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Anaesthetic practices in the gynaecology and obstetric department in the principal health facilities of Butembo city, Eastern of the Democratic Republic of the Congo

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Abstract

Background: The practice of anaesthesia should be team work involving Obstetrician and Anesthesiologist to determine the anaesthetic and surgical needs of the patient in order to have a successful plan for the baby and mother. The aim of this survey was to evaluate the practice of anesthesia in obstetric and gynaecology department in the principal health facilities of Butembo city. **Methods:** A prospective and observational descriptive study was done in four health facilities of Butembo city, from January 1st, 2015 to December 31st, 2019. **Results:** 64.86% of obstetrical and gynaecological procedures were done under spinal anaesthesia. General anaesthesia with an endotracheal tube was performed in 2.97% of the cases, the laryngeal mask in 0.10% and intra venous anaesthesia without any airway support in 96.93% of the cases. 100% of the cases had benefited from a pre-anaesthetic consultation; 77.75% anaesthesia was administered by anaesthetic officers. 53.27% of the patients were classified as ASA I and 77.25% of cases were electives. Caesareans accounted for 87.83% of emergency cases and 70.73% of elective cases. The pre-medication consisted of atropine and diazepam in 31.02%. Bupivacaine was used for spine anaesthesia in 66.87%. Maintenance during general anaesthesia with ketamine was done in 98.72%. Pethidine was the analgesic used in intraoperative in 48.00%. Tramadol was the most used drugs for pain management in post operative period. Adverse events were recorded in 2.94% of the patients; hypotension was noted in 39.27%. 24 maternal deaths were recorded. Fifteen among them died due to complication related to anaesthesia. There is a dependency between the accidents and complications and qualification of anaesthetists. **Conclusion:** Anaesthesia is commonly used in the gynaecology and obstetric department. It is important to promote continuous training of Non Physician Anaesthetists as well as Consultants Anaesthesiologists in order to practice safe anaesthesia for the well being of our patients. Spinal anaesthesia was the common used predominantly with few adverse events to the mother and foetus.

Keywords: Practice, Anaesthesia, Gynaecology, obstetrics, Butembo, Eastern RDC.

INTRODUCTION: BACKGROUND

Anaesthesia and Resuscitation (AR) are specialities in Medicine that are less well practised in developing countries, but many are the needs and pathologies that can benefit [1-3]. Their exercise requires adaptation to particularities: abundance of pathologies, shortage of material and human resources [4]. Obstetric and gynaecological emergencies are a serious public health problem because of their importance and their vulnerability on several levels: family, individual, social, economic, professional [5].

Whether it is used to provide analgesia during childbirth or to allow a caesarean to be performed, an anaesthesia technique must be safe and have no serious consequences for the mother and the child [4]. Applied during labour, it must, moreover, have no significant consequences on childbirth and obstetric mechanics [6].

Surgical and diagnostic procedures are influenced by technological and pharmacological advances, as well as by social factors, and anaesthetic services have had to adapt accordingly. Anaesthesia in obstetrics is characterized by the simultaneous care of two human beings: the mother and her fetus. The safety of one and the other must be ensured [6, 7].

The anaesthetic practice in gynaecology and obstetrics seems to be a responsibility that must be managed by a gynaecologist-obstetrician-anaesthesiologist, while determining the appropriate anaesthetic management procedures and evaluating the impact of each anaesthetic technique on the mother on the one hand and the fetus on the other hand [8].

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Gynaecological and obstetric emergencies are common in developing countries where they are responsible for high fetal-maternal mortality and morbidity [9]. Their scale has led to awareness at both national and international levels. The World Health Organization (WHO) estimates that more than half a million women worldwide die from gynaecological obstetric complications and poor anaesthetic practices [5, 9-11]. Maternal mortality directly attributable to anaesthesia is the seventh leading cause of maternal death in the latest US data [12], and the ninth in the last triennial survey in England, and partly for anaesthesia and intensive care [13, 14]. Nonetheless, general anaesthesia in pregnant women is associated with increased risk related to airway management [14].

The same source [13, 14] claims that more than 30% of deaths occur in Africa, while in developed countries, 6,000 deaths are recorded each year. In the Democratic Republic of Congo, maternal mortality remains high and has been estimated at 944 cases per 100 000 inhabitants in 2009 [15].

Gynaecological obstetric bleeding is a frequent, dreaded emergency and the leading cause of maternal mortality in underdeveloped countries [11]. Haemostasis surgery, the usual remedy for treatment, makes anaesthesia essential, in a context of risk and which will have to deal with haemorrhagic shock but especially with acute anaemia, hence the constant improvement of patient safety and quality of care in anaesthesia requires regular evaluation [11].

In Europe, the anaesthetic practice in obstetric emergencies accounts for between 8 and 12% of anaesthetic procedures in gynaecobstetric surgery [16].

In Africa, studies have shown that more than 30% of anaesthetic procedures are performed in the gynaecology-obstetric block [17, 18]. It has been shown that 69% of these deaths are preventable thanks to anaesthesia and resuscitation [17].

The particular context of Africa dominated by a shortage of anaesthesiologists and insufficient capacity for on-the-job training justifies the degradation of anaesthetic management [19, 20]. In some African countries, the practice of anaesthesia is unknown and not evaluated [2]. While anaesthesia by its place during surgery is an important support to the surgical team, as shown by the study of Chu *et al.* in Masisi, North Kivu, on surgical care for victims direct and indirect effects of violence in eastern Democratic Republic of Congo [21].

Also in North Kivu, in eastern DRC, specifically in Beni, Ketha *et al.* have shown in their recent publication that anaesthetic practices at Beni General Reference Hospital are adapted to the work environment with insufficient qualified personnel and lack of an appropriate technical platform and this was at the base of the non realization of many specialized surgical acts, which is a major public health problem, which deserves an urgent solution [22].

The complications that often lead to death in anaesthesiological-surgical management in pregnant women occur, most often, in obstetric emergencies, where they are transferred to the operating room for a caesarean, or after a long trial of the work of childbirth or during a major complication related to pregnancy [23].

As anaesthetic practice has become more and more frequent, the risks of this practice are increased. This risk is also increased if anaesthetic practices are carried out under inadequate technical conditions and in the presence of under-qualified personnel [24].

In the diocese of Butembo-Beni, there are fewer anesthetists. Anesthetic practices and especially anaesthesia for cesareans are most often left to ordinary nurses. Anesthetic equipment is almost non-existent and thus anesthesia is performed under unsafe conditions [25].

The patients to be anaesthetized have peculiarities, which is why the favourable result of any surgical procedure depends very much on the quality of the anaesthesia.

The shortage of qualified personnel means that it is unable to respond adequately to the surgical and anaesthetic needs that are sharply increased in the region as a result of an increase in surgical, gynaecological and obstetric conditions, and this most often occurs as an emergency.

On this, from the foregoing we asked ourselves the question of how gynaecological and obstetric emergencies are supported in our environment, because in these conditions without observance of surgical safety, the anaesthetic practice in gynaecological and obstetric emergencies are to high risk and deserves a study to apprehend the problem.

For this reason, we have defined this research under the theme: Anaesthetic Practice in Gynaecology and Obstetrics in Butembo City.

The aim of this work is to evaluate the practice of anaesthesia in the gynecology and obstetrics department of the health facilities of the City of Butembo.

METHODOLOGY

Our study took place in four large health facilities in the city of Butembo: Katwa General Reference Hospital (HGR), Kitatumba HGR, Matanda Hospital and Graben University Clinic (CUG). The town of Butembo is located in the North of North Kivu Province, in the Democratic Republic of Congo.

The selection of facilities took into account attendance, the nature of the interventions performed and the hierarchy (reference structures).

The CUGs are part of the Catholic University of Graben, created with the aim of offering society a specialized framework for the treatment of diseases as well as scientific research. They operate with five specialized departments: Ophthalmology and Dentistry, Paediatrics, Gynaecology and Obstetrics, Internal Medicine and Surgery.

HGR Kitatumba is located 10km from the Katwa HGR. It is a private accredited health facility belonging to the 55th Community of Baptist Churches of Congo (CEBCE). It is the reference general hospital for the health zone of Butembo. It offers the following services: Paediatrics, Gynaecology and Obstetrics, Internal Medicine and Surgery.

The Matanda Hospital, located 5.5 km from the Katwa HGR and the central office of the Katwa Health Zone, was designed in the program of the five-year plan of the Belgian colony. It offers the following services: Paediatrics, Gynaecology and Obstetrics, Internal Medicine and Surgery.

The Katwa HGR, located in the Katwa Urban-Rural Health Zone, is a hospital under the management of the Central African Baptist Community (CBCA). It offers the following services: Paediatrics, Gynaecology and Obstetrics, Internal Medicine and Surgery.

Table 1: Characteristics of the hospitals included for the study

Characteristics	Health formations			
	KATWA	MATANDA	CUG	KITATUMBA
Number of beds in Gynaecology obstetrics service	76	43	16	57
Number of Operating Rooms in Obstetrics Gynaecology	1	1	1	1
Qualification of the person operating				
- General practitioner	Yes	Yes	Yes	Yes
- Specialist in obstetric gynaecology obstetric	Yes	Yes	Yes	No
Qualification of person administering anesthesia	A ₁ and Doctor	A ₀ , A ₁ and Doctor	A ₁ and Doctor	A ₀ , A ₁ and Doctor
Staff nursing gynaecology obstetrics	9	12	8	12

This study looked at 14,563 anaesthetic procedures that were performed in obstetric gynaecology of health facilities constituting our study environment.

This was a proprospective, Observational descriptive study done in the obstetrical gynaecological surgery in the health centers of reference in the city of Butembo from 1 January 2015 to 31 December 2019

Included in our study were all patients who received anaesthesia in gynaecology in any of four health facilities in our study setting, whose medical records contained all data collection variables sought.

Excluded from our study were all patients who did anaesthesia outside of the study period, and those who, although underwent anaesthesia, had incomplete medical records. Also, we excluded all cases of anaesthetic acts in general surgery, orthopedic, ophthalmic and so on.

Our sample was exhaustive, consisting of 9354 anaesthetic acts performed on patients hospitalized in gynaecology-obstetrics service centers of the health facilities constituting our study environment.

The information for each patient was collected on pre-established individual survey cards containing the variables to be studied (see Appendix I: Data Collection Sheet). The files of the patients, as well as the records of the operative reports served as supports for the collection.

We considered:

- **Anesthetist-Reanimator:** A Physician with a Specialized Degree in Anesthesia-Resuscitation.

- **Anesthetist A0:** a nurse with a masters in anesthesiology and resuscitation;

- **Anesthetist A1:** a nurse with a bachelor in anesthesiology and resuscitation

The data capture and analysis was done using the EPI INFO software version 3.5.4 of July 30, 2012. The percentage allowed us to determine

the proportions of the parameters studied. The statistical test that is used for the comparison of qualitative variables is chi-square. The test is significant if $p < 0.05$.

The norms of ethics have been respected in the realization of this work (the informed consent of the authorities of the health structures, the Benevolence and the judgment). Confidentiality was guaranteed anonymously because the patient's name was replaced by a code.

RESULTS

During the study period, 14,563 patients received anaesthesia in the city of Butembo. In our study structures at the Gynaecology-Obstetrics block, the study population had 9,354 files, 64.23% of the cases.

Frequency of anesthesia performed in the different health facilities

The table 2 below gives the frequency of anaesthesia performed in the different health facilities during our study.

It can be seen from this table that the frequency of anesthetic procedure at Gynecology-Obstetrics blocks in the four health facilities is 9354. Matanda Hospital has the highest frequency, 45.62% of cases.

Table 2: Frequency of anesthesia by health facility

Structures	Number of anesthesia performed at GO blocks	Percentage
MATANDA	4267	45,62
CUG	1661	17,76
KATWA	1915	20,47
KITATUMBA	1511	16,15
TOTAL	9354	100,00

Sociodemographic variables and Practice of Anesthesia

The table 3 below gives the proportion of the population according to sociodemographic factors and the practice of anaesthesia.

Table 3: Sociodemographic Factors and Practice of Anesthesia

Sociodemographic variable and anesthetic practice	Frequency	Percentage
Slice from age to year		
<15	63	0,67
15-19	1773	18,95
20-24	2094	22,39
25-29	1214	12,98
30-34	1337	14,29
35-40	1087	11,62

41-45	836	8,94
46-50	614	6,56
50 and over	336	3,59
Profession		
Housewife	3376	36,09
Dressing	1398	14,95
Seamstress	1120	11,97
Cultivatrice	1967	21,03
Student / student	839	8,97
Other	654	6,99
Marital status		
Married	5879	62,85
Single	2729	29,17
Widow	746	7,98
Origin		
City	8319	88,94
Outside town	1035	11,06
Anesthetic techniques		
General anesthesia with IOT	89	0,95
General anesthesia with MF	0	0,00
General anesthesia with ML	3	0,03
General anesthesia outdoors	2901	31,01
Spinal	6067	64,86
Rachianesthesia supplemented by general anesthesia	188	2,01
Other *	106	1,13
Total	9354	100,00

* Diaz analgesia (Pethidine + diazepam); IOT: Orotracheal Intubation, MF: Facial Mask, ML: Laryngeal Mask

Antecedent of anaesthesia, pre-anaesthesia consultation, surgical team qualification, type of anaesthesia, ASA classification, type of intervention.

patients based on antecedent anaesthesia, pre-anaesthetic consultation, surgical team qualification, type of anaesthesia, ASA classification, and type of procedure.

The table 4 below shows the distribution of anaesthesia-treated

Table 4: Distribution of patients by anaesthesia history, pre-anaesthesia consultation, anesthetic team qualification, ASA classification, type of intervention.

Variables	Anaesthesia performed	Percentage
ATCD anaesthesia		
Yes	2729	29,17
No	6625	70,83
CPA		
Yes	9354	100,00
No	0	0,00
AR qualification		
A0	1315	14,06
A1	7273	77,75
Doctor no AR	766	8,19
Doctor Anesthetist Resuscitator	0	0,00
ASA classification		
ASA I	4983	53,27
ASA II	4071	43,52

ASA III	282	3,01
ASA IV	18	0,19
ASA V	0	0,00
Types of intervention		
Urgent	2128	22,75
Programmed	7226	77,25
Total	9354	100,00

Operative Indications and Types of Interventions

The table 5 below divides the patients according to the types of obstetric surgery and the types of intervention.

Table 5: Distribution of Surgery Types by Intervention Types

Operational indications	Types of intervention				Total workforce	Percentage
	Urgent	Percentage	Program	Pourcentage		
Caesarean	1869	87,83	5111	70,73	6980	74,62
Tubal ligation	0	0,00	700	9,69	700	7,48
Salpingectomy	0	0,00	165	2,28	165	1,76
Adnexectomy	0	0,00	78	1,08	78	0,83
Myomectomy	0	0,00	199	2,75	199	2,13
Hysterectomy	109	5,12	272	3,76	381	4,07
Cystectomy	0	0,00	262	3,63	262	2,80
GEU	131	6,16	68	0,94	199	2,13
Nodulectomy / Mastectomy	0	0,00	136	1,88	136	1,45
Ovariectomy	0	0,00	37	0,51	37	0,40
Wedge resection of the ovary	0	0,00	38	0,53	38	0,41
Ovarian tumor removal	0	0,00	31	0,43	31	0,33
Repair Fistulas	0	0,00	42	0,58	42	0,45
Other *	19	0,89	87	1,20	106	1,13
TOTAL	2128	100,00	7226	100,00	9354	100,00

* strapping, Bartholin's cyst, tubal plasty, condyloma, curettage, intra uterine manual aspiration

Operative Indications and Types of Anesthesia

The table 6 below lists the types of gynaecological-obstetrical surgery according to the types of anaesthesia performed.

Table 6: Distribution of Indication according to the types of anaesthesia performed

Operative indication	Types of anesthesia				TOTAL
	AG	RA	AG+RA	OTHERS	
Cesarean	2380	4538	62	0	6980
Tubal ligation	68	632	0	0	700
Salpingectomy	7	158	0	0	165
Adnexectomy	29	49	0	0	78
Myomectomy	79	85	35	0	199
Hysterectomy	83	286	12	0	381
Kystectomy	95	124	43	0	262
USG	53	116	30	0	199
Nodulectomy / Mastectomy	108	0	0	28	136
Oophorectomy	24	13	0	0	37

Cuneiform resection of the ovary	11	21	6	0	38
Ovarian tumors removal	14	17	0	0	31
Repair Fistulas	42	0	0	0	42
Other *	0	28	0	78	106
TOTAL	2993	6067	188	106	9354

P = 0, which proves that there is a statistically significant connection between the two variables; operative indications and types of anesthesia.

Products used in premedication

The following table 7 gives the distribution of cases according to the products used in premedication. At 31.02% of cases premedication was done with atropine associated with diazepam.

Table 7: Distribution of cases according to the products used in premedication

Premedication products	Workforce	Percentage
Atropine and Diazepam	2902	31,02
Atropine	1776	18,99
Diazepam	1306	13,96
Metoclopramide	653	6,98
Promethazine	466	4,98
Cimetidine (Antihistamine)	373	3,99
Nothing to Report	1878	20,08
Total	9354	100,00

Induction medications and Maintenance during general anesthesia

The following table 8 gives the distribution of the cases according to the products used in induction and during the maintenance in those having benefited from the general anaesthesia.

Bupivacaine was used for spinal anaesthesia in 6255 or 66.87% of cases and anaesthetic maintenance in general anesthesia was performed with ketamine in 98.72% of cases.

Table 8: Induction and maintenance products used

Products	Effectif	Percentage
AG	2993	32,00
Ketamine	2873	95,99
Propofol	7	0,23
Halothane	46	1,54
Thiopentane	67	2,24
Isoflurane	0	0,00
Rachianesthesia with bupivacaine	6255	66,87
Other*	106	1,13
Interview completed	2975	99,40
Under Ketamine	2937	98,72
Under Isoflurane	0	0,00
Under Profolol	11	0,37
Under Halothane	27	0,91

III.8. Morphic used intraoperatively

The table 9 below divides the cases according to the opioids used intraoperatively.

Pethidine was the most used morphine intraoperatively in 48.00% of cases.

Table 9: Distribution of cases by morphine used

Morphic Used Intraoperatively	Effective	Percentage
Fentanyl	1683	17,99
Morphine	1402	14,99
Oxycodone	746	7,98
Pentazocine	476	5,09
Pethidine	4484	47,94
Nothing to report (in whom morphine was absent)	563	6,02
Total	9354	100,00

III.9. Intraoperative and postoperative monitoring and postoperative analgesia

The table 10 below breaks down the cases according to the surveillance equipment performed intraoperatively and the postoperative analgesia.

Intraoperative monitoring of patients was performed using a multiparametric monitor in 78.80% of cases.

Table 10: Distribution of anesthetized patients according to intraoperative monitoring postoperative analgesia.

Variables	Number	Percentage
Intraoperative surveillance performed under		
Oxygen concentrator	466	4,98
Electrocardiogram	0	0,00
Multiparametric monitor	7371	78,80
Multi Parameter Monitor and Oxygen Concentrator	934	9,99
No	583	6,23
Postoperative analgesia received		
No	303	3,24
Diclofenac	2149	22,97
Paracetamol	746	7,98
Tramadol	3545	37,90
Tramadol and paracetamol	1492	15,95
Ibuprofen	1119	11,96
Total	9354	100,00

III.10. Accidents and complications according to the types of anaesthesia

The table 11 below lists the accidents and complications recorded according to the types of anaesthesia used.

The result of this table reveals a dependence between accidents and complications and types of anaesthesia. This table shows that 275 accidents and complications were noted in patients, ie 2.94% of cases. There is a dependence between accidents and complications and the type of anaesthesia.

Table 11: Distribution of Accidents and Complications by Type of Anaesthesia

Types of anaesthesia	Accidents and complications										Percentage
	Deceased	Hypotention	Hypertension	Tachycardia	Apnea	Rachi failure	Bronchospasm	Intubation difficult	Nausea and vomiting	Total	
AG (n=114)	15	27	15	19	26	0	8	4	0	114	41,45
RA (n=161)	9	81	39	6	0	12	0	0	14	161	58,55
Total(n=275)	24	108	54	25	26	12	8	4	14	275	100,00

$\chi^2_{\text{Calculated}} = 104,9598067 > \chi^2_{\text{Tabulary}} = 15,50731306$; ddl = 8; P = 4,12239

III.11. Correlation between accidents and complications and the qualification of anaesthetists

The table 12 below gives the correlation between accidents and complications and the qualification of anaesthetists.

There is a dependence between accidents and complications and the qualification of anaesthetists. It can be seen from this table that of the 275 cases of accidents and complications, 156 or 76.72% were observed during the anaesthetic practice performed by A1 level anaesthesia nurses.

Table 12: Correlation between Accidents and Complications and the Qualification of Anaesthetists

Qualification of the anaesthetist	Accidents and complications										Total
	Deceased	Hypotension	Hypertension	Tachycardia	Apnea	Rachi failure	Bronchospasm	Intubation difficult	Nausea and vomiting		
A0	5	19	18	9	15	0	5	0	4	75	
A1	17	89	12	5	11	9	2	4	7	156	
General practitioner	2	0	24	11	0	3	1	0	3	44	
Total	24	108	54	25	26	12	8	4	14	275	

$\chi^2_{\text{Calculated}} = 120,9664 > \chi^2_{\text{Tabulary}} = 26,2962$; ddl = 16; P = 3,5800

DISCUSSION

Frequency of anaesthetic practice in obstetric gynaecology in Butembo city

Anaesthesia in gynaecology-obstetrics accounted for 55.17% of the anaesthetic activity during our study period. This rate is explained by the fact that all the structures make more than 70,00% of the deliveries of the city of Butembo and that they are the referral hospitals for all the complicated pregnancies. The Matanda Hospital has the highest frequency, 37.62%. This result is different from that found by Binam F *et al.* in Yaounde, Tomta K *et al.* in Togo, and Ketha *et al.* in the East of the Democratic Republic of Congo for a frequency of 48.22% respectively; 31.4% and 43.00% [4, 19, 22].

Sociodemographic Characteristics and Practice of Anesthesia

The age group of 20-24 years was the most represented with 22.39% of patients. In African literature apart from some authors such as Belkrezia [26] in Morocco in 2002; most authors have observed a young anaesthetized population [4, 27]. This predominance is in line with the African population, which is mostly young.

In our series, housewives were most recorded in this study with 36.09%, followed by female growers with 21.03%. This is explained by the fact that the majority of the population of Butembo is without function and practices agriculture for food self-sufficiency. Our rate is lower than that of Clutton-Brock T. [14] (66%) $p < 0.001$ out of 200 cases; higher than Tomta K. [19] 46.6% (42/90) ($p < 0.001$).

The results relating to the source, 8319 patients or 88.94% of cases came from the city. This is because they are the only referral hospitals close to the population in relation to their geographic location and to which the first-level health services transfer the complicated cases where specialized services and staff are found. We will discuss the characteristics of health services that propose that care is integrated, that is to say, be close to the population they serve (less than 5 km walk). Our result is different from that of the study by Brouh Y *et al.* [11] on the practice of anesthesia in Côte d'Ivoire, for which 78.80% of the patients came from rural areas.

64.86% of surgical procedures in the gynaecology and obstetrics block were performed under spinal anaesthesia. For general anaesthesia, the endotracheal tube was used in 89 patients or 2.97% of cases, the laryngeal mask in 3 patients or 0.10% of cases, the facial mask in no patient and air anaesthesia 2901 patients, or 96.86% of cases. In France, general anaesthesia in 2003 accounted for only 1.7% of obstetrical anaesthetic procedures [28]. In our series, the rate of caesarean section performed under spinal anaesthesia is high, comparable to that of Itéké [29] and Beye [30]. The use of the laryngeal mask (0.10%) as an alternative to tracheal intubation in minor surgery and short-term surgery or difficult intubation is still infrequent in our series.

Antecedent of anaesthesia, pre-anaesthesia consultation, surgical team qualification, type of anaesthesia, ASA classification, type of intervention.

29.17% of the cases had a previous surgical anaesthesia. Prual [31] reports that in Africa, in its study of serious maternal morbidity due to

direct obstetric causes in West Africa: Incidence and lethality, the woman has already been cesarean sectioned and / or with an anaesthetic antecedent presenting herself. delay with a catastrophic complication and extreme emergency making the anaesthetic procedure.

All patients had benefited from a pre-anaesthetic consultation at a rate of 100%, close-anaesthetic consultation can identify operative risk factors to minimize intra and postoperative complications, A1 level anaesthesia nurses performed 7273 anaesthetic acts, ie 77.75%. The A0 level anaesthetists and GPs were respectively responsible for 1315 acts, 14.06% of cases and 766 acts or 8.19%. In fact, the number of anaesthetists in Butembo City is still very small to cover the need for the community. There is no anaesthetist physician for a population of over 600,000. This shortage of qualified personnel is recognized as a risk factor for increasing maternal morbidity and mortality [9]. As in the literature series, anaesthetic consultations are performed by senior technicians in anaesthesia and resuscitation and most anaesthetic procedures are performed by TSAR [4, 32]. In investigations of anaesthetic practice, Binam in Yaoundé [4] and Sall in the Saint Louis Hospital [33] found respectively 26.5% and 57% of anaesthesia supervised by an anaesthesiologist. Belkrezia in Morocco found 72% of anaesthesia supervised by an anaesthetist [26].

96.79% of the patients had a satisfactory preoperative state, belonging to the ASA I and ASAII classes. The predominance of ASA classes I and II is found in other African series [29, 30, 32]. In 77,25% of the cases the patients had intervened on program and 22,75% in emergency.

Operative Indications and Types of Interventions

Most anaesthesia was performed in a programmed situation in 77.25% of the cases compared to those performed in an emergency situation in 22.75% of the cases. In our series, caesarean section was the first indication for anaesthesia, regardless of the surgical setting. Several African and one French studies also report that caesarean section is the main indication of anaesthesia in gynaecology-obstetrics [28, 30, 34, 35, 36]. In the emergency context, 87.83% of anaesthesia for caesarean section was performed urgently and the anaesthetic consultations were performed by A1 level anaesthesia nurses. In France, anaesthesia consultation was made mandatory in the eighth month of pregnancy to assess the risk of anaesthesia [37].

Products used in premedication

In our series, 31.02% of the cases premedication was made by atropine associated with diazepam. Atropine combined with diazepam was most commonly used for premedication with a frequency of 40.50% in the study conducted by Djomkoué M at the Gabriel Touré University Hospital Center in Bamako, causing anxiety and use in the decreased side effects of anesthesia [38]. The work of Co Tui, Standard S, [39] had shown that the use of atropine in the premedication of locoregional anaesthesia resulted in a reduction in the incidence of hypotension from 76.00% to 52.00 %, but at the expense of tachycardia.

Induction medications and Maintenance during general anaesthesia

For general anaesthesia induction ketamine was used 95.99% of cases. Bupivacaine was used for spinal anaesthesia in 6255 or 66.87% of cases. Spinal anaesthesia with Bupivacaine 0.5% in 100% of cases is the most used technique in Butembo more frequently during cesarean section, the regional blocks were not used in our series. In a study conducted by Djomkoué M at the Gabriel Touré University Hospital Center in Bamako, the types of anaesthesia identified during his work were general anaesthesia (67.1%); epidural anaesthesia (3.00%); spinal anaesthesia (29.80%) and peripheral nerve blocks. These are responsible for only 0.1% because of lack of technical skills [38]. According to Guegen G., spinal anaesthesia is characterized by the preservation of consciousness, its simplicity of execution and its low cost. It is the technique of choice for surgical procedures of less than 2

hours per day on the body and was used in 86.00% of cases at the Regional Hospital of Ziguinchor in Senegal [40].

In DRC, more precisely in Lubumbashi, Kabey AK and colleagues conducted a study on anaesthesia practices found that general anaesthesia was performed in 86.70% of cases, locoregional anaesthesia for 11.80 % and combined anaesthesia at 0.60%. Most loco-regional anaesthesia techniques consist of spinal anaesthesia (66.00%) [41]. Isoflurane, considered to be the reference halogen in obstetrics [25], was not used in our series [42]. Anaesthetic maintenance was performed with ketamine in 98.72% of cases. Our result is different from that of the literature for which sevoflurane (Isoflurane), also recommended for the maintenance of general anaesthesia during caesarean section [43, 44, 45].

Morphine used intraoperatively

Pethidine was the most administered morphine intraoperatively in 47.94% of cases followed by fentanyl in 17.99% of cases. In the literature, it is reported that sufentanil, also indicated for caesarean section [46, 47], is being acquired. Fentanyl was the only morphinomimetic administered intraoperatively in the Essola L study and its collaborators on the practice of anaesthesia in the operating theater of gynecology obstetrics at the University Hospital Center of Libreville [48].

Intraoperative and immediate postoperative monitoring and postoperative analgesia.

Intraoperative monitoring of patients was performed using a multiparametric monitor in 78.80% of cases to measure non-invasive arterial pressure, electrocardiogram, heart rate, partial or peripheral oxygen saturation and temperature,

The postoperative analgesia used was Tramadol alone in 37.90% or 3545 patients. In the study of Essola L *et al.* [48] postoperative analgesia was performed using a multimodal approach. Recently, transverse abdominal block (TAP) has been proposed for post-caesarean analgesia [49]. The practice of this block could be integrated in the protocols of management of the post-operative pain in our structures.

Accidents and complications

275 accidents and complications were noted in patients, ie 2.94% of cases; hypotension was noted in 39.27% of cases. The same patient could have several complications at a time. The frequency of hypotension after spinal anaesthesia is estimated between 55 to 90.00% if not prevented. Our results corroborate with that of Furaha Nzanu and colleagues on the issue of anaesthetic complications during cesarean section in hospitals in the Diocese of Butembo-Beni [25]. Our results coincide with most studies of the complications of caesarean section [26, 29, 30, 32]. Obstetric hemorrhage is the leading direct cause of death in our study [50]. According to the expert committee on maternal mortality in France, it is responsible for 18.7%. In the United States it is responsible for 13% of deaths [50]. As in the expert reports [51, 52, 53], most of these deaths were preventable and did not benefit from the highest level of quality of care. 9 deaths related to anaesthesia were noted in our series. Other studies have also reported deaths from anaesthesia [32, 50, 51, 54].

Limitations

Our study did not reach all health facilities in Butembo city. It was focused on four main health facilities which are well-equipped and more frequented. This could be a limitation to the study. However, those health facilities make more than 70,00% of the deliveries and gynaecological procedures of the city of Butembo and that they are the referral hospitals for all the complicated pregnancies and gynaecological procedures. So we think that our findings reflect the big picture of practices of anaesthesia in gynaecology – obstetrical health

facilities in Butembo. In the expert reports, the most deaths were preventable and did not benefit from the highest level of quality of care. This could be explained by lack of anaesthesiologists. There is an urgent need to build an advanced capacity for improving practices of anaesthesia in gynaecological - obstetrical health facilities in this region.

CONCLUSION

Anaesthetic activity in the gynaecological-obstetrical environment is common. The low incidence of complications in our study is an important aspect, but it should not hide the difficulties encountered during daily practice.

The epidemiological data of our study thus confirm the preponderant role of spinal anaesthesia in our practices of anaesthesia in gynaecology-obstetrics, as well as the absence of major adverse effects of the latter on maternal or fetal morbidity and mortality. These results are obtained provided that they comply with the rules of good practice and maintain constant vigilance and must not be relaxed by anaesthetists.

It is important to promote the continuous training of anaesthetist doctors and senior technicians for an optimization of care. The application by the different actors (anaesthetists, gynaecologists-obstetricians, midwives and nurses) of recommendations made by WHO would improve the quality of care and reduce mortality.

Declarations:

Abbreviations

AG: General anaesthetic;

AR: Anaesthetic and resuscitation;

ASA: American society of anesthesiologists;

BP: Blood pressure;

CBCA: Central african baptist community;

CEBCE: Community of baptist churches of congo;

CUG: Clinic University of Graben;

DRC: Democratic Republic of Congo;

ECG: Electrocardiogram;

ISTM: Institut Supérieur des techniques médicales;

LMD: License Master Doctorate; min: Minimum; max: Maximum;

RA: Regional anaesthetic;

WFSA: World Federation of Societies of Anaesthesiologists;

WHO: World Health Organization

Ethics approval and consent to participate: The study was authorized by the Academic Board of the Catholic University of Graben and approved by the University Ethics committee, under trial No 09/CUG/2019. The Health districts of Butembo and Katwa Ethical Committee also approved the study. Permission to carry out this study was also sought from the administrators of different settings.

Consent for publication: The study has been conducted according to good ethical practice. Explanation was given to the caregivers and the patients about the study objectives, information to be collected, procedures, risks and benefits, how the study findings will be used and given the choice not to participate. Written informed consent was obtained from the patient or nearest relative or a person who had been designated to give consent on admission of the critical patient.

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