

## Original Research Article

### **PROPOSAL FOR A NEW CLASSIFICATION OF CESAREAN SECTIONS FOR DEVELOPING COUNTRIES: A MULTICENTER STUDY IN FIVE MATERNITY HOSPITALS IN DAKAR**

#### **ABSTRACT**

**Objectives:** The general objective of this study was to contribute to the study of the classification of cesarean sections. The specific objectives were to propose a new classification of cesarean sections based on the obstetrical complications specified by the WHO and to see the applicability of this classification, especially in Africa.

**Methods:** This is a prospective, descriptive and analytical study, consisting of a review of the records of patients received at the level of the target maternities and who had a caesarean section during the period from January 1, 2019 to December 31, 2019 (12 months). Our study was conducted at five level 2 and 3 maternity hospitals. All patients who had a cesarean section during the study period were included in the study, as well as those with a uterine rupture discovered during cesarean section in one of the study maternity units in the Dakar region.

We proposed a classification of cesarean section into four groups. In patients with interrelated causes for cesarean section, the most urgent primary indication was used to classify patients into one of the groups.

**Results:** Group I represented parturients with a direct obstetric complication; group II was for patients with an indirect obstetric complication; patients with a fetal complication were grouped in group III. Group IV was for prophylactic cesarean sections. With this distribution, we obtained the following proportions. Group I comprised the majority of indications with 40.9%, group II was the least represented with 3.5%; groups III and IV represented 32% and 24% respectively. Group I of our classification encompasses almost all major obstetrical emergencies and thus allows us to understand that our high rates of cesarean section in our facilities are justified.

**Conclusion:** Direct and indirect obstetrical complications are the main causes of maternal death. Taking these obstetrical complications into account in the cesarean section classification systems would contribute to a better control of maternal deaths.

**Keywords:** caesarean section - obstetrical complications - maternal death - caesarean section classification - Robson classification

## 1. INTRODUCTION

Since 2000, maternal and child health has become a major concern for the international health community and has been chosen to represent two (2) of the eight (8) Millennium Health Goals (MDGs) [18]. This concern is especially relevant in Africa where unfavorable socio-economic conditions expose many pregnancy-related complications, with high maternal and perinatal morbidity and mortality rates. Among the factors contributing to this high rate of maternal and perinatal morbidity and mortality in developing countries is the problem of access to care, particularly to cesarean section.

Caesarean section is an essential surgical procedure in obstetrics, since there are approximately 100,000 caesarean sections per year in France and it remains the most common procedure in the world [3,16].

Since 1985, the WHO has considered the ideal rate of cesarean delivery to be between 10% and 15% [2]. Since that time, cesarean delivery has become increasingly common in both developed and developing countries. However, in recent years, governments and clinicians have expressed concern about the increase in cesarean deliveries and the potential negative consequences for maternal and child health, and the need to reconsider the cesarean section rate recommended in 1985 has been raised [2]. The cesarean section rate differs between the population and hospital levels, and the need for a uniform classification of cesarean sections has been suggested to better control the rate.

Several classifications have been described and used, but none has achieved global consensus. Among those existing, the WHO proposes to adopt the Robson classification system as the international reference system for the evaluation, monitoring and comparison of cesarean section rates within and between health care facilities [1,17].

However, this Robson classification has limitations because it does not take into account the existence of a surgical pool or certain extreme emergencies in the indication for cesarean section.

It is in this context that we considered it necessary to propose a new classification of cesarean sections taking into account these elements; and as an example we will base ourselves on a prospective multicenter study by classifying the different indications according to our new parameters.

The general objective of this study was to contribute to the study of the classification of cesarean sections.

The specific objectives were:

- to propose a new classification of cesarean sections based on obstetrical complications.
- To see the applicability of this classification especially in Africa.

## 2. METHODOLOGY

### Type and period of study

We conducted a multicenter prospective descriptive and analytical study classifying the indications for cesarean sections in 5 surgical maternities in Dakar according to the different classifications of cesarean sections and according to obstetric complications. Subjects were selected according to an exhaustive sampling that identified all cases of cesarean section during the period from January 1, 2019, to December 31, 2019, i.e., a period of 12 months. All patients who had a cesarean section during the study period were included in the study, as well as those with a

**uterine rupture discovered during the cesarean section.** Patients referred postoperatively to the selected facilities were not included in the study. The data collected came from two sources: the first source was the medical records and surgical reports of patients at the following facilities, using a previously established form: the Gynecological and Obstetrical Clinic, the Ouakam Military Hospital, and the Institute of Social Hygiene. The second source for the Centre de Santé Philippe Maguilen Senghor and the Centre Hospitalier National de Pikine came from the File Maker Pro software database used in these two facilities. For each patient, we collected the following parameters: sociodemographic data, main indications for cesarean section, classification of the main indications according to the different classification systems for cesarean section, and then we classified this cohort according to obstetrical complications.

### **Operational definitions**

#### ***Direct obstetric complications***

These are complications that occur during pregnancy, childbirth, or the postpartum period. When not treated effectively from the outset, they become serious emergencies with a high risk of maternal and fetal death. The seven major direct obstetric complications that account for 85% of maternal deaths are: antepartum and postpartum hemorrhage, prolonged labor/dystocia, puerperal infection, abortion complications, preeclampsia/eclampsia, ectopic pregnancy, and uterine rupture. In our study of a cesarean section classification that constitutes care at the end of pregnancy, direct complications such as abortion complications and ectopic pregnancy are excluded. Similarly, puerperal infection is not taken into account because it occurs after the cesarean section.

The direct complications retained to enable a new classification are: antepartum hemorrhage, prolonged labor/dystocia, preeclampsia/eclampsia, and uterine rupture.

#### ***Indirect obstetrical complications***

These are complications that result from a pre-existing disease or condition that developed during pregnancy without direct obstetric causes, but which was aggravated by the physiological effects of pregnancy.

#### ***Fetal complications***

These are complications concerning the feto-annexal state leading to a caesarean section in the parturient.

#### ***Classification according to complications***

These definitions provide an understanding of the breakdown we want to develop. Each of these complications will constitute a group, and patients who receive a Caesarean section in an uncomplicated setting will constitute a separate group.

### **Data Entry and Analysis**

The data collected from the CGO, HMO and IHS were entered using CsPro software. For the CSPMS and CHNP, they were processed directly with FileMaker Pro software.

The analysis was performed with the following software: Excel 2010, Epi info 7.2 and IBM SPSS Statistics 21.

In the descriptive analysis, the qualitative variables were described by frequency tables, bar graphs, and pie charts. Quantitative variables were described by their positional (Mean, median and mode) and dispersion (Standard deviation, extremes) parameters.

The bi-variate analysis allowed us to search for associations between the variables while using the appropriate statistical tests according to their applicability conditions. The alpha risk of error was set at 5% and the CI at 95%.

### 3. RESULTS

The proportion of mandatory cesarean sections was 48.7% (or 1928 patients) as shown in Figure 1.

Concerning the distribution of cesarean sections according to the classification of entry into labor, we noted a predominance of mixed indications (41.3%), which concerned 1633 patients. Figure 2 illustrates this distribution.

The proportion of cesarean sections in group 5 was higher and represented 27% of the cesarean section indications (1068 patients) as shown in Figure 3. These were cases of monofetal pregnancies in a scarred uterus with a fetus in cephalic presentation. Transverse and oblique presentations belonging to group 9 were rare in our series (0.9%).

We noted a predominance of cesarean sections with an extraction time of less than 60 minutes, known as "green code", i.e. 42.3% (n=1674). The following figure 4 shows the details of this distribution according to the 3 cesarean section codes.

We propose to classify the indications for Caesarean section into four groups.

The first group consists of patients whose indications represent direct obstetric complications at the time of delivery that may cause maternal death.

The second group consists of patients whose indications represent indirect obstetric complications.

The third group includes patients whose indications for Caesarean section are related to fetal complications.

The fourth group includes indications for cesarean sections without the context of complications (prophylactic, convenience...). This is shown in Table I.

Following this distribution, we obtain with our cohort the different proportions represented in figure 5.

Group I is the most represented with 1618 patients (40.9%) with direct obstetric complications at the time of caesarean section.

This was followed by patients with fetus-related Caesarean sections (32%) and those with abnormal pelvis, scarred uterus or elective Caesarean sections (23.6%). Group II was the least represented with 3.5% each. For each group, the distribution of indications for caesarean section is shown in the following figure 5.

Caesarean sections for dystocia and severe eclampsia/pre-eclampsia were more represented with 52% and 28% respectively. However, antepartum haemorrhage represented a significant rate of 19%.

In group II, comprising patients whose main indication is related to indirect obstetric complications, the indications for arterial hypertension, diabetes and uterine myomatosis are in the majority with 30.7%, 21.4% and 16.4% respectively.

Indications for acute fetal distress/non-reassuring fetal status for the fetal complications group were in the majority with 34.5%. Caesarean sections for intrauterine growth retardation were the least represented with 2.4%. In group IV, indications for caesarean section for scarred/multi-scarred uterus dominated with 58% or 539 patients.

### 4. DISCUSSION

Maternal death is defined as the death of a woman during pregnancy or during the 42 days following the end of pregnancy, regardless of its duration or location. The cause of death is neither accidental nor incidental. Death is due to, or aggravated by, the pregnancy, or by the necessary care [2]. Death most often occurs as a result of complications. Obstetric morbidity has been defined as any condition in a pregnant woman (regardless of the location and duration of the pregnancy) or in a woman who has been in labour for less than 42 days, due to a cause related to or aggravated by the pregnancy or its management, but not related to an accidental or incidental cause [13]. Nearly 80% of maternal deaths are due to obstetric complications and the therapeutic armory includes caesarean section to improve the prognosis of these parturients (severe maternal morbidity) [6]. Several classification systems have been proposed but none of them took into account obstetric complications in isolation. In its 2014 statement, the World Health Organization concluded that the Robson classification is the system that best meets current local and international needs for classifying indications for Caesarean section, after conducting a systematic review of different classifications. As with other caesarean section classifications, WHO hopes that this classification will help health care facilities to evaluate the effectiveness of strategies or interventions to optimize caesarean section use [15]. However, is the use of this classification in sub-Saharan Africa appropriate? These direct and indirect obstetric complications represent the main causes of maternal death in this region of the world [13]. To better combat maternal mortality, the WHO has identified seven causes of obstetric complications that can directly cause maternal death and indirect causes of maternal death.

To counter this high mortality and the morbidity linked to these obstetric complications, preventive and curative strategies have been implemented, in particular caesarean sections [14]. It is therefore important to take these complications into account in the classification systems, as for the majority, Caesarean section is part of the curative strategy.

Given the importance of this subject, we felt it necessary to propose a classification taking into account the obstetrical complications developed by the WHO.

To do this, we developed 4 groups numbered from 1 to 4. By analysing the distribution of Caesarean section indications in our cohort according to our classification, we find direct peripartum obstetrical complications in the foreground, followed by fetal complications. This is understandable in our context where antepartum haemorrhage, vasculo-renal syndromes, dystocia and uterine rupture represent the first emergencies and occupy a non-negligible proportion of caesarean sections [5]. In the literature [2,5,6,9,13], these complications are the biggest contributors to maternal mortality. Prual et al in their study found a lethality of 3.3% for haemorrhage, dystocia and complications of hypertension [12].

The low proportion of indirect obstetric complications (3.5%) is explained by two facts. On the one hand, we note the regression of many maternal pathologies associated with pregnancy. For example, this is the case of malaria, the incidence of which in pregnant women represented 115 women in the Dakar region for a total number of 7155 cases in 2019, i.e. a rate of 1.6% [11]. On the other hand, in our classification, cases of indirect complications were only taken into account when they were isolated. If they were associated with direct complications, these took precedence over indirect causes. This may justify the low rate of patients in this group.

In our study and in the majority of publications in the literature regarding Robson's classification, the main contributing groups for caesarean section were groups 5, 1

and 10; with group 5 being the majority [3,4,7,8,10]. Robson's group 5 represents patients with a scarred uterus in a full-term pregnancy, regardless of the mode of induction of delivery. But this group does not differentiate patients coming for emergency labour and therefore potentially dystocic labour from parturients who are not in labour. In our study, we separated these two categories of parturients who had a scarred uterus, some in labour had dystocia while those not in labour had prophylactic caesarean sections. This separation allows us to see those who require more urgent and rapid management. So part of our sample was in group I and part in group IV.

Group 1 of Robson's classification includes primiparous women in spontaneous labour with a full term pregnancy. These primiparous women in spontaneous labour had a caesarean section for dystocia or a fetal complication such as distress in more than 50% of cases. Indeed, in our classification, dystocia was in the majority with a proportion of 52% in group I and cardiac rhythm anomalies were in the majority in group III with 32.54%. Group 10 of Robson's classification represents non term pregnancies. Therefore any woman with a non term pregnancy whatever the reason for caesarean section is in this group. Obstetric complications such as antepartum haemorrhage are major contributors to prematurity, whereas prematurity is not an indication for caesarean section. Some of these parturients with a pregnancy that is not full term are therefore in our group I because of the seriousness of the pathology. This makes it possible to understand the predominance of group I by comparing our classification with that of Robson.

Ours is perfectly adapted to our context, as is Robson's, but allows us to better understand where the rate of caesarean sections in hospitals is highest. And it shows that although this rate is said to be high in facilities exceeding the WHO standards, it is justified and even indispensable.

## **5. CONCLUSION**

Comparing this new classification with Robson's, we can see that Robson's dominant groups were all found in the 4 groups of our classification but with a different distribution of proportions. Group I of our classification includes almost all major obstetric emergencies and therefore allows us to understand that our high caesarean section rates in our facilities are justified. This allows us to recommend the introduction of this new classification in clinical practice, especially in sub-Saharan Africa, in order to easily compare our Caesarean section indications and see that they are justified.

### **Consent**

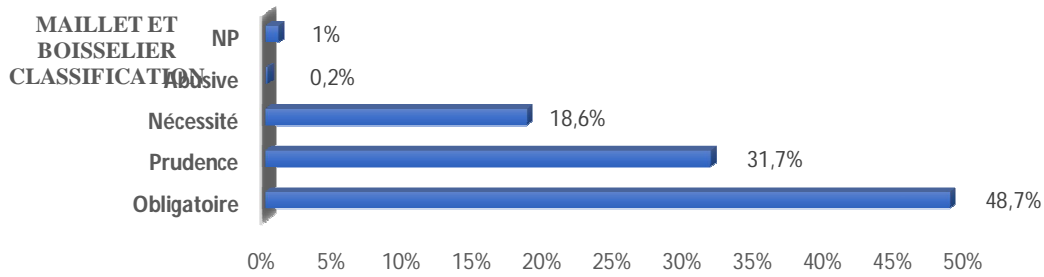
As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

### **Ethical Approval**

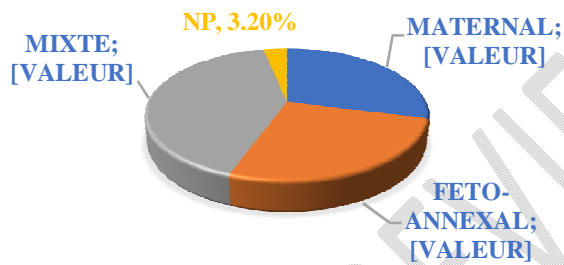
All information was collected anonymously. Prior authorization from the hospital management or the chief medical officer, as well as the approval of the head of the maternity department was obtained at the level of the structures targeted for our study.

## 7. REFERENCES

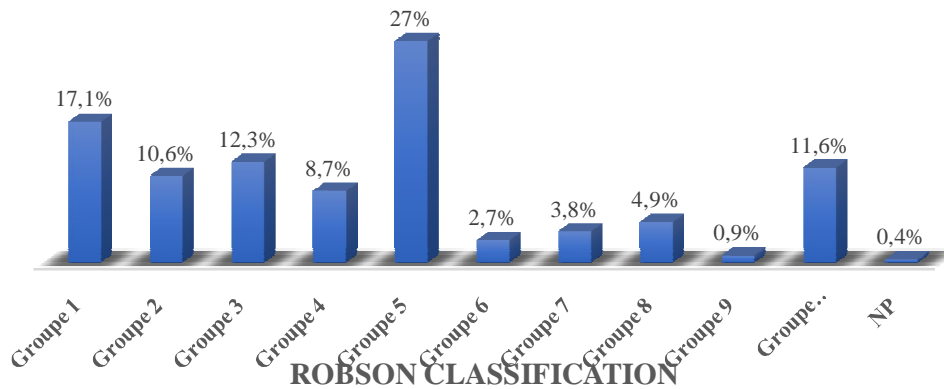
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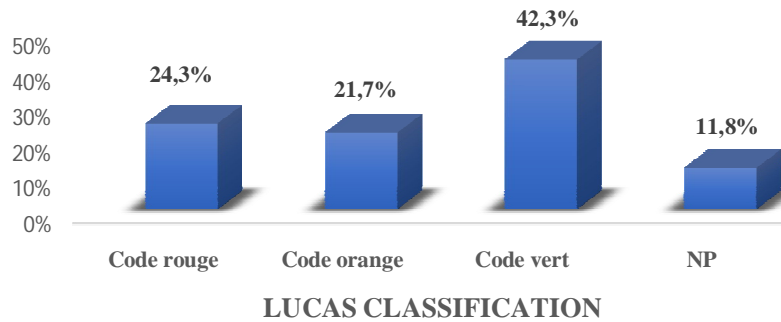
**Figure 1 :** Distribution of caesarean sections according to the Maillet and Boisselier classification



**Figure 1 :** Distribution of caesarean sections according to classification by entry into labour



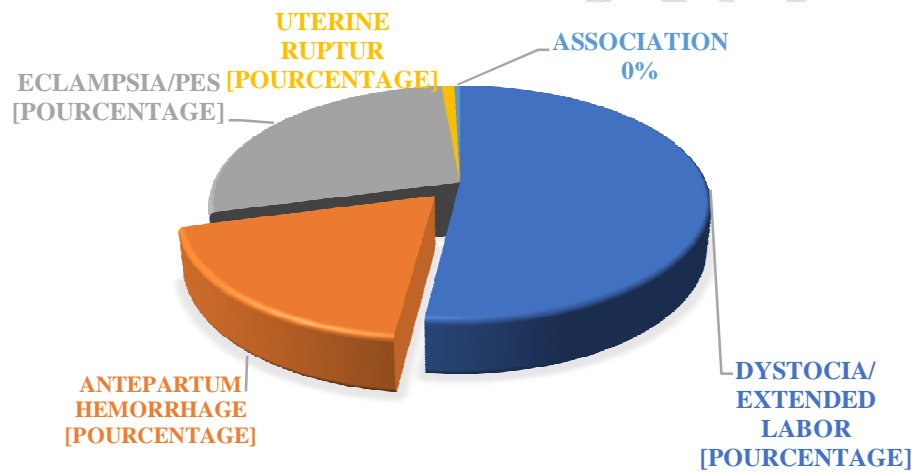
**Figure 2 :** Distribution of patients according to the different groups of the Robson classification



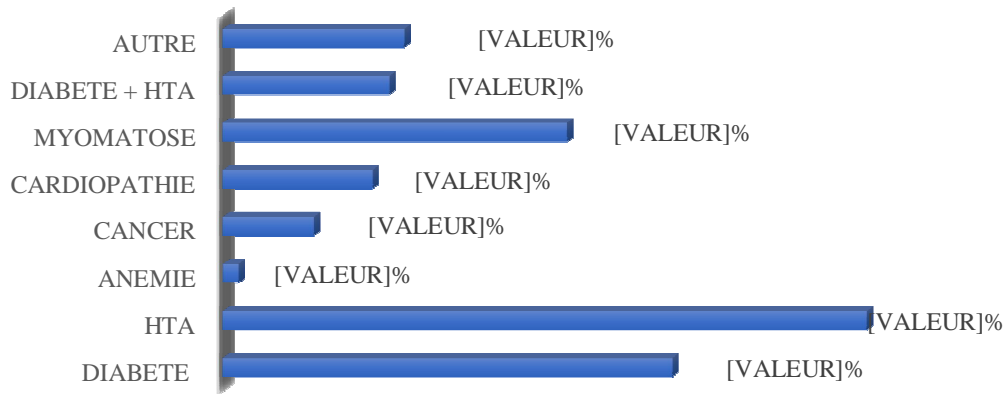
**Figure 3 :** Distribution of caesarean sections according to the Lucas classification

**Table I** : Distribution of caesarean section indications according to obstetrical complications

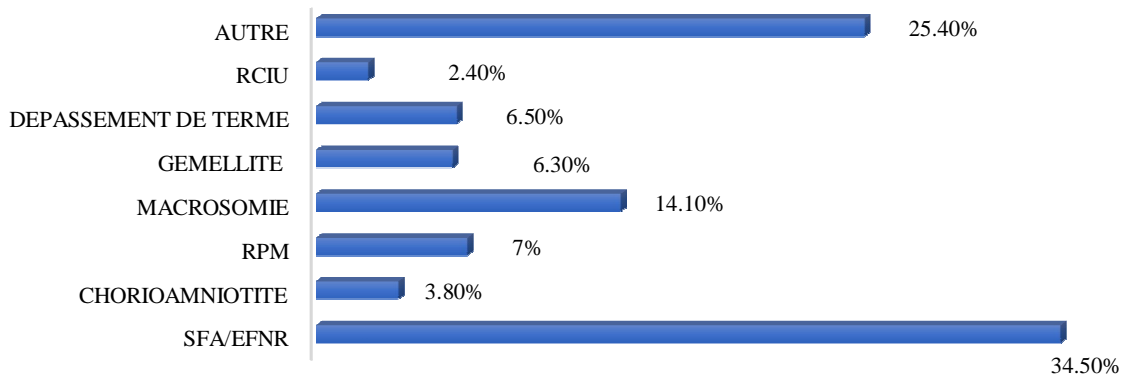
GROUPS	INDICATIONS FOR CESAREAN SECTION
GROUP I	DIRECT OBSTETRIC COMPLICATIONS
GROUP II	INDIRECT OBSTETRIC COMPLICATIONS
GROUP III	COMPLICATIONS FŒTALES
GROUP IV	UNCOMPLICATED CESAREAN SECTIONS



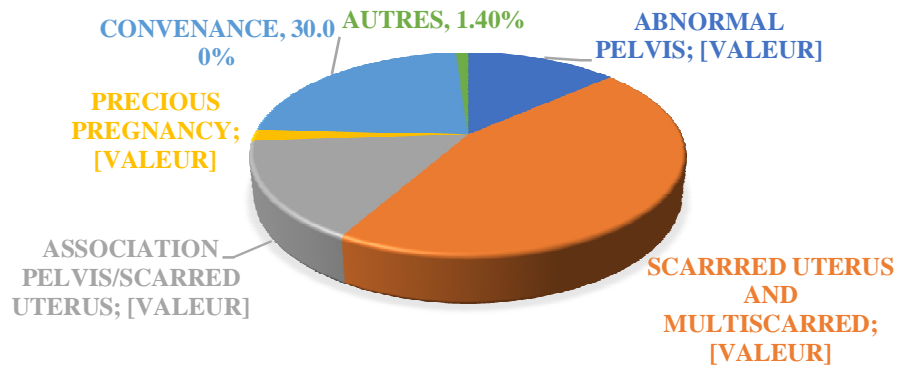
**Figure 5** : Distribution of indications for GROUP I caesarean sections



**Figure 6 :** Distribution of indications for caesarean sections in GROUP II



**Figure 4 :** Distribution of indications for caesarean sections in GROUP III



**Figure 5 :** Distribution of indications for caesarean sections in GROUP IV