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Preoperative Cardiovascular Risk Assessment Prior Non Cardiac Surgery: A Case Series of Patients Undergoing Urological Surgery in Ngaoundere, Cameroon

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Abstract

Background and objective: Preoperative cardiovascular risk control is critical to reducing the frequency of perioperative cardiovascular events and improving the survival and quality of life of surgical patients. This study aimed at assessing preoperative cardiovascular of patients undergoing urological surgery in Ngaoundere, Cameroon. **Methodology:** A cross-sectional study was carried at the urological surgery department of the Ngaoundere Islamic Clinic. Participants' sociodemographic, clinical and biological data were collected and analyzed using Sphinx V5 software. **Results:** A total of 58 patients were included in the study. Their mean age was 61.33 ± 16.16 years. The most represented age group was the one over 70 years (34.50%). In total, 50 (86.20%) patients had low risk surgical procedures and 20 (34.5%) patients had poor functional capacity. Lee score was calculated for all patients with low functional capacity. Of these patients, 17 (85%) had a low risk of cardiovascular events. **Conclusion:** The present study reveals a low preoperative cardiovascular risk in urological surgery in Ngaoundere, Cameroon; however, this observation does not exclude the need of systematic evaluation of preoperative cardiovascular risk for better prevention of postoperative complications, in surgical setting in our context.

Keywords

Cardiovascular Risk Factor, Preoperative Risk, Urologic Surgery

1. Introduction

Cardiovascular diseases are the leading cause of death worldwide and the prevalence of their risk factors is increasing sharply in developing countries [1]. The typography and frequency of these risk factors vary according to the particular characteristics of the populations concerned. In surgical setting, for example, age and type of surgery have been shown to significantly influence the risk of a serious cardiovascular event or other complications in the perioperative period [2] [3]. Each year worldwide, 500,000 to 900,000 patients experience a major perioperative cardiac complication such as myocardial infarction, non-fatal cardiac arrest and death [4]. In the U.S., 27 million patients undergo surgery each year and of these, approximately 8 million have coronary disease or cardiovascular risk factors [5]. Preoperative cardiovascular risk control is critical to reducing the frequency of perioperative cardiovascular events and improving the survival and quality of life of surgical patients [6]. According to the joint recommendations of the American College of Cardiology (ACC) and the American Heart Association (AHA), preoperative cardiovascular risk assessment should be systematic and consider both the risk factors associated with the planned surgery and those associated with the patient [7]. This systematic assessment remains a major challenge for many developing countries such as Cameroon. In some regions, the scarcity or non-existence of available data on preoperative cardiovascular risk assessment confirms the fact that prevention of cardiovascular events in surgical setting needs to be improved. The objective of the study was to assess preoperative cardiovascular risk in urological surgery in Ngaoundere. This is to our knowledge a pioneering exploration of this subject in the northern regions of Cameroon.

2. Materials and Methods

Type of study, period and study population

This was an analytical cross-sectional study conducted from September to December 2018 at the Ngaoundere Islamic Clinic, in the city of Ngaoundere in Cameroon. The study population consisted of patients admitted for urological surgery. All patients aged 20 years and above who were scheduled for imminent urological surgery and who agreed to participate in the study were included. Only non-consenting patients were not included.

Study Variables and Data Collection

The variables studied were sex, age, surgical indication, surgical risk, functional capacity and Lee score. Data on these variables were collected through a semi-structured questionnaire from the participants interviewed during the medical visits and from their medical records. Surgical risk, functional ability and Lee's index were assessed according to the joint recommendations of the ACC and the AHA [8].

Surgical Risk Assessment

Surgical risk was considered **low** (<1% cardiac events) for endoscopies, in-

termediate (1% - 5% cardiac events) for prostate surgery, and **high** (>5% cardiac events) for cystectomies [9].

Evaluation of the functional capacity of the participants

The functional capacity was estimated at:

- 1 metabolic equivalent (MET) in patients with very limited physical activity and bedridden patients,

- 1 - 4 METs in patients, who are independent of activities of daily living or able to walk flat for 100 metres,

- 4 - 10 METs in patients capable of climbing two stairs or running a short distance and ≥10 METs in patients capable of vigorous physical activity [9].

Determination of the Lee Index

Lee's index was determined from the number of clinical risk factors including history of coronary heart disease, history of heart failure, history of cerebrovascular disease, insulin-dependent diabetes, renal failure with creatinine > 175 µmol/L, and surgery at high risk of complications [10]. Lee's index was considered to be:

- **Class I** for patients with no clinical risk factors (Incidence of major cardiovascular complications = 0.4%),

- **Class II** for those with 1 clinical risk factor (Incidence of major cardiovascular complications = 0.9%),

- **Class III** for those with two clinical risk factors (Incidence of major cardiovascular complications = 7%),

- **Class IV** for those with more than two clinical risk factors (Incidence of major cardiovascular complications = 11%).

Classification of postoperative complications

Postsurgical complications were classified according to the Modified Clavien System [11] as follows:

- **Grade 1**: Postoperative complications without the use of drugs (other than those listed below) or surgical, endoscopic or radiological procedures. Medications such as antiemetic, antipyretics, analgesics, diuretics, electrolytes are allowed, as well as physiotherapy. This grade also includes opening the wound for drainage of a subcutaneous abscess at the patient's bedside.

- **Grade 2**: Complication requiring drug treatment, including blood/plasma transfusion or unplanned introduction of parenteral nutrition.

- **Grade 3**: Complication requiring surgical, endoscopic or radiological intervention in other than general anaesthesia, Complication requiring surgical, endoscopic or radiological intervention in general anaesthesia.

- **Grade 4**: Vital complication requiring an intensive care stay including dysfunction of a single organ (including dialysis) or multiple organs.

- **Grade 5**: Death of the patient.

Data Analysis

The data were analysed using Sphinx V5 software. The Chi-square test was used to look for the relationship between preoperative cardiovascular risk indicators and postoperative complications. The results were considered significant

for p values less than 0.05. The results were considered significant for p values less than 0.05.

Ethical Considerations

The study was authorized by the Ethics Committee of the University of Ngaoundéré (Ref. N° 2018/064/UN/DFS/CD-SBM).

3. Results

Sex, age and operative indications

A total of 58 subjects aged between 20 and 104 years, 53 men (91.40%) and 5 women (8.60%) were included in the study. The average age of this population was 61.33 ± 16.16 years. Surgical indications were dominated by benign prostatic hyperplasia (47.40%), urethral stricture (17.50%) and prostate cancer (10.50%). These indications are presented in Table 1 (Figure 1).

Preoperative cardiovascular risk indicators and postoperative complications

The majority of participants (86.20%) had undergone low-risk surgery; 34.5% (n = 20) of these participants had low functional capacity and 41.4% (n = 24) had moderate functional capacity. Postoperative complications occurred in 52 (89.7%) of the participants. According to the modified Clavien classification, almost all (86.2%) of these complications were Grade I (Table 2).

Table 1. Distribution of participants according to operative indications and preoperative cardiovascular risk indicators.

Variables		All (n = 58)	%
Operating indications			
	Benign prostatic hypertrophy	27	46.5
	Urethral Stenosis	10	17.2
	Prostate Cancer	6	10.3
	Caliceal lithiasis	5	8.6
	Bladder tumour	3	5,2
	Vesical vagina fistula	2	3.4
	Bladder lithiasis	1	1.7
	Other indications	4	6.9
Risk of surgery			
	Low	50	86.2
	Intermediate	8	13.8
Low functional capacity			
	Low	20	34.5
	Moderate	24	41.4
	High	14	24.1
Lee Index			
	Class I	17	85
	Class II	3	15

Table 2. Distribution of participants according to preoperative cardiovascular risk indicators and severity of postoperative complications.

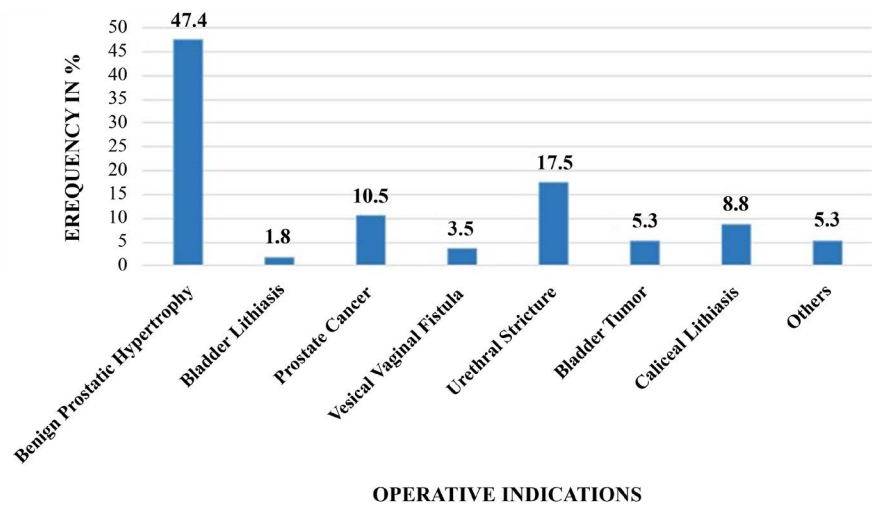| Variables	Grade I (n = 50)		Grade II (n = 1)		Grade III (n = 1)		None (n = 6)		P
	N	%	N	%	N	%	N	%	
Risk of surgery									
Low	44	88.0%	1	2.0%	0	0.0%	5	10.0%	0.086
Intermediate	6	75.0%	0	0.0%	1	12.5%	1	12.5%	
Functional capacity									
Low	18	90.0%	1	5.0%	0	0.0%	1	5.0%	
Moderate	22	91.7%	0	0.0%	0	0.0%	2	8.3%	0.251
High	10	71.4%	0	0.0%	1	7.1%	3	21.4%	

Test performed: Chi-Square test.

Figure 1. Distribution of participants according to operative indications.

Distribution of participants according to preoperative cardiovascular risk indicators (risk of surgery, functional capacity) and severity of postoperative complications is presented in Table 2.

Regarding Lee index, it was calculated on 20 patients, 17 (87.5%) of whom had a class I index and only 3 (12.5%) a class II index.

4. Discussion

Sex, age, and operative indications

A total of 58 subjects participated in this study. Their mean age was 61.33 ± 16.16 years. This mean age is identical to that reported by Sabate *et al.* in a study of 23,136 patients admitted for urological surgery in Spain [12]. Several studies have shown that the proportion of elderly people is higher in urological surgery than in other specialties [12] [13], probably due to the increase in the prevalence

of surgical urological conditions with age. The majority of participants (91%; n = 53) were male. This proportion is close to the 87.5% reported by Sabate *et al.* [12].

The predominance of men among patients admitted to urological surgery could be explained by the fact that, in addition to urinary tract diseases common to both men and women, urology also deals with diseases of the male genital system, whereas diseases of the female genital system are treated in other specialties. As examples, benign prostatic hyperplasia (46.60%; n = 27) and prostate cancer (17.20%; n = 6), which exclusively affect men, were the most frequent surgical conditions in the study population.

Preoperative Cardiovascular Risk Indicators

Anaesthesia and surgery are physiologically stressful invasive procedures that can exacerbate underlying disease processes and lead to serious cardiovascular complications such as myocardial infarction, pulmonary embolism and stroke. For this reason and for preventive purposes, it is important to perform a preoperative cardiovascular risk assessment.

Risk associated with surgery

According to the ACC and AHA, high cardiovascular risk surgical procedures result in an incidence of perioperative cardiac events greater than 5%, while those with intermediate and low cardiovascular risk result in incidences of 1% and 5% and less than 1%, respectively [7]. In this study, no patients underwent a high-risk procedure. The proportions of participants who underwent low and intermediate risk procedures were 86.20% and 13.80% respectively. These results differ from those reported by Abbas *et al.* in a study of patients with proximal femur fractures, all of whom were scheduled for intermediate-risk surgery [14]. They also differ from those reported by Xu *et al.* who estimated intermediate and high risk in 67.9% and 32.1% of patients receiving non-cardiac surgery in five major Chinese surgical centres, respectively [15]. The context of the present study is therefore marked by the frequent use of endoscopic surgical procedures recognized as having a low preoperative cardiovascular risk.

Functional capacity

The preoperative functional capacity is a known indicator of the risk of perioperative cardiovascular events [10]. Indeed, patients with low functional capacity have a high risk of perioperative mortality because they have a low cardiovascular reserve to support stressful operations, whereas those who are able to exercise regularly without limitations generally have a high cardiovascular reserve to support stressful operations. In the present study, 34.5% (n = 20) of the participants had a low functional capacity. This proportion is much higher than that reported in other studies [15] [16]. Xu *et al.* reported low functional capacity in 13.6% of patients undergoing non-cardiac surgery in China [15]; Davenport *et al.* reported the same indicator in 17% of American patients [16]. This difference may highlight the fact that in urological surgery the prevalence of low functional capacity is high compared to other specialties. Indeed, in our study, the majority of patients with low functional capacity were those suffering from

benign prostatic hyperplasia and prostate cancer.

Lee Index

The Lee score is one of the risk indices used to select patients at high cardiovascular risk. Its interest relies on the fact that it provides greater precision on preoperative cardiovascular risk in patients with low functional capacity and in cases where the evaluation of this functional capacity is limited. This evaluation allows the surgeon to request cardiology investigations likely to influence therapy. In the present study this score was determined in 20 patients. Of these patients, 17 (85%) had a Class I score and 3 (15%) had a Class II score. According to the joint recommendations of the ACC and AHA, these patients could be operated on without additional investigations. Investigations could exceptionally concern the 03 patients with a Class 2 score, particularly if the practitioner believes that it could lead to a change in intraoperative behaviour.

Postsurgical complications

The lack of a well-established definition and classification of complications in the surgical world has long limited their identification. In addition, differences in methodology in the acquisition of these data make comparisons difficult.

The classification of complications used in this study is that of modified Clavien [11]. This system takes into account not the severity of the complication, but the severity of its treatment. Grade I complications were the most common in the study population. They occurred in 86.2% (n = 50) of the participants. Grade II complications occurred in only 1.72% (n = 1) of participants. With regard to grade I complications, our results are close to those reported by Kwon *et al.* [17], who described the same grade of complication in 95% of patients who underwent photo selective spraying of the prostate with a high-performance system. On the other hand, they differ from those reported by Mamoulakis *et al.* who described grade I complications in 59.1% of patients [18]. The proportions of 15.2% and 29.5% of patients suffering from grade II complications reported respectively by the two previous authors are much higher than in the present study. However, in the results of the present study, as in those of the other two, the majority of postoperative complications are grade I, and therefore minor.

Limitation of the study

The small number of participants is the main limitation of this study.

5. Conclusion

The results of this study show a low preoperative cardiovascular risk in patients undergoing urological surgery in Ngaoundere, as well as a lack of association between the risk indicators used and the occurrence and severity of postoperative complications. These results do not exclude the need of systematic evaluation of preoperative cardiovascular risk for better prevention of postoperative complications in our context.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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