years who came to a cardiology consultation for a preoperative checkup (POC). Patients were classified according to operative predictors and the American Society of Anesthesiologists (ASA) Classification [6-9]. We identified the following data from the patients' records:.

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Epidemiological and clinical data

Patient history with emphasis on cardiovascular risk factors (CVRFx); anthropometric and hemodynamic constants (blood pressure, heart rate, respiratory rate, arterial oxygen saturation, weight, height); physical examination data, especially cardiovascular examinations. We used the 2018 World Health Organization (WHO) classification to calculate the body mass index (BMI) and classify obesity [10].

Electrocardiogram (ECG)

The analysis focused on the search for rhythm or conduction disorders, signs of myocardial ischemia or myocardial necrosis, and left ventricular overload abnormalities.

Frontal chest X-ray

We noted the following particularities: the presence of cardiomegaly, the existence of atelectasis or pneumopathy.

Transthoracic cardiac echodoppler (TTE)

The abnormalities considered were those provided by the interpretation. We were interested in the measurements taken by the cardiologists who performed the examinations.

Biological examinations

Renal insufficiency (RI) was defined as responsible for a significant operative risk (8% mortality) for a blood creatinine level ≥ 200 µmol/L or 22.6mg/l [11]. Diabetes was defined by personal history (ATCD) of diabetes or a venous blood glucose level ≥ 1.26g/l on two occasions in the fasting state; dyslipidemia was defined as total cholesterol ≥ 2.66 g/l, or LDL cholesterol 1.7g/l, or hypertriglyceridemia >1.64 g/l; HIV infection status is requested and confirmed before surgery.

Statistical data processing and analysis

The collected data were reviewed, coded and entered with Excel and Word software. Figures and tables were created using Microsoft Excel. Data analysis was done using R software, and Epi-info 7.2.6. The results were presented as proportions for qualitative variables and as means ± standard deviation and medians + extremes for quantitative variables. The prevalence of abnormalities was presented with its 95% confidence interval (95% CI).

Ethical considerations

Confidentiality was ensured by restricting access to the files and respecting anonymity. The heads of the Anesthesia-Intensive care and Cardiology departments were the initiators of this work and had participated in this study.

Results

Epidemiological data: age and sex

In total, 220 patients were selected out of 4800 patients received during this period, i.e. 4.6% of the consultants. The mean age was 57.1 ± 14.4 years with a female /male sex ratio of 1.2.

Cardiovascular factors predictive of operative risk

CIn our series, 60% of patients had at least 2 CVRFx. More than 26% had grade 2 hypertension and 30% had grade 3 hypertension.

As shown in Table I, patients had a minor operative risk factor in 81%, an intermediate factor in 17.6%, and a major operative risk factor in 1.4%. Hypertension was the primary predictor of minor operative risk (70.3%), followed by age correlated with sex (48.2%) in men, metabolic syndrome (21.8%), and left ventricular hypertrophy (LVH) found in 21% of cases. Intermediate predictors were dominated by diabetes (9.1%) and RI (4.5%).

Patients with an intermediate and/or major predictor were more in the 60-80 age groups. Thus, the older the patient, the higher the level of operative risk as shown in Table II.

Table I: *Distribution of patients according to predictive factors*

PREDICTIVE FACTORS	NUMBER	%
Minors	178	81
Age > 70	39	17.7
Age > 45 (Men)	106	48.2
Age > 55 (Women)	50	22.7
Hypertension[a]	155	70.4
Smoking	18	8.1
Dyslipidemia	41	18.6
LVHb	46	21
BB[c]	32	19.3
Metabolic syndrome	48	21.8
HIV[d]	2	0.9
Intermediates	39	17.6
Stroke[e]	9	4.1
Diabetes	20	9.1
Renal insufficiency (creatinine > 200 µmoL/L)	10	4.5
Ischemia	12	5.5
Majors	3	1.4
Decompensated heart failure	3	1.4
Malignant arrhythmias	0	0

a Hypertension, b Left ventricular hypertrophy, c Branch block, d Human Immunodeficiency Virus, e Stroke

Table II : *Distribution of predictive factors by age groups.*

Age groups (years)	0 Factors (n = 19)	Minors (n = 178)	Intermediates (n = 20)	Majors (n = 3)	Total
< 20	5 (26.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5
[20-40[	5 (26.3%)	13 (7.3%)	6 (30.0%)	0 (00%)	24
[40-60[	9 (47.4%)	80 (44.9%)	4 (20%)	1 (33.3%)	94
[60-80[	0 (00%)	77 (43.3%)	10 (50%)	2 (66.7%)	89
≥ 80	0 (00%)	8 (4.5%)	0 (0.0%)	0 (0.0%)	8

Table III : *Distribution of patients according to the ASA classification by age group.*

Age groups (years)	**ASA 1 n=111 (%)**	**ASA 2 n=80 (%)**	**ASA 3 n=26(%)**	**ASA 4 n=3 (%)**	**Total N=220 (%)**
< 20	5 (4.5)	0 (0.0%)	0 (0.0)	0 (0.0)	5 (2.3)
[20-40[	11 (10.0)	6 (7.5)	0 (0.0)	0 (0.0)	17 (7.7)
[40-60[	49 (44.1)	40 (50.0)	10 (38.5)	1 (33.3)	100 (45.5)
[60-80[	46 (41.4)	32 (40.0)	10 (38.5)	2 (66.7)	90 (40.9)
≥ 80	0 (0.0)	2 (2.5)	6 (23.0)	0 (0.0)	8 (3.6)
Total N=220 (%)	111(50.4)	80(36.4)	26(11.8)	3(1.4)	220(100)

The American Society of Anesthesiologists (ASA) classification

Of the 220 patients, 50.0% were classified as ASA1 and 39.1% were ASA2 in our series. ASA 3 and ASA 4 patients were between 60 and 80 years of age in 50% and 56.7% of cases, respectively. According to the results summarized in Table III, age seems to be proportional to ASA stage.

In our practice, no patient benefited from myocardial revascularization or preoperative stress test due to lack of technical facilities.

Discussion

Predictors of minor operative risks (perioperative injury rate less than 0.7%) and ASA 1 – ASA 2 classes

The mean age was 57 ± 14.4 years, which could be explained by the health insurance of civil servants. Since 2011, there is a health insurance for Togolese civil servants and this insurance covers the NCS.

Among our patients, 70.3% had a history of hypertension. Schotte et al in 2016 in France had 11% of hypertensives in their study [12]. The high prevalence of hypertension in the black race is further confirmed.

If hypertension is among the minor risk predictors, the blood pressure level of our patients was an additional risk. Indeed, more than 30% had a grade 3 hypertension under treatment. In addition, the hypertensive patient is at high risk of complications, because on the one hand the hypertensive patient under anaesthesia is poorly protected against a dysregulation of hypertension [13] and on the other hand he presents an increased risk of occurrence of silent ischemia during surgery under general anaesthesia [14]. In addition, hypertension is an aggravating factor and an independent factor of perioperative excess mortality, especially if it is associated with another risk factor [15].

Smoking, a major CVRFx, is among the minor operative risk factors. It was found in 8.1% of our series. Although it is one of the minor predictors of surgery, smoking in the hours before or immediately after surgery is strongly not recommended [16].

Dyslipidemia was present in 18.6% of our patients. This is a complex problem both in terms of individual behavior and the quality of the oils available on the market. This dyslipidemia will promote atherosclerosis with coronary heart disease.

LVH and predominantly left bundle branch blocks are also classified as minor operative risk factors. These are frequently encountered abnormalities that pose a significant risk to patients and should be considered in POCs. The systematic realization of an ECG within the framework of a POC in our contexts of poverty may seem like an additional burden to the patient. But in reality, it is often an opportunity for many patients, even those with major cardiovascular risk factors, to do a first ECG. However, the latter represents the minimum of inexpensive cardiovascular exploration, very accessible and which provides rich medical information, particularly cardiological. This prescription is more systematic when the patient already has another minor risk parameter. It should be noted that more than 90% of ECGs were prescribed to patients during the anaesthetic consultation.

For HIV, carriers have a 1.5 times higher risk of heart attack than the corresponding uninfected population [17].

The metabolic syndrome can be considered as the antechamber of CVD and predisposes the patient to an accumulation of factors and to an advanced stage of the ASA classification or risk predictor.

Intermediate operative risk predictors and ASA 2-ASA 3 stages (complication rate between 1 and 6%)

Obesity represented 21.8% of the patients among whom we had 6.4% of morbid obesity. This obesity leads to the classification of patients at higher perioperative risk in ASA3. However, such obesity is frequently associated with other CVRFx. Among these other risk factors, diabetes occupies a prominent place.

Today, diabetes is considered a true pandemic. According to the WHO, there will be more than 300 million diabetics in sub-Saharan Africa by 2025 [18]. It is therefore clear that the diabetic is not only at high cardiovascular risk, but also present a spontaneously high risk of up to 6% of perioperative complications for a NCS. In addition, the presence of diabetic neuropathy increases the risk of high perioperative blood pressure instability [19]. In reality, the diabetic is the patient who is more likely to have all the intermediate operative risk parameters: silent ischemia, myocardial infarction (MI), RI, stroke, in short, diabetic micro and macroangiopathy.

In our series, significant RI represented 4.5% of case. Normal creatinine in cardiac surgery exposes the patient to an operative mortality risk of less than 2% [11]. Age and other factors (hypertension, diabetes) found in the patients in our series would explain this frequency of RI. RI is a risk factor for all-cause mortality [20].

Stable coronary patients, patients with angina pectoris or history of uncomplicated MI, are classified as intermediate risk patients. We had no patients with stable angina or angina after coronary syndrome referred for POC. ECGs reported a 6.8% rate of asymptomatic myocardial ischemia and necrosis. This is likely an underestimate. And this is a worrying situation for safety in anesthesia. In Côte d'Ivoire and Senegal, ACS is the primary reason for admission to the cardiac intensive care unit (CICU) [21] because these capitals have true coronary intensive care units. According to Pio et al. in 2017 in the Cardiology department of the CHU SO, patients come to consult at a very advanced stage of decompensated ischemic heart disease with an average diagnostic delay of ACS of 42 days [22].

Major risk predictors and ASA stage 4 (complication rate greater than 6%)

These are patients with cardiovascular decompensated heart failure (HF), unstable angina and treatment-refractory rhythm disorders.

Concerning cardiac rhythm disorders, their refractory character should be affirmed by the clinic and the Holter ECG. Also, a rhythm disorder occurring during the operative period should not be overlooked, as it may be a marker of myocardial injury. Therefore, the use of Holter ECG should be encouraged if the surface ECG is suspicious.

Clinically we had 1.4% of patients with CI. The cardiac echo-doppler completion rate was 25.0% (n=55) and in 25.5% of cases, the TTE was normal. We had 1.8% dilated cardiomyopathy (DCM). This rate of DCM could be higher if more patients had performed TTE. In fact, the use of TTE is justified when the patient is not stabilized in terms of hypertension, coronary signs, abnormalities on the ECG and frontal chest X-ray. It is also appropriate when treatment is poorly tolerated or does not result in a stable clinical state. Additional examinations to complete the evaluation of the patient are also most often left to the discretion of the cardiologist, especially since they are still discussed. [1,6-9]

International recommendations and our practices

No preoperative cardiological investigation is currently recommended for patients with a single isolated stabilized minor cardiovascular risk factor [1,6-9]. But it should be noted that each minor risk prediction parameter is weighted by a risk between 0 and 0.7%; therefore, the accumulation of these factors increases the level of operative risk. The most informative examination is the evaluation of exercise tolerance (functional capacity/stress test) [23].

Patients with intermediate risk, asymptomatic and/or with good functional capacity (≥ 4 MET) and patients eligible for urgent surgery do not require further mostly invasive investigations [24]. Indications for functional cardiology evaluation are currently limited to patients with intermediate cardiovascular risk, symptomatic and/or with a functional capacity <4 METs (or not evaluable). The rate of myocardial ischemia, CI and cerebrovascular events increases from 10% above 5 MET to 20% below 4 MET. The risk of cardiac complications increases by 2.7 times between an independent and a totally dependent patient [25].

Indication for coronary angiography in ACS is possible before major-risk surgery or in the presence of <3 clinical risk factors and before intermediate-risk surgery [1,25].

Patients scheduled for NCS with intermediate and major operative cardiovascular risks and classified as advanced ASA stages (≥ASA3) underwent surgery on the basis of clinical evaluation, ECG, cardiac echodoppler, and biology. Some were re-evaluated in the short term (3 to 6 weeks) after appropriate medical treatment.

Although it has significant limitations, the Lee index is still considered to date to the best predictive index of cardiovascular risk prior to scheduled NCS, and its use in preoperative risk stratification is still recommended [19]. But our precarious technical platform does not allow its use in this study. We used the ASA classification and predictive factors that were analyzed either in isolation or in combination.

In the absence of being able to practice ergometry in our context with a limited technical platform and low purchasing power, we can calculate the distance covered during 06 minutes of walking. Patients who walk more than 560 m do not require any preoperative investigation, while those who walk 400 m in 06 minutes or more are at high operative risk and require appropriate care [1]

Reducing the prevalence of perioperative complications starts with a better knowledge of CVRFx, the operative risk, and then with the implementation of measures to control them [3]. The initial evaluation of the level of cardiovascular risk is therefore the essential prerequisite for pre, per, and post-operative care. Professional practices relating to the perioperative care of NCS patients must be reviewed and adapted in our country and in a multidisciplinary way for better anesthetic and operative safety of our patients.

Conclusion

OPerioperative cardiovascular complications occurring during NCS are an important cause of morbidity and mortality. It is often a drama leading to a lawsuit in the West, and to speculation of all kinds in Black Africa.

In addition to the weakness and inadequacy of our technical platform to international recommendations, patients scheduled for NCS at the CHU SO of Lomé have predictive factors of intermediate and major operative cardiovascular risks and are classified at moderate to medium stages of the ASA. The parameters of these risks are multiple and observed in the same patients. There are non-modifiable factors such as age. The modifiable factors are hypertension, diabetes, obesity, smoking, heart rhythm disorders, chronic myocardial ischemia, ACS, CI and RI.

In terms of medical practices, some non-invasive cardiological explorations such as stress tests with VO2Max should be included in patients with an intermediate or major preoperative cardiovascular risk.

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