International Journal of Anesthesia and Clinical Medicine
2023; 11(2): 66-68
http://www.sciencepublishinggroup.com/j/ijacm
doi: 10.11648/j.ijacm.20231102.12

Pediatric Anesthesiology Practice Evolution in Benin, from the Study Research Realized in 2010 and 2020

Akodjenou Joseph[1, *], Ahounou Ernest[2], Lalèyè Yasmine[1], Zoumenou Eugène[2], Gbénou Séraphin Antoine[1], Fiogbé Michel Armand[2], Veyckemans Francis[3]

[1]Resuscitation Anesthesia Department, Mother and Child Teaching Hospital Lagoon, Abomey-Calavi University, Cotonou, Benin

[2]Hubert Koutoukou Maga National Teaching Hospital Center, Abomey-Calavi University, Cotonou, Benin

[3]Hospital Jeanne de Flandre, Lille, France

Email address:

josephakodjenou@yahoo.fr (Akodjenou Joseph)

[*]Corresponding author

To cite this article:

Akodjenou Joseph, Ahounou Ernest, Lalèyè Yasmine, Zoumenou Eugène, Gbénou Séraphin Antoine, Fiogbé Michel Armand, Veyckemans Francis. Pediatric Anesthesiology Practice Evolution in Benin, from the Study Research Realized in 2010 and 2020. *International Journal of Anesthesia and Clinical Medicine*. Vol. 11, No. 2, 2023, pp. 66-68. doi: 10.11648/j.ijacm.20231102.12

Received: June 2, 2023; **Accepted**: July 10, 2023; **Published**: July 31, 2023

Abstract: *Introduction:* This is a literature review on pediatric anesthesiology practice from 2010 to 2020 in two reference teaching hospitals of Cotonou: National University Hospital Centre (CNHU), and Lagoon--Mother and Child Hospital Centre (CHUMEL). *Objective:* To highlight the advances in pediatric anesthesia in Benin through the work carried out in 2010 and those of 2020 in the two reference hospitals in southern Benin. *Patients and Methods:* Data concerning the sociodemographic profile of patients, epidemiologic profile, human resources, infrastructures, equipment, medications and caregiving are examined. In this study, the work carried out in 2010 was compared to those in 2020. *Results:* The study carried out in 2010 included 512 children under 15 years, for a year's duration; when in 2020, 345 children were included, all of which had surgery in a five months period. Equipment and Human ressources had improved with the creation of a pediatric critical care unit. The new monitoring material, anesthetic medications, and regional anesthesia technics were not practiced in 2010. *Conclusion:* This work shows that the practice of pediatric anesthesia in 2020 in the two reference hospitals in Benin, compared to previous years, is becoming increasingly satisfactory, even if anesthesia safety is not yet optimal.

Keywords: Pediatric Anesthesiology, Evolution, CHU-MEL

1. Introduction

In 2010, Zoumenou et al. described anesthesiology practice in the two teaching hospitals of Benin in a restrospective study including 512 children under 15 years during a one-year period. They showed that general anesthesia was the far more used technic (94%), with 156/10.000 cardiac arrest under anesthesia, and 62% mortality which is 97/10.000 [1].

The study by Hmamouchi B et al. carried out in 2009 in a pediatric anesthesia and intensive care unit (Children's Hospital, CHU Ibn Rochd, Casablanca) confirms these facts by finding a mortality of 2.23 per 10,000 anesthesia [2] showing a significant difference between the 2 countries.

At the ADARPEF (French Speaking Pediatric Anesthesiology and Critical care Specialists Association) congress in 2010, Benkhalifa et al. [3] presented the practice of pediatric anesthesia in the Maghreb focusing on training, practices and obstacles. They showed that paediatric anaesthesia in this region was mainly performed by unaccustomed practitioners, without specific training.

At the ADARPEF congress in 2015, Zoumenou et al. [4] showed that the majority of children undergoing surgery in sub-Saharan Africa were cared for by nurse anaesthetists who had neither the competence nor the experience required to ensure optimal anaesthetic safety. The incidence of perioperative morbidity and mortality was unacceptably high compared to the standard in developed countries.

We present in this article the evolution of pediatric anesthesia by comparing the study carried out and published

in Pediatric Anesthesia in 2010 by Zoumènou et al. to that carried out and published in American Journal of Pediatrics by Akodjenou et al. [5] ten years later, in 2020.

2. Patients and Methods

Data on socio-demographic profile of patients, epidemiological profile, human resources, equipment and infrastructure, medicines and care provision were examined.

Like that of 2010, the present study took place in the two (02) large reference teaching hospitals of Cotonou (Benin).

The 2010 study included 512 children under 15 years of age over a one-year period and the 2020 study included 345 children, all of which undergone surgery over a period of 5 months. Most of our studies used 0 to 15 years old, as pediatric age range for the surgical interventions [6, 7].

The socio-demographic profile of the children recorded in this study is identical to that of the previous study in 2010. Notably, it is the predominance of the male sex, as found in previous studies [1, 8] with an average age of 5 years ± 3.9 with extremes from one day to 15 years.

In 2010, the three most performed procedures were orthopedic surgery (37%), urologic surgery (23%) and digestive surgery (20%). This study finds a different classification. Digestive surgery ranked first (30.1%) followed by urologic surgery (20.9%) and traumatology surgery (16.8%). Difference between orthopedics and traumatology, which is often emergency orthopedics.

2.1. Human Ressources

In 2010, there were five (5) anesthesiologists, all university anesthesiologists, from which only one had additional training in pediatric anesthesiology. While in 2020 there were seven (7) anesthesiologists with two (2) of them having additional skills in pediatric anesthesiology. The number of pediatric surgeons increased from 4 in 2010 to 6 in 2020.

2.2. Equipements and Infrastructures

2.2.1. Monitoring

In 2010, intraoperative monitoring focused on SpO2 in 73% of cases and Blood Pressure (BP) in 54% of cases. ECG monitoring and capnography were not used at all.

In 2020, monitoring of SpO2 and BP was systematic in all children undergoing surgery. ECG and capnography were measured in 30.14% and 14.7% of cases, respectively.

Table 1 shows the comparison between the different monitored parameters.

Table 1. *Comparison of monitored parameters.*

	2010	2020
	Percentage	**Percentage**
Parameters		
SpO2	73	100
BP	54	97,97
ECG	00	30,1
Capnography	00	14,7

2.2.2. Airway Management

All children undergoing surgery under general anaesthesia were left on spontaneous breathing or manually assisted breathing in 2010. In 2020, following the provision of pediatric ventilators in some rooms of the operating room, some children could benefit from mechanical ventilation (34.2%) according to indications, though only with pure oxygen.

2.2.3. Anesthetics

In 2010, anesthetic induction was inhalatory with the exclusive use of halothane. We observed in 2020, a greater use of sevoflurane (32.5%) which is more indicated in newborns and infants.

Thiopental diluted to 1% formerly used in 56% of cases with intravenous induction is now almost entirely replaced by propofol used in 78.6% of cases with induction.

Neuromuscular blocking agents were used in 42% of cases in 2010. Pancuronium was the only used neuromuscular blocker. The use of pancuronium has been abandoned because several other molecules were made available: Suxamethonium, Vecuronium, Rocuronium. During our study, muscle relaxation was performed at induction with suxamethonium in 40.9% of cases for emergencies.

Fentanyl was used in 70% of cases to ensure intraoperative analgesia and was replaced by Sufentanyl used in 78.6% of cases in 2020. Table 2 shows the distribution of anaesthetic products in 2010 and 2020.

Table 2. *Distribution of anesthetics.*

	2010	2020
Halogenes	Halothane (100%)	Sevoflurane (32,5%)
Hypnotics	Thiopental (56%)	Propofol (78,6%)
Morphinics	Fentanyl (100%)	Sufentanil (76,5%)
Muscle bloking agents	Pancuronium (100%)	Succinylcholine (41%), Vecuronium, Rocuronium

2.2.4. Anesthesia Techniques

The practice of regional anaesthesia has increased from 18.7% to 27.53% over the last 10 years. This evolution is in line with the new recommendations in paediatric anaesthesia management [9], thus improving safety and efficacy [10, 11]. Spinal anesthesia was the most commonly practiced locoregional anesthesia technique in 2010; as found by other studies after 2010 [12, 13]. We are now observing in 2020 a diversification of locoregional anesthesia techniques (ALR) with the practice of different peripheral blocks at CHU-MEL even if they are performed in small proportions. Table 3 shows the distribution of regional anaesthesia techniques.

Table 3. *Distribution of regional anesthesia techniques.*

	2010	2020
Spinal anesthesia	Sole one	11,90%
Caudal block	00%	11,30%
Peripheral blocks	00%	4,35%

2.2.5. Post-Operative Care Site

In 2010, 93% of operated patients were transferred directly to the inpatient ward at the end of the procedure, and only 1%

and 6% of patients were sent to the post-interventional monitoring room and intensive care room respectively.

In 2020, there is considerable progress with the availability of post-interventional recovery rooms at the National Hospital and University Center (CNHU), and the establishment of the pediatric intensive care unit at the Hospital and University Center for Mothers and Children – Lagoon (CHU-MEL). A total of 84.3% of operated children were transferred to a postoperative care unit for immediate postoperative monitoring.

3. Morbidity and Mortality

In 2010, the incidence of intraoperative complications in pediatric anesthesia was 156 cardiac arrests per 10,000 anesthesia (1.56%), with an intraoperative mortality rate of 97 per 10,000 anesthesia (0.97%).

Postoperative complications were not recorded in this study. Hypoxia and respiratory complications were the main causes of cardiac arrest.

The main risk factors associated with the occurrence of perioperative complications were: children under 1 year of age; the urgency of the surgery, ASA scores above 2.

In 2020 there is a prevalence of perioperative complications of 23.7% with a mortality of 4.1%. They were represented by respiratory complications (11.5%), followed by cardiovascular complications (8.6%) and neurological complications (6.9%).

It should be noted that the children operated during our study were followed until their discharge from the hospital and 30 days later on phone call.

The main risk factors identified in our study are superimposed to those found in the previous study.

4. Conclusion

This work shows that the practice of pediatric anesthesia in 2020 in the two reference hospitals of Benin, compared to previous years, is becoming increasingly satisfactory, though anesthetic safety is not yet optimal.

It seems imperative to promote the training of practitioners, to promote locoregional anesthesia and to create pediatric hospitals with adapted critical care units and operating theatres.

To ensure safety in anesthesia, referral hospitals must urgently review their anesthesia practice, with particular attention to pediatric anesthesia. Achieving this objective will require an improvement in the organization of human resources, available equipment, and specific training.

Conflicts of Interest

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

Acknowledgements

The authors wish to thank NJITAM GASSAM Stéphane Brice for his contributions to the translation of this manuscript.

References

[1] Zoumenou E, Gbenou S, Assouto P, Ouro bang'na, Lokossou Th, Hounnou G, Aguemon abdou rhaman, Chobli M. Pediatric anesthesia in developing countries: experience in the two main university hospitals of Benin in West Africa. Pediatric Anesthesia 2010 20: 741–747.

[2] Hmamouchi B, Neijmi S, Benkhalifa S, Dehdouh A, Chlilek A. Morbimortalité en anesthésie pédiatrique au Maghreb. Ann Fr Anesth Reanim 2009; 28 (6): 671-3.

[3] Benkhalifa S, Dehdouh A, Hmamouchi B, Trifa M, Hassen AF. Anesthésie pédiatrique au Maghreb: formation, pratique et obstacles. Ann Fr Anesth Reanim 2010; 29: 576–8.

[4] Zoumenou E, Ndoye MD, Tchaou B, Nguessan F, Kaboré F, Diango D, et al. Pratique de l'anesthésie chez l'enfant en Afrique francophone subsaharienne. État des lieux et perspectives d'amélioration. Anesth Reanim 2015; 1 (6): 512-6.

[5] Akodjènou Joseph, Mewanou Serge, Ahounou Ernest, Lalèyè Yasmine, Zoumenou Eugène, Gbénou Séraphin Antoine, Fiogbé Michel Armand. Practice of Pediatric Anesthesia in Sub-Saharan Africa: Experience of Two Referral Hospitals in Benin. American Journal of Pediatrics 2021; 7 (4): 219-224.

[6] Akodjenou J, Ahounou E, Biaou COA, Métchihoungbé CS, Goudjo EUEM, Zoumenou E, Fiogbé MA; chirurgie foraine pediatrique: organisation et prise en charge anesthesique. Journal de la Société de Biologie Clinique du Bénin, 2019; N° 031; 20-24.

[7] Lopez T, Sanchez FJ et al. Spinal anesthesia in pediatric patients. Minerva Anaestesiol 2012; 78: 78–87.

[8] Boyodi KT, Fousseni A, Kossigan AA, La chirurgie foraine: une solution aux problèmes d'accès aux soins chirurgicaux des populations rurales. European scientific Journal 2016; 36 (12): 174-181.

[9] Recommandations 2010: Anesthésie loco-régionale en pédiatrie. Adarpef.org.

[10] Park JH et al. Determination of the optimal angle for needle insertion during caudal block in children using ultrasound imaging. *Anaesthesia* 2006; 61: 946-9.

[11] Tsui BCH, Suresh S. Ultrasound imaging for regional anesthesia in infants, children and adolescents. *Anesthiology* 2010; 112: 719-28.

[12] Chrystelle Sola, Anne-Charlotte Saour, Caroline Couchepin, Laurent Hertz, Christophe Dadure. Rachianesthésie en pédiatrie: quoi de neuf ? Congrès de l'Adarpef 2016.

[13] Corinne Lejus, Cécile Magne. Rachianesthésie chez l'enfant: faut-il encore l'utiliser? Le Praticien en anesthésie réanimation (2015) 19, 120-124.