

Antibioprophylaxis in Paediatric Surgery at University Hospital Center of Brazzaville (Republic of Congo)

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Abstract: *Aim:* Evaluate the practice of antibioprophylaxis in paediatric surgery at University Hospital of Brazzaville. *Materials and methods:* The study was a retrospective, cross-sectional and descriptive, during 12-month (January to December 2013) conducted in the operating room of University Hospital of Brazzaville. All patients undergoing scheduled paediatric surgery were included in this study. The parameters analyzed were: ASA class, Alteimer class, duration of surgery, type of antibiotic administered, timing of administration and reinjection of antibiotic. *Results:* A total of 216 patients were analysed. The average age was 7.57±5.03 years. The ASA I was the most represented in 94.9% of cases. Anaesthesia was general in 89.9% of cases. Surgery was classified as Alteimer I in 68.1% of cases, Alteimer II and III in 26.9% and 5.1% of cases respectively. The indication for antibioprophylaxis was conformed in 54.1% of cases. The most commonly used antibiotics were cefuroxime in 42.3% of cases and ceftriaxone in 31.5% of cases. In 20.7% of cases the antibiotic was administered after the surgical incision. Antibiotic reinjections were not performed. The average duration of the surgery was 99.94±46.36 minutes. The overall compliance (indication, choice of molecule, injection-incision time and reinjections) was 47.1%. *Conclusion:* In almost half of the cases, antibioprophylaxis did not comply with the recommendations. Consensus between surgeons and anesthesiologists must be reached to develop national protocols for antibioprophylaxis in pediatric surgery.

Keywords: Surgery, Paediatric, Antibioprophylaxis, Brazzaville

1. Introduction

Surgical site infections (SSIs) are a major cause of postoperative mortality and morbidity [1]. Intraoperative antibioprophylaxis (ABP) aims to prevent bacterial proliferation at the tissue level and is, after asepsis techniques, the most effective way to combat SSIs [2]. The bacterial target depends on the patient's endogenous flora, the ecology of the hospitalization services as well as the level of intra operative contamination, defined by the Altemier classification [3, 4], and the recommendations on ABP are based on studies done in adults. It seems acceptable to consider that the recommended

doses for adults as part of prophylaxis are probably sufficient for children, based on their weight. The American Academy of Pediatrics (AAP) offers child-friendly dosages [6]. Few African studies have been conducted on antibioprophylaxis in paediatric surgery, the purpose of our study was to evaluate the practice of antibiotic prophylaxis in pediatric surgery in order to improve our practices.

2. Materials and Methods

This was a cross sectional and descriptive study with retrospective data collection conducted in the operating room

of the University Hospital of Brazzaville, over a 12 months period from January to December 2013. All anaesthetic data of patients operated in scheduled paediatric surgery were included in the study; incomplete records were excluded. In the absence of local protocols on ABP in surgery for adults and more particularly for children, the updated recommendations of the French Society of Anesthesia and Resuscitation (SFAR) of 2010 have served as a reference for us in assessing compliance of the ABP. The criteria evaluated were: indication of ABP, choice of molecule, injection-incision time and reinjection if necessary. Overall grouping the percentage of patients in whom the four (4) evaluation criteria were compliant with the standard assessed compliance in our series. The data collected were entered and analyzed in Excel 2011 and Epi Info version 7.1.

3. Results

A total of 216 files were analyzed. The average age of our patients was 7.57 ± 5.03 years with extremes ranging from 1 month and $\frac{1}{2}$ to 17 years. The most represented age group was under 4 years with 36.1% (Figure 1).

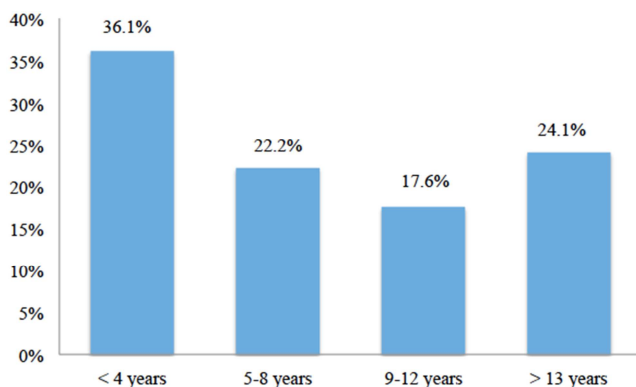


Figure 1. Distribution by age group of patients operated in scheduled paediatric surgery.

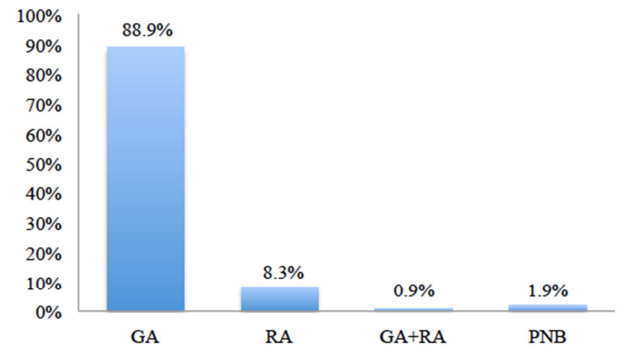
These patients were divided into boys in 76.4% of cases and girls in 23.6% of cases, i.e. a sex ratio of 3.2. Patients were classified as ASA I in 94.9% of cases and ASA II in 5.1% of cases. General anesthesia was the most commonly used technique in 88.9% of cases (Figure 2).

Digestive surgery accounted for 40.7% of cases followed by orthopedic surgery in 32.4% of cases. Table 1 shows the distribution of patients by type of surgery.

Table 1. Distribution of patients by type of surgery.

Type of surgery	Effective (n=216)	Percentage (%)
Digestive	88	40.7
Orthopedics	70	32.7
Urology	40	18.5
Others	14	6.5
ORL	2	0.9
Neurosurgery	2	0.9
Total	216	100

+ Others: skin grafting, nodulectomy, biopsy; ORL: otorhinolaryngology.



GA: general anaesthesia; RA : rachianaesthesia ; PNB : peripheral nerve blocks

Figure 2. Distribution by type of anaesthesia of patients operated in scheduled paediatric surgery.

Concerning the level of intraoperative contamination defined by the Altemier classification, the majority of patients were classified as Altemier I (Figure 3)

Of the 216 patients operated on had ABP prescribed in 51.4% of cases. In 23.1% of cases, ABP was indicated but not performed. The indication of ABP was in compliance with the recommendations in 54.1% of cases (Figure 4).

In 45.9% it was non compliant. The choice of molecule was compliant in 55% of cases and inappropriate in 45% of cases. The antibiotics used were distributed as follows: 2nd generation cephalosporin (C2G) - 42.3% of cases, 3rd generation cephalosporin (C3G) - 31.5% of cases, amoxicillin-15.3% of cases and amoxicillin clavulanic acid-10.8% of cases. 79.3% of cases were in compliance with the time between the surgical incision and the antibiotic injection. It was late (after the surgical incision) in 20.7% of cases. No reinjection was performed, but she was indicated in 21.6% of cases. Overall compliance in our series was 47.1%. Table 2 shows the judgment criteria for assessing ABP compliance.

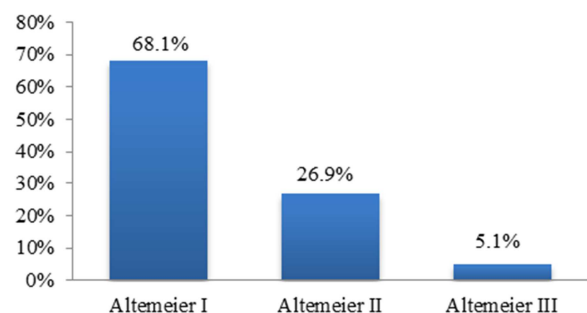


Figure 3. Distribution of surgeries by Altemier class.

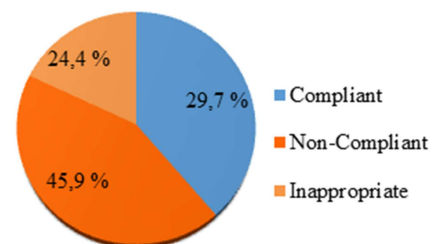


Figure 4. Compliance of antibioprophylaxis in pediatric surgery.

Table 2. ABP judgment criteria.

Criteria	Conforming n (%)	Non-Conforming n (%)
Indication	60 (54.1%)	51 (45.9%)
Choice of molecule	33 (55.0%)	27 (45.0%)
Incision-injection delay	88 (79.3%)	23 (20.7%)
Reinjection	0 (0%)	24 (21.6%)

4. Discussion

Our study has limitations, such as its retrospective nature, as well as the doses of the antibiotic administered and the duration of the ABP, which have not been specified. Many studies have shown that the practice of surgical ABP in general is inappropriate [7-9]. Errors included indications, timing, prolonged duration or inappropriate dosage. In our study, in the absence of local protocols on ABP in surgery and particularly in pediatric surgery, the updated recommendations of the 2010 SFAR were used as a reference for assessing ABP compliance [5].

The ABP indication was respected only in 54.1% of cases. It was not respected in 45.9% of cases, these were patients in whom there was no indication of ABP but who received it. Our results are far below those found by Fall *et al* in Senegal [7] which showed an 89.0% compliance rate for the ABP indication. Daurat *et al* at the University Hospital of Saint Etienne showed that the ABP indication was correct in 82.0% of cases [10]. On the other hand, our results are quite similar to those found by Krug *et al* in which the compliance of the ABP indication was 49.4% [11], also Anandalwar *et al* found 44% of an inappropriate antibioprophyllaxis in our cohort [12]. This low compliance rate in our study can be explained in part by the fact that ABP is sometimes prescribed by surgeons who are unaware of the recommendations of the SFAR, as well as by anesthesiologists who prescribe according to "old" habits that have not been reviewed for several years or by a certain resistance to change. In our study, the indication of ABP was not in compliance with the recommendations in 45.9% of cases. When the prescription is overprescribed, it exposes the patient to the risk of allergies and especially to antibiotic resistance [13, 14].

The choice of antibiotic administered was compliant in 55.0% of cases and this choice was inappropriate, and therefore not in accordance with the recommendations in 45.0% of cases. Fall *et al* and Daurat *et al* found that the choice of molecule used for ABP was correct in 78.0% and 74.0% of cases respectively [10, 11]. As with the indication of ABP, the failure to comply with the choice of molecule is explained by the lack of knowledge of the recommendations in force of the various prescribers, and an update of knowledge would improve our results.

In our series, the time between the surgical incision and the injection of the antibiotic was not respected in 20.7% of cases. Krug *et al* showed non-compliance with the timing of administration in 12.0% of cases [11], Fall *et al* found similar proportions [7], while Daurat *et al* found 32.0% non-compliance with the timing of ABP administration

during an audit of antibiotic prophylaxis practices at Saint-Etienne University Hospital [10]. The reasons for these results could be the unavailability of the product at the time of induction. Antibiotic administration should precede the start of the procedure by approximately 30 to 60 minutes [2, 4, 6] to achieve good tissue diffusion at the surgical site at the time of incision (in practice, induction should be separated from ABP administration by 5 to 10 minutes to determine what each should receive in the event of an allergic reaction); administration of ABP is less effective once the incision is made and is of no benefit after closing the surgical wound exposing the patient to SSI [6, 11, 15, 16].

Concerning intraoperative reinjection, none were carried out in our study, although it was indicated in 21.6% of cases but not carried out. In the clinical audit of [7] the unrealized but indicated reinjection rate was 25%, due to the omission or lack of knowledge of the agents of the ABP reinjection times. The absence of reinjection during surgery exposes patients to SSI [15, 16].

Our study showed an overall compliance of 47.1%, which is close to the results of some studies found in the literature [7, 9], but our results are lower than those of Daurat *et al* and Gilles *et al* [10, 17] who found an overall compliance of 53.0% and 58.0% respectively, which would be explained by the fact that surgical antibiotic prophylaxis recommendations are not known to anesthesia nurses and are not posted in operating rooms. Also the lack of preanesthetic visits and the systematic use of the checklist contribute to perpetuate this situation.

5. Conclusion

The study indicates an overall low compliance rate of 47.1% regarding surgical antimicrobial prophylaxis (SAP) practice in pediatric surgery at University Hospital of Brazzaville, which predisposes the patients to the unnecessary side effects associated with a non-compliant SAP.

Training and periodic evaluation of practices would be desirable in order to comply with current recommendations. Also in the absence of local protocols on antibioprophyllaxis in surgery and particularly in pediatric surgery, a consensus between surgeons and anesthesiologists should be found for their development according to the realities of our country.

Conflicts of Interest

All the authors do not have any possible conflicts of interest.

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