

Research Article

ANESTHESIA PRACTICE IN LOW- INCOME COUNTRY: A MULTICENTRIC STUDY

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Abstract

Objective: The aim of this study was to evaluate anesthesia practice in low-income country (Niger case)

Methods: This is a multicenter, prospective and observational study over a period of 7 days from 9th to 15th January, 2019, carried out in national hospitals, regional hospitals, mother and child centers and district hospitals in Niger. Included were all patients admitted to the selected centers who had received an anesthetic procedure. The following variables were analyzed: age, sex, hospital structures and equipment, anesthesia staff, indication of surgery, technique of anesthesia, type of surgery, the qualification of the anesthesiologist, American Society of Anesthesiologist (ASA) physical status classification, indications of the surgery, critical incidents, postoperative follow-up. This follow-up was until the discharge of patients who had been hospitalized for less than a month. It was one month for patients whose hospital stay exceeded one month.

Results: The series included 802 patients, 482 women (60.10%) and 320 men (39.90%); or a sex ratio of 0.66. Patients were classified ASA1 in 66.5 % and Mallampati 1 in 80.30% of cases. Anesthesia was performed by anesthetist nurses in 91% of patients and by the anesthetist in 9% of patients. General anesthesia was the most used technique with 53.12%, followed by spinal anesthesia with 41.40%. For the induction of general anesthesia, the intravenous hypnotics used were ketamine (36.6%) and propofol (22.52%). Maintenance was provided with halothane in 58.22% of patients. Regarding spinal anesthesia, the bupivacaine-fentanyl combination was the most used; 65.06% of cases. The most performed types of surgery were cesarean section with 33.69% followed by digestive surgery; 32.16%. Emergency surgery concerned 61% of patients. Accident incidents were encountered in 5.49% of patients with a predominance of bradycardia (2.74%). Mortality was 0.99%.

Conclusion: The practice of anesthesia in low-income country still suffers from shortcomings compared to international standards. The improvement of this situation requires the training in sufficient numbers of anaesthetists, the judicious distribution of qualified personnel throughout the national territory and the equipment of hospitals in materials and drugs for anesthesia.

INTRODUCTION

Anesthesia currently involves much less risk and much more comfort for the patient than 50 years ago, which revolutionized the world of surgery. Surgeons are carrying out more complicated operations on more patients, and the result is increased demand, but at the same time a shortage of anesthesiologists in developing countries. Many studies published in the international literature show that developing countries, in particular those south of the Sahara, remain largely outside of this progress with excessively high anesthesia morbidity and mortality [1-5].

METHODS

This is a multicenter, prospective observational study over a 7-day period from January 9 to 15, 2018, carried out in 40 hospital structures: national hospitals (HN), regional hospitals (CHR), mother and child centers (CME) and district hospitals (HD) of Niger. Included were all patients admitted to the selected centers who had undergone an anesthetic act. The variables studied were: sex, age, the hospital structure, equipment, anesthesia technique, type of intervention, qualification of anesthesiologist, American Society of Anesthesiologist (ASA) physical status classification, type and indication of surgery, anesthetic protocol,

critical incidents, postoperative follow-up. Data were analyzed by the software Word 2013 and Epi info 3.5.4.

RESULTS

In our series, 802 patients were been included. They came from district hospitals (DH:57.5%), followed by mother and child centers (MCC:25%). Regional hospitals (RH) represented 10% and national hospitals (NH :7.5%) (Figure 1).

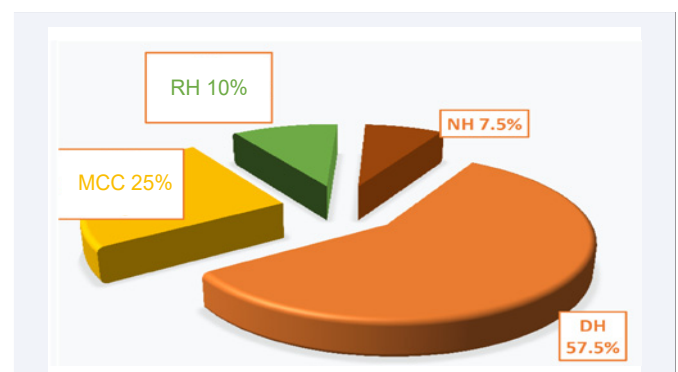


Figure 1 Distribution of patients by hospital levels.

For equipment and staff, all centers had an anesthesia machine and a pulse oximeter. Thirty-six (36) structures had a monitor (90%) and 8 structures had a defibrillator (20%). During this period, there were 15 anesthetists and 132 nurse anesthetists distributed in the 40 centers; 14 of these anesthetists and 59 nurses' anesthetists were in Niamey the capital. For a population the ratio is one anesthetist for 1,188,884 peoples and one nurses anesthetist for 135,100 . All the structures had ketamine, thiopental was found in 38 centers (95%), propofol in 18 centers (45%) and midazolam in 3 centers (7.5%). Thirty-nine centers had Halothane (97.5%), two centers also had halothane, isoflurane (2.5%) and sevoflurane (2.5%). fentanyl, morphine in 30 centers (75%) and alfentanil in one center (2.5%). Thirty-five hospitals (87.5%) had suxamethonium, 18 centers (45%) had pancuronium , 7 centers (18%) of vecuronium and only 3 centers (7.5%) had atracurium. In this study, bupivacaine was found in 38 hospitals (95%) and lidocaine in 35 hospitals (87.5%). The WHO checklist was applied by 19 hospitals (47.5%). Of the 802 patients, 482 were women (60.10%) and 320 were men (39.90%), the sex ratio of 0.66. The mean age was 57.28 ± 10.60 years with extremes of 2 months to 90 years. Patients classified ASA I represented 66.58% (n = 534); ASA II 29.42% (n = 236); ASA III 3.74% (n = 30) and ASA IV 0.24% (n = 2). Mallampati score assessment found 80.30% (n = 644) of Mallampati 1 patients; 18.95% of Mallampati 2 (n = 152) and 0.75% of Mallampati 3 (n = 6). The types of operations performed the most were cesarean section with 33.69% (n = 270) followed by digestive surgery 32.16% (n = 258) (Figure 2).

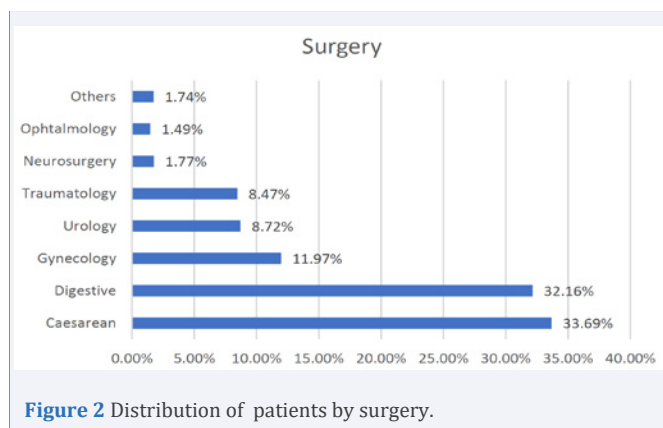


Figure 2 Distribution of patients by surgery.

The surgery was urgent in 60.97% of patients (n = 489) and scheduled in 39.02% of patients (n = 313). General anesthesia was performed in 53.11% of cases (n = 426), followed by spinal anesthesia in 41.39% (n = 332) and local anesthesia, 5.48% (n = 44). Anesthesia was performed in 91% (n = 730) of cases by a nurse's anesthetist and in 9% (n = 72) of cases by anesthetists. Four hundred and twenty-six (426) patients had been operated on under general anesthesia for whom the most used intravenous hypnotic was ketamine 41.78% (n = 178), thiopental 30.75% (n = 131), propofol, 22.53% (n = 96). Induction was inhalation for 21 patients, 4.92%. Fentanyl was the only opioid drug used, in 207 patients (48.59%). For maintenance halothane was used in 248 patients (58.21%) and ketamine in 50 patients (11.73%). Three hundred and thirty-two patients were operated on under spinal anesthesia. Bupivacaine was the local anesthetic used.

The adjuvant was fentanyl alone in 216 patients (65.06%) and fentanyl in combination with morphine in 40 patients (12.04%). Forty-four patients (5.48%) had critical incidents. Bradycardia was the most common intraoperative anesthetic incident with 22 patients (2.74%), followed by hypotension and tachycardia in 6 patients each (0.74%) (Table 1).

| Critical incidents | Number | Percentage(%) |
|---------------------|--------|---------------|
| Bradycardia | 22 | 2,74 |
| Hypotension | 6 | 0,74 |
| Tachycardia | 6 | 0,74 |
| Cardiac arrest | 4 | 0,49 |
| Hypertension | 2 | 0,24 |
| Intubation Faillure | 2 | 0,24 |
| Vomit | 2 | 0,24 |
| None | 758 | 94,51 |
| Total | 802 | 100 |

All the patients had had analgesics immediately after surgery. Paracetamol alone was used in 124 patients (15.46%), tramadol alone in 12 patients (14.96) and in 420 patients (52.36%) the analgesia was multimodal. The average length of hospitalization is 5 days, 8 patients had died (4 intraoperatively and 4 postoperatively); mortality was 0.99%.

DISCUSSION

In this study 802 patients were been included from 40 hospital structures. For equipment, 32 health structures (80%) did not have a defibrillator. Ouro-Bang'Na. Et al, Binam F et al reported this hardware problem, particularly with regard to monitors [6, 7]. The lack of anesthetic drugs remains a major problem in our countries, indeed propofol was only found in 18 hospitals (45%), a lower result than that found in Togo where propofol was available in 61% of centers. [6] Halothane was the only halogen in 38 centers (95%). This result is close to that of Brouh Y in Ivory Coast [8]. Thirty-five hospitals (87.5%) had succinylcholine, 18 centers (45%) pancuronium, 7 centers (18%) vecuronium. This result differs from that of Togo where pancuronium was found in 91% of the centers. Brouh Y found vecuronium in 62% of the centers [6,8]. In our study bupivacaine was the local anesthetic available, this has been found by other authors [6]. The ratio was 1 / 1,188,884 peoples and 1 nurse / 135,100. This result is different of Brouh Y in Ivory Coast with a ratio of 1 anesthetist / 349,230 and 1 nurse / 99,126 inhabitants [8]. Regarding the patients treated, we noted a female predominance with 60.10%, this was found by Dembelé AS and Rasamoelina N. with respectively 56.10% and 55.10% [10,11]. Gad Secka A found a male predominance of 52.6% in Chad [12]. The mean age of our patients was 57.28 ± 10.60 years with extremes of 2 months to 90 years. This result differs from that of Iteke F R , Essola L. who found respectively 41.2 years and 26.8 years [13,14]. In our study, 66.58% of patients were classified ASA1. This result is lower than those found by Otiobanda G F and Rasamoelina N with 78.3% and 85.5% ASA1 respectively. Keita M found a significantly lower result with 50.40% of ASA1 patients [11, 15,16]. Emergencies represented

60.97% of patients according to the results of Dembelé A S and Gad Secka A who had respectively 64.4% and 58.1%. Otiobanda GF, Sani R. in Niger had different results with 18.30% and 51.80% respectively of emergency cases [10, 12,15, 17]. Cesarean section with 33.69% of cases followed by digestive surgery 32.16%. Tomta K et al and Dembelé A S found a predominance of cesarean section followed by digestive surgery with 48.22% and 20.5% respectively. Sani R. a predominance of cesarean section in 37.21% of cases. Our results differ from those of Rasamoelina N who noted a predominance of digestive surgery with 54.70% [9, 10, 11,17]. In our series, 9% of the acts of anesthesia were performed by anesthetist and 91% by an anesthesia nurses, this observation of Tomta K in Togo. [9] because the insufficient number of anesthetists in hospitals in most developing countries [2]. General anesthesia was the most used technique (53.11%) followed by spinal anesthesia (41.39%). Others have reported a predominance of spinal anesthesia, 68.70% and 59% [9, 13]. The combination of bupivacaine and fentanyl was the most used for spinal anesthesia with 65.06% of patients. This result differs from that of Iteke F R, who found the combination of bupivacaine and adrenaline in 68% of cases and bupivacaine-fentanyl in 2% of patients. In Tomta study bupivacaine used in 97.76% of patients [9,13]. In our series, at induction, the most widely used intravenous hypnotic was ketamine 41.78% (n = 178) followed by thiopental 30.75% (n = 131) and propofol 22.53% (n = 96). Tomta K, Gad Secka A found 41.01% and 76.76% of ketamine use, respectively. Ogonbo B, Otiobanda G F noted a predominance of propofol with respectively 35.30%; 47.80% of cases [9, 12, 15, 18]. In our series, halothane is the only halogen used in the maintenance of general anesthesia. This result is similar to that of Iteke F R use halothane in all patients. Halothane is still used despite the recommendations of learned societies to stop using it in general anesthesia because of its side effects on patients and on staff with the known risk of severe drug-induced hepatitis. The moderate cost of halothane compared to other halogens and its availability makes it easier to use in developing countries. [13] We recorded 5.49% cases of critical incidents. Bradycardia predominated with 2.74% of cases. Dembelé A S et al reported 14.50% of adverse events with a predominantly cardiovascular condition in 13.1% of patients. [10] All the patients had had analgesics immediately after surgery. Paracetamol alone was used in 124 patients (15.46%), tramadol alone in 12 patients (14.96) and in 420 patients (52.36%) the analgesia was multimodal. For Essola L the combination of paracetamol + tramadol in 22.4% of cases [14] and Chaïbou MS. 64.5% of paracetamol use and 53.23% of multimodal analgesia in the management of postoperative pain [19]. The average length of hospital stay was 5 days. Iteke F R found an average of 11 days. Mortality was 0.99%. The ASOS study in 2018 found a mortality rate of 1.1% . Iteke F R and Gad Secka A ewho had respectively 0.5% and 0.8% of deaths [12, 13, 17, 20].

CONCLUSION

This study of forty national hospital structures made it possible to see the shortcomings of the practice of anesthesia in our country. The centers are insufficiently equipped with equipment and personnel, but work a lot. For the safety of our patients, it is more than necessary to equip health structures with modern anesthesia and resuscitation equipment and to train a sufficient number of specialist physicians in the discipline for a better distribution of specialists in the regions.

REFERENCES

1. www.who.int. consulted 29th March 2021 at 9:30 pm
2. Adnet P, Diallo A, Sanou J et al. Anesthesia practice by nurse anesthetists in French speaking Sub-Saharan Africa. *Ann Fr Anesth Reanim.* 1999; 18: 636-641.
3. Carpentier J.P, Banos J.P, Roth C et coll. Practice and complications of spinal anesthesia in African tropical countries. *Ann Fr Anesth Reanim.* 2001; 20: 16-22.
4. Saissy J.M, Carpentier J.P. Anesthesia in developing countries. In « Kamran Samii. *Anesthésie-réanimation chirurgicale* ». Flammarion Médecine-Sciences. 1996, 1291.
5. Sanou I, Vilasco B, Obey A, F Binam, M Chobli, et al. Evolution of the demography of anesthesia practitioners in French speaking Sub-Saharan Africa. *Ann Fr Anesth Reanim.* 1999; 18: 642-646.
6. Ouro-Bang'Na Maman A.F, Tomta K, Kangni N et al. Evaluation of the anesthesia technical platform in Togo. *Méd. Afr. Noir,* 2008, 55: 101-105.
7. Binam F, P Lemardeley, A Blatt et al. Anesthesia practices in Yaounde (Cameroon). *Ann Fr Anesth Reanim.* 1999; 18: 647-656.
8. Brouh Y, Tetchi Y, Pete Y et al. The practice of anesthesia in Cote d'Ivoire. *Rev. Afr. Anesth. Med. Urg.* Tome,2011, 16 : 48-53.
9. Tomta K, Mouzou T, Sama H et al. Practice of anesthesia in Togo. *Rev Afr Anesth Med Urg.* 2012 ; 17 : 17-18.
10. Dembelé AS, Diango DM, Mangané M.I et al. Anesthetic activities in medico-surgical and intensive care unit Pastor of Bamako. *Rev Afr Anesth Med Urg.* 2013 ; 18 : 45-46.
11. Rasamoelina N, Rasataharifetra H, Rajaobelison, Lackson Tembo, Carol Clements T et al. Preliminary investigation into the practice of anesthesia in adults at the Toamasina University Hospital. *Rev Afr Anesth Med Urg.* 2010 : 21-24.
12. Gad Secka A, T Lokossou, M Kaboro et al. Practice of anesthesia in Chad in 2002: Current situation and prospects for improvement. *Rev Afr Anesth Med Urg.* 2004; 9: 8.
13. Iteke FR, Kapimba B, Muka N et al. Assessment of anesthetic management of urologic surgery. *Rev Afr Anesthésiol Med Urgence.* 2014; 19: 18-22.
14. Essola R, Obame R, Mandji-Lawson JM et al. Anesthetic practice in the obstetric and gynecology operating room of the teaching hospital of Libreville. *Rev. Afr. Anesth. Med. Urg.* 2004; 19: 3-7.
15. Otiobanda GF, Mahoungou-Guimbi KC, Odzebe A.W. Set al Management of paediatric anaesthesia in university hospital of Brazzaville. *Rev Afr Anesth Med Urg.* 2011; 16: 3-6.
16. Keita M, Samaké B, Goita D. Loco-regional anesthesia practices in 1261 cases. *Mali Medical,* 2013; 28 : 22-26.
17. Sani R, Samuila S, James Lassey D, Garba Mohamed Salifou , Habibou Abarchi et al. Rural surgery in Niger: A multicentric study in 21 District Hospitals. *Indian J Surg.* 2015; 77: 822-826.
18. Ogonbo B, Yapi F, Pete Y et al. Practice of pediatric anesthesia in emergency at Cocody teaching hospital. Abidjan- (RCI). *Rev Afr Anesth Med Urg.* 2014; 19: 31-35.
19. Chaïbou MS., Samuila S, Sani R., Nouhou AT. et al. Management of postoperative pain: experience of the Niamey National Hospital, Niger. *Journal of Pain Research.* 2012; 5: 591-595
20. Biccard BM, Madiba TE, Kluyts H-L et al. Perioperative patient outcomes in the African Surgical Outcomes Study. *Lancet.* 2018; 391: 1589-1598.