

## Research Article

# Towards a unified evidence-based cesarean section in the african continent-Introduction of the all-african surgical database

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## Abstract

Surgeons in different countries are using varying modifications to perform operations for the same given indications. Cesarean Section (CS) is the most frequently performed operation and it is expected that a unified and optimal operation, based on evidence with the most favorable short- and long-term outcomes should be used. An All-African Surgical Database was created in order to unify the CS methodology all over the continent. Software was built in order to record and centralize all reported operations, including each surgical step. The first 1437 reports concerning CS in 7 different African countries highlight a great discrepancy in surgical cultures. In countries, like Burkina Faso and Senegal, where surgical workshops were conducted, the evidence-based CS is widely in use, for the benefit of the patients, and emphasizes the importance of continued education. This is the first report concerning the Database Project which should be adopted in other countries and will enable a unified surgical method to be determined for CS for universal use.

## Introduction

The first successful open abdominal surgery was performed by Ephraim McDowell in 1809 [1], using a longitudinal incision. Throughout the 19<sup>th</sup> century, longitudinal incisions, in all disciplines where abdominal surgery was indicated, were the rule until 1897 when Johannes Pfannenstiel introduced his transverse incision [2]. The first successful Cesarean Section (CS) in the new era was performed by Ferdinand Adolf Kehrer in Meckesheim on the 25<sup>th</sup> of September in 1881 [3]. For many years obstetricians used either longitudinal or transverse incisions depending on their local tradition. Due to strong local traditions, the first comparison between the two types of incisions was only conducted just in 1971 by Mowat and Bonnar [4], which highlighted that the transverse incision resulted with less eventrations.

Until today, different obstetricians, even those working in the same departments, are using different combinations of steps as well as variations in the type of anesthesiology used, the mode of laparotomy, the level of the incision in the uterine wall (with or without omission of the bladder flap) [5], closure of the uterine wall by one or two layers [6], leaving the peritoneum layers open or suturing them [7] and/or the way to close the skin [8]. The Stark Cesarean Section (the Misgav Ladach technique), includes evidence-based steps where all steps were analyzed for their necessity and if found so, for the optimal way of performance.

What is true for CS is valid also for other gynecological operations such as the vaginal hysterectomy or endoscopy. Also in these procedures there are many variations based on local traditions. Recently, attempts were made to analyze each step of the vaginal hysterectomy [9], or

the optimal way to enter the abdomen when performing endoscopic procedures [10]. The Worldwide Cesarean Section (CS) rate has dramatically increased with an average global value of 18.6% (minimum to maximum range 1.4-56.4%) [11]. Nowadays, more than 23 million CSs are annually performed worldwide and three countries have overridden 50%, five countries 40% and 22 countries the 30% range. The increased trends of CS rate between 1990 and 2014 with an interval of about 25 years by the global, regional and national estimates were demonstrated between the previously collected data and the current estimations [11]. For many countries these estimates (1990-2014) correspond with the analogous CS rate from the global data of WHO published in the World Health Report [12]. There are many reasons for the dramatic increase in the rate of CS, definitely not all indications are justified, but it is our duty to enable to the most optimal method with as little as possible post-operative complications, and definitely in countries with limited resources.

There are 54 recognized states in Africa. In the past century, many of these states were controlled by French, Italian, Belgian or British rule. The surgical cultures used in Africa were strongly influenced by the medical practice of the countries which were governing them and these cultures continue even now within the sovereign states of Africa. For example the surgical methods used in Senegal are still strongly influenced by the methods used in France and usually Senegalese

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surgeons choose to attend French universities for their degrees and participate in the national French medical conferences. It is therefore clear that all over the continent, many different surgical methods are in use.

There is no way to compare surgical procedures for their methods, including early and late outcome, if the methods themselves are not standardized. Only standardized methods enable a comparison of performances of different surgeons, hospitals and countries [13].

The New European Surgical Academy (NESA) is an international surgical academy based in Berlin, Germany with members in 54 countries. Its aim, among others, is to evaluate surgical methods, standardize them and distribute surgical knowledge in countries with limited resources. In 2014 the NESA conducted a surgical workshop in Burkina Faso where most of the obstetrical departments in the country were present, and in May, 2015, the NESA conducted a surgical workshop in Dakar, Senegal for all French-speaking countries. Two methods were successfully introduced and locally adopted into standard practice – the evidence-based CS (Stark Cesarean or Misgav Ladach method) and the Ten-step vaginal hysterectomy.

In parallel, the International Society for Gynecologic Endoscopy (ISGE), an international which was founded to support the exchange of information and new ideas among gynecological endoscopists and cooperating with the NESA, successfully conducted an endoscopic workshop. Following these successful workshops the NESA was approached by the African Society of Obstetrics and Gynecology (SAGO), the parent society of all-African gynecological associations, to establish an African Gynecological Surgical Database in order to optimize and unify surgical methods in this field all over the continent, based on evidence, which would improve the post-surgical outcome and enable comparison among surgeons, institutions and countries.

The NESA and SAGO joined forces and created, together with the University of Dakar in Senegal, standardized surgical report forms as well as standardized forms for post-surgical follow-up and evaluation. Due to the large distance between surgical centers in Africa, it was decided that the forms would be completed and centralized electronically. Tailored software was created by the Institute of Numerical Mathematics at the Russian Academy of Sciences (INM RAS) and the Moscow Institute of Physics and Technology (MIPT) for collection of the forms, enabling comparison between different institutions, evaluation and statistical analysis.

The collection of the completed surgical forms from the first 7 African countries that joined the initiative, started May 19, 2016. The aim of this article is to describe the different surgical cultures as could be learned from the first results of 1437 Cesarean Sections performed at 20 different hospitals in the respective countries of Burkina Faso, Gabon, Guinee, Ivory Coast, Mali, the Central African Republic (RCA) and Senegal.

## Material and methods

1437 Cesarean Sections were performed and reported between May 19, 2016 and February 19, 2017 in 20 hospitals from 7 African countries, Burkina Faso, Gabon, Guinee, Ivory Coast, Mali, the RCA and Senegal (Table 1). All of the surgeons used a unified electronic form to report the different steps which they used in each operation. 53.1% of all surgeries were done by epidural anesthesia and 45.5% by general anesthesia with 0.8% conversion from epidural to general.

Following surgical workshops in different African countries, an evidence-based CS was presented to all participants and suggested for

use. The steps were: laparotomy using a modified Joel-Cohen method [14], opening the peritoneum by repeated bi-digital stretching [15], separating and pushing down the bladder plica before opening the uterus [5], leaving both peritoneum layers open [16], suturing the fascia continuously [17], and adaptation of the skin with single sutures [18]. The electronic forms, however, gave the possibility to indicate which of these steps were adopted and when variations were used. In order to unify the surgical method, and enable comparison, even a standardized suture material and size of the needles were recommended [19]. The completed forms were analyzed in order to see which of these steps were adapted in the different countries.

## Results

The surgical step details and how they differ from each of the 7 countries can be viewed in Table 2. It is clear from the comparison chart (Table 2) that the country where most of the evidence-based, optimal steps occurred is in Burkina Faso, where 100% of the abdominal incisions were done by the modified Joel-Cohen method. Nearly all of the parietal peritoneum is opened by stretching and left open at the end of the surgery. The fascia is closed continuously and the skin with 99.2% with single stitches.

In all of the 7 countries, most of the bladder flaps are omitted. At the moment there is a discussion in the literature about the importance of this step and therefore a prospective study is needed and planned [5]. In the RCA, most surgeries were done using the Pfannenstiel incision. The visceral peritoneum is sutured with 93.9%, and the parietal peritoneum is left open with 84.1%.

## Discussion

Each step in any operation has an influence on the outcome [20] and CS is no different. Details which are not in the scope of this study, such as the location of the surgeon during surgery or the usage or omission of abdominal packs, do influence the outcome [21]. There is enough evidence that the outcome of the following suggested method is a reduced need for analgesics and shorter operation time [22].

Many obstetricians in different countries are using surgical steps which were taught to them by their instructors based on local traditions which depend on the background and countries where the surgical techniques originated. For many years, local traditions prevailed, such as using a transverse incision or a longitudinal one. The proof is that the first comparison between both took place only 74 years after the superior transverse incision was introduced [4].

The All-African Surgical Database enables, for the first time, a unified, optimal CS method based on evidence which in turn enables comparison among different surgeons, institutions and countries. In the coming years, the Database will enable comparison of the early and late outcomes as compared to the single steps in different institutions and certainly more African countries will join the project. The reason for the large discrepancies currently seen between the different countries is definitely due to the workshops conducted in Burkina Faso and Senegal, where an evidenced-based CS was introduced and adopted by local surgeons, as compared to other countries where local traditions still prevail and where workshops were not yet conducted.

## Conclusion

Surgical education which sheds light on the current knowledge regarding the importance of each surgical step, when it is accompanied by surgical demonstrations, encouraging local doctors in each country

**Table 1.** Number of surgeries in the different countries.

	Burkina Faso	Gabon	Guinee	Ivory Coast	Mali	RCA	Senegal	Total
CS	118	227	437	11	72	82	490	1437
Hospital	2	5	3	1	2	3	4	20

**Table 2.** Detailed surgical steps in the different countries.

Surgical details	Global Frequency	Burkina Faso	Gabon	Guinee	Ivory Coast	Mali	RCA	Senegal
<b>Type of abdominal incision</b>								
Modified Joel-Cohen	42,2%	100,0%	34,8%	37,1%	45,5%	75,0%	2,4%	38,0%
Pfannenstiel	53,8%	0,0%	59,5%	59,0%	54,5%	19,4%	82,9%	60,0%
Mouchel	0,5%	0,0%	1,3%	0,0%	0,0%	1,4%	3,7%	0,0%
Longitudinal	3,0%	0,0%	5,7%	3,7%	0,0%	2,8%	11,0%	0,6%
<b>Opening the peritoneum</b>								
Repeated stretching by fingers	73,3%	99,2%	76,2%	39,1%	100%	78,8%	85,4%	90,8%
Sharp instruments	26,6%	0,0%	23,3%	60,4%	0,0%	21,2%	13,4%	7,3%
<b>Opening the bladder flap</b>								
Using scalpel	3,8%	0,0%	1,3%	0,0%	0,0%	0,0%	1,2%	4,9%
Using scissors	9,6%	0,0%	43,6%	0,2%	72,7%	2,8%	4,9%	10,4%
Omission of the bladder flap	84,1%	100,0%	54,2%	98,9%	27,3%	95,8%	91,5%	79,2%
<b>Visceral peritoneum</b>								
Left open	28,7%	98,3%	49,8%	1,1%	18,2%	94,4%	6,1%	21,2%
Sutured	69,1%	1,7%	49,8%	98,4%	81,8%	1,4%	93,9%	73,7%
<b>Parietal peritoneum</b>								
Left open	64,6%	96,6%	43,2%	27,7%	0,0%	95,8%	84,1%	93,7%
Sutured	33,0%	3,4%	56,4%	70,5%	100%	1,4%	15,9%	4,7%
<b>Suturing the fascia</b>								
Continuously	97,0%	100,0%	98,7%	99,5%	100,0%	95,8%	95,1%	93,7%
Single stitches	1,9%	0,0%	0,4%	0,0%	0,0%	0,0%	3,7%	4,7%
<b>Skin closure</b>								
Single stitches	78,6%	99,2%	9,7%	95,9%	100,0%	90,3%	31,7%	95,7%
Intradermal	20,7%	0,8%	89,9%	4,1%	0,0%	1,4%	69,5%	3,3%
Staples	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,2%

to perform the evidence-based CS under surveillance, is the key towards the introduction of an optimal CS technique to the different countries.

It is obvious that where such workshops were conducted, the application was enthusiastically accepted as the local doctors were convinced of the ease, simplicity and efficiency accompanying short and safe operations and of the benefits in the immediate short-term outcome. What is valid for Africa is certainly valid worldwide, and it seems that CS, which is the most frequently performed operation, will be the first one with a unified surgical method for universal use.

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