

Original Research Article

Adult Anaesthesia Practice at Zinder National Hospital

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Abstract: **Introduction:** Anesthesia allows surgery to proceed smoothly, with pain suppression, patient immobility and neurovegetative protection. The aim of this study is to describe anesthetic practice in adults at Zinder National Hospital. **Patients and Method:** it was a prospective cross-sectional study including patients aged at least 16 undergoing surgery at the Zinder national hospital from December 4, 2023 to March 3, 2024 (3 months). **Results:** During the study period, 560 anaesthetic procedures were performed in the operating theatre, of which 329 (58.8%) involved patients aged 16 or over. The mean age was 38.7 ± 17.8 , with extremes of 16 and 85 years. Past history was present in 30% of patients, dominated by hypertension. The types of surgery were: visceral surgery 48.9% followed by traumatology 27.1%, all patients were evaluated before anesthesia. General anesthesia (GA) was used in 61.4% of cases. In 55.3% of cases, patients were classified as ASA I. The drug regimen most commonly used for GA was: fentanyl, suxamethonium and ketamine in 38.4% of cases, and for spinal anesthesia, the bupivacaine-fentanyl combination. Anesthesia was provided by 2 anesthesiologists and 10 anesthesia technicians. More than half the patients developed adverse events in the operating room, and one (1) patient died (0.3%). **Conclusion:** This study provides us with information on the socio-demographic characteristics of patients, the types of surgery and the characteristics of adult anaesthesia at Zinder National Hospital. A number of aspects remain to be improved, including the number of anaesthetists and the availability of equipment such as respirators and capnographs. **Keywords:** Adult, Anesthesia, Zinder National Hospital.

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INTRODUCTION

Anesthesia allows surgery to proceed smoothly, with pain suppression, patient immobility and neurovegetative protection [1]. The role of this practice is not negligible in surgery, but also outside the operating theatre: in intensive care, patient transport and for certain imaging tests. There is a need to evaluate its indications and its contribution during surgery. Many countries, including France, Spain, Côte d'Ivoire, Togo, Cameroon and Niger, have carried out assessments of anesthesia practice and made recommendations for improvement in this field [2-7]. With this in mind, and with a view to obtaining recent statistical data on anaesthesia activity in the operating theatre of Zinder National Hospital, the present study was initiated. The aim of this work is to describe adult anaesthetic practice at Zinder National Hospital.

PATIENTS AND METHOD

We conducted a cross-sectional, descriptive study with prospective collection, from December 4, 2023 to March 3, 2024 (3 months) including all patients aged at least 16 admitted to the operating room for scheduled or emergency surgery. On the survey form, we collected socio-demographic data, antecedents (medical-surgical, anesthetic), ASA classification (American Society of Anesthesiology), type of anesthesia, ventilation mode, monitoring parameters and qualification of the anesthetist during the procedure, most commonly used anesthetic products, type of surgery, surgical specialties involved, intraoperative incidents and accidents, patient progress on leaving the operating room. We used the patients' medical records and the anesthesia monitoring form in the operating room as a basis. Our data were entered and analyzed using SPSS 22 software. Word processing was performed on WORD® 2013 and EXCEL® 2013. Verbal informed

consent was obtained after explaining the purpose of the study to the patients, data confidentiality was respected, and the results of this work were used for scientific purposes only.

RESULTS

During the study period, 560 anaesthetic procedures were performed in the operating theatre of Zinder National Hospital, of which 329 (58.8%) involved patients aged 16 or over. The mean age was 38.7y±17.8 with extremes of 16 and 85 years, The 16 to 35 age group accounted for 56.3%. Males predominated, with a sex ratio of 2.9 (Table I). Past history was present in 98 patients (30%), of whom 13.3% had hypertension, 6.12% a peptic ulcer and 3% diabetes. Atopy and smoking were present in 3% and 4% respectively. Sixty-seven percent had undergone surgery, mainly under general anaesthetic. The types of surgery in order of frequency were: visceral surgery 48.9%, traumatology 27.1%, followed by urology, neurosurgery and others (Table II). Scheduled surgery was the most common, with a frequency of 50.2% (figure 1), and all patients had benefited from a preanesthetic evaluation: either a preanesthetic consultation (PAC) for scheduled procedures or a preanesthetic evaluation (PAE) for emergency cases. Anesthetized patients presented a low anesthetic risk, with an ASA1 and 2 score in 55.3% and 44.7% respectively. Anesthesia was performed by anesthesia technicians (AT) in 92% of cases, and alone in 8% in the presence of an anesthesiologist-resuscitator (AR). Zinder National Hospital has two (2) AR and ten (10) AT. Premedication was carried out in 48.3% of

cases with atropine and 8.2% of cases with benzodiazepines. The most commonly used anesthesia technique was general anesthesia (GA) in 61.4% and locoregional anesthesia (LRA) in 38.6%, represented by spinal anesthesia (SA). The drugs used for SA were the combination of bupivacaine 0.5% hyperbaric and fentanyl in 93% of cases. For GA, ketamine was the most commonly used hypnotic for induction in 58% of cases, followed by Propofol 45% and thiopental 10%. The morphine was fentanyl in all patients. Suxamethonium (celocurine) was the most commonly used curare mainly for intubation in 88.11% of patients followed by vecuronium for maintenance of anesthesia in only 4%. Halothane was the main halogen used in 51% of cases followed by isoflurane in 20%. During GA, 27 patients (13.4%) received ventilator support. The following parameters were monitored for all patients: oxygen saturation, blood pressure, pulse, heart rate and respiratory rate. 10% were monitored for CO2 by capnography. One hundred and eighty-two (182) patients (55.3%) developed an adverse event. Of these, 155 patients (85.2%) had experienced only cardiovascular events (dominated by tachycardia, hypotension and bradycardia), 8 patients (4.4%) only respiratory events (dominated by desaturation and difficult intubation) and 19 patients (10.4%) a combination of cardiovascular and respiratory events. We recorded 3 cardiac arrests intraoperatively, one of whom (1) died, representing a mortality of 0.3%. By the end of the operation, all patients had been admitted to the ICU following a postoperative pain prevention protocol based on injectable paracetamol in 60% of cases, and tramadol in 40% of cases.

Table I: Patient distribution by socio-demographic characteristics

Socio-demographic characteristics	frequency	Percentage %	
Age	[16-25]	96	29,2
	[26-35]	89	27,1
	[36-45]	44	13,4
	[46-55]	31	9,4
	[56-65]	33	10
	[66-75]	28	8,5
	[76-85]	8	2,4
	Total	329	100
Sex	Male	85	25,8
	Feminine	244	74,2
	Total	329	100

Table II: Breakdown of patients by specialty

Surgical specialties	Number of pupils	Percentage %
Visceral	161	48,9
Traumatology	89	27,1
Urology	43	13,1
Neurosurgery	18	5,4
ENT	16	4,9
Stomato-ophthalmology	2	0,6
Total	329	100

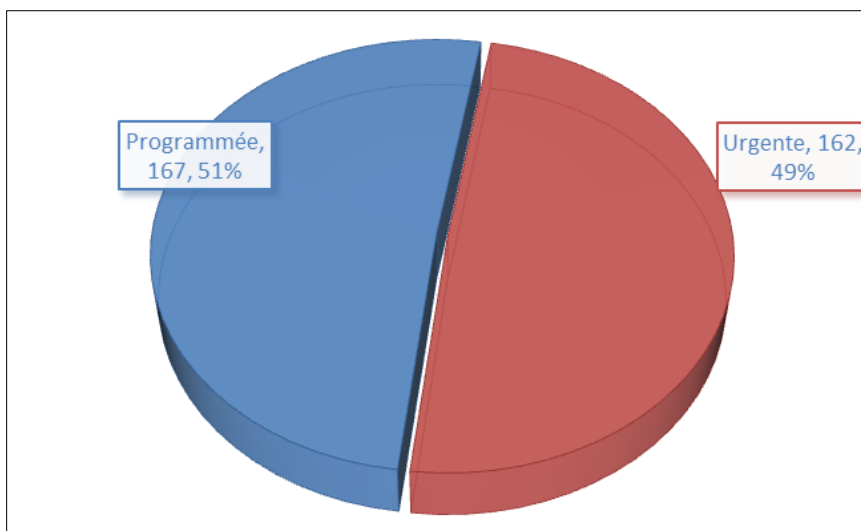


Figure 1: Patient distribution by type of surgery

DISCUSSION

Of the 560 anaesthetic procedures performed, 329 (58.8%) concerned patients aged 16 and over. The average age was 38.7 ± 17.8 years, with extremes of 16 and 85 years. The 16 to 35 age group accounted for 56.2%, which is due to the young age of the Nigerien population; according to the United Nations, by 2023, the population of Niger will have the lowest median age in the world [8].

Males predominated, with a sex ratio of 2.9, whereas Dembélé SA, *et al.*, [9], reported a higher frequency of females (56.1%). This difference is related to the type of surgical activity carried out in the different facilities. The Zinder National Hospital does not have a gynecology-obstetrics unit.

The types of surgery in order of frequency were: visceral surgery 48.9% in first position due to abundant abdominal emergencies linked to a high rural population also reported by Harissou A, *et al.*, [10]. This is a consequence of the infectious syndromes observed in this rural population, which are complicated by surgical abdomen due to precarious hygienic conditions. Traumatology, in second place, represented 27.1% of the study population, due to the youthfulness of the population, the latter's disregard for traffic regulations and safety measures on the one hand, and the lack of pre-hospital care on the other, resulting in various delays in treatment. Binam F *et al.*, [6], and Kabey AK *et al.*, [11], reported respectively for digestive and traumatological surgery 27%, 17% and 47.9%, 9.3%.

Anesthesia for elective surgery was less predominant, at 50.8% compared with 49.2% for emergency surgery. This slight difference can be explained by the large number of patients undergoing emergency surgery in digestive surgery, which even exceeded the number of scheduled patients.

All patients had undergone a preanesthetic evaluation: either a preanesthetic consultation (PAC) for scheduled procedures or a preanesthetic evaluation (PAE) for emergency cases, with the same form used to collect information. The PAC was carried out exclusively by anesthesiologists, and the PAE by anesthesia technicians (AT). Anesthetized patients presented a low anesthetic risk, with an ASA1 and 2 score respectively in 55.3% and 44.7% of cases, reflecting the extreme youth of the population. Anesthesia was performed by AT in 92% of cases, and alone in 8% in the presence of an anesthesiologist AR. This situation is found in most sub-Saharan African countries, due to the shortage of AR in the structures [5-12].

The patient's condition may require premedication prior to the start of anesthesia, to ensure anxiolysis, prevent nausea and vomiting, or reduce vagal reflexes, which can lead to vagal shock. In our study, two families of drugs were used: benzodiazepines (diazepam and midazolam) and anticholinergics (atropine). Atropine was used in 48.3% of patients and benzodiazepines in 8.2%. Dembélé SA, *et al.*, and Bengaly M, *et al.*, [9-13], had made the same observation, based on the predominance of the use of these two (2) drugs.

The most commonly used anesthesia technique was general anesthesia (GA) in 61.4% and spinal anesthesia (SA) in 38.6%, which represented the only locoregional anesthesia technique. Tomta K, *et al.*, [5], had reported a higher rate of SA, 59% compared to GA, due to the high number of Caesarean sections performed. The drugs used for LRA are bupivacaine and fentanyl, in 93% of cases. This combination is classic in current SA practice [5-7]. For GA induction, ketamine was the most widely used hypnotic in 58% of cases, followed by Propofol 45% and thiopental 10%. Several authors have reported a predominance of ketamine [5-14], a drug widely used in emergency situations, especially in

patients with hemodynamic instability. Ketamine has an anti-hyperanalgesic action in addition to hypnosis, allows less consumption of analgesics during or after surgery, and is more accessible and available than other drugs. Belomo Zogo BL, *et al.*, [15]. Taibi H *et al.*, [16], found a predominance of Propofol during induction, especially in children, whereas our study concerns adults. In addition to the hypnotic, induction is achieved by combining a morphine with or without curare. In our study, one morphine was used for all patients: fentanyl. Celocurine was the most commonly used curare, mainly for intubation in 88.11% of patients, followed by vecuronium for maintenance of anesthesia in only 4% of patients, as reported by Doumbia MAM *et al.*, [14].

In our series, halothane was the main halogen used in 51% of cases, followed by isoflurane in 20%. The use of halothane was reported in several studies [7-17], despite its prohibition by the recommendations of learned societies in general anesthesia due to its side effects on patients and staff with the known risk of severe drug-induced hepatitis. The moderate cost of halothane compared with other halogens and its availability facilitate its use in developing countries [7]. However, in August 2024, the WFSA informed the World Health Organization [18], that halothane production would cease and that shortages were imminent. The decision was taken by private companies from an economic point of view. The countries of sub-Saharan Africa, the main consumers of halothane, need to switch to safer and more readily available inhalation agents. During the GA, 27 patients (13.4%) had benefited from ventilator-assisted ventilation, compared with 61% in France, as reported by the French Society of Anesthesia and Intensive Care [2]. This was due to the lack of ventilators in most operating theatres, but also to the lack of training to upgrade AT. The following parameters were monitored for all patients: oxygen saturation, blood pressure, pulse, heart rate and respiratory rate. 10% were monitored for CO₂ by capnography. These monitoring elements constitute the minimum set of parameters strongly recommended by WHO and the World Federation of Societies of Anaesthesia during anaesthesia [19]. The low use of capnography is mainly due to the lack of this device in most theatres.

One hundred and eighty-two (182) patients (55.3%) developed an adverse event. Of these patients, 155, or 85.2%, had only cardiovascular events (dominated by tachycardia, hypotension and bradycardia). Their management required the use of crystalloids in 40% of cases, and vasopressors (ephedrine) in 25% of cases. These events were comparable to those reported by other authors such as Dembélé SA, *et al.*, [9], Binam *et al.*, [6], most of which were cardiovascular events. Eight (8) patients or 4.4% of respiratory events (dominated by desaturation and difficult intubation) Dembélé SA, *et al.*, [9], reported 0.6%. Anaesthetic mortality was 0.3%, comparable to the 0.49% reported by Rasamoelina N, *et al.*, [20], which

is very low given that the majority of patients had a low risk of anaesthesia (ASA 1 and ASA 2).

CONCLUSION

This study provides us with information on the socio-demographic characteristics of patients, the types of surgery and the characteristics of adult anaesthesia at Zinder National Hospital. It is up to hospital management and the Ministry of Health to recruit intensive care anaesthetists, and to organize ongoing training for anaesthesia practitioners to ensure safer anaesthesia.

Conflict of Interest: none

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