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Clinical Outcomes and Feasibility of the Extraperitoneal Cesarean Section: Insights from the Yaoundé Gynecological, Obstetric, and Pediatric Hospital

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Abstract

Introduction: The extraperitoneal cesarean section (ECS) offers a compelling alternative to the conventional transperitoneal approach. Its core advantage lies in potentially reducing maternal morbidity. This technique specifically aims to lower infectious complications and enhance postoperative recovery. We report our experience and perioperative outcomes with ECS at a major referral hospital in Cameroon. **Methods**: A prospective observational, descriptive study was conducted in our maternity unit from August to September 2021. Among 201 deliveries, 69 were cesarean sections. From these, we included 11 cases of ECS, representing a frequency of 15.94%. We excluded patients with a scarred uterus, prior major surgery, grade 2 or higher obesity, a praevia obstacle, macrosomia, or any life-threatening condition for mother or fetus. Sociodemographic, clinical, intraoperative, and postoperative data were collected and analyzed. **Results**: Attempted rate of ECS was 15.94%. The procedure was successful in 81.81% of cases (9/11), with two conversions to transperitoneal section due to difficulty in fetal extraction. The average patient age was 29 years. The primary indications for surgery were non-reassuring fetal status (27.27%) and severe preeclampsia (18.18%). Spinal anesthesia was used exclusively. The mean fetal extraction time was rapid, at 1 minute and 56 seconds. Average operative duration was 34

minutes and 17 seconds. Intraoperative blood loss was minimal, remaining under 500 ml for 81.8% of patients. Complications included one bladder injury and two minor peritoneal breaches. Postoperative outcomes were notably positive. Most patients (72.73%) reported only minimal or moderate pain. Nearly half (45.45%) required no analgesics within the first 24 hours. Bowel function returned immediately for 72.73% of women, and the same proportion reported satisfactory early mobility. **Conclusion**: Our preliminary series from HGOPY demonstrates that the extraperitoneal cesarean section is a feasible technique. It is associated with low intraoperative morbidity and an excellent early recovery profile, particularly regarding pain, mobility, and return of bowel function. These promising results confirm the value of ECS for improving postoperative care pathways. It represents a compelling alternative to the conventional technique, certainly deserving of further evaluation through comparative studies.

Keywords

Extraperitoneal Caesarean Section, Maternal Morbidity, Postoperative Recovery, HGOPY, Cameroon

1. Introduction

Cesarean delivery ranks among the world's most common surgical procedures. Its incidence continues to rise, a trend particularly evident in low- and middle-income countries [1]. The conventional technique, the transperitoneal cesarean section, requires incising the parietal peritoneum to access the uterine cavity. According to the World Health Organization (WHO), a cesarean rate between 10-15% is sufficient to cover necessary medical indications [2]. Significant disparities exist, however, across the African continent, where hospital rates can be strikingly high. While life-saving, this procedure exposes patients to several risks directly linked to opening the peritoneal cavity. These risks include postoperative ileus, intra-abdominal adhesions, and a heightened potential for infection and peritonitis [3] [4].

The extraperitoneal cesarean section (ECS) was developed to counter these specific complications. It aims to preserve peritoneal integrity. First described by Frank in 1907, this technique has experienced a renewed interest in recent decades [5]. Its fundamental principle involves accessing the uterus through an extensive vesico-uterine dissection, deliberately avoiding any opening of the peritoneum. This approach contains amniotic fluid, blood, and uterine secretions within the retropubic space of Retzius [6]. The theoretical advantages are compelling. They include a reduction in infectious morbidity, such as endometritis and peritonitis less postoperative pain, and the prevention of adhesions. Ultimately, this leads to a faster maternal recovery, characterized by an early return of bowel function and easier mobilization [7] [8].

Despite these benefits, the ECS is widely considered more technically demand-

ing. A learning curve is involved, which likely explains its limited adoption. The international scientific literature presents mixed evidence. While some studies are promising, others call for more robust data, a point highlighted in several meta-analyses [8] [9].

In sub-Saharan Africa, the context is crucial. Maternal morbidity and mortality rates remain unacceptably high. Surgical resources are often limited. In such settings, adopting techniques that reduce postoperative complications is of paramount importance [10]. Yet, data on the practice and outcomes of ECS within this specific context are scarce. A Malian study by Diallo *et al*. demonstrated the technique's feasibility, noting favourable outcomes like reduced analgesia needs and rapid resumption of feeding [11]. Similarly, a case report from Cameroun by Metogo *et al*. reported a positive experience, emphasizing the complete absence of postoperative complications [12]. These pioneering studies illuminate the technique's potential for African settings. But also underscore a clear need for broader documentation.

It is within this specific gap that our study was conducted. We carried out this work at the Yaoundé Gynaeco-Obstetric and Pediatric Hospital (HGOPY). Our goal was to describe our initial experience with the extraperitoneal cesarean section. We focused on evaluating its feasibility, its success rate, and its impact on immediate maternal and neonatal outcomes. We aim to contribute valuable, nascent data on this surgical alternative from a Central African perspective.

2. Methodology

2.1. Study Design and Setting

We conducted an observational, descriptive and prospective case series. The study took place over one month, from August to September 2021. It was set at the Yaoundé Gynaeco-Obstetric and Pediatric Hospital (HGOPY), a national reference centre for maternal and child health. This university hospital, with its robust technical facilities and high patient volume, provided an ideal setting for evaluating this surgical technique.

2.2. Study Population and Sampling

Our target population consisted of all women who delivered by cesarean section at HGOPY during the study period. The source population was further refined to include only those patients with complete and available medical records who underwent a cesarean.

We used a non-probabilistic, consecutive sampling method. Every eligible patient who consented to participate during the data collection period was included. This study was designed as a feasibility analysis for a specific surgical technique. Its primary aim was to describe the characteristics and outcomes of a defined cohort. Therefore, a census of all cases over a set period was deemed more appropriate than a sample size calculation. Our final study population included 11 patients, representing every woman who underwent an attempted ECS during the

study window.

2.3. Inclusion and Exclusion Criteria

Inclusion in the study required an attempted extraperitoneal cesarean section, regardless of the original indication, coupled with the patient's informed consent.

We established clear contraindications for attempting the ECS procedure. Patients presenting with any of the following pre-operative conditions were not eligible:

- A scarred uterus (from a previous cesarean or myomectomy with cavity entry).
- Suspected acute fetal distress requiring ultra-rapid delivery.
- Antepartum haemorrhage.
- Morbid obesity (Class II or III, BMI ≥ 35 kg/m^2).
- Suspected fetal macrosomia (estimated weight ≥ 4000 g).
- The patient refused to participate in the study.

2.4. Data Collection

Data were collected prospectively using a pre-tested, validated survey form. This information was gathered in three distinct phases:

- Pre-operative: Data came from medical records and patient interviews, covering sociodemographics, medical history, admission reasons, and clinical examination.
- Intra-operative: The surgical team recorded data directly in the operating room, noting anesthesia type, procedure timings, complications, conversions, estimated blood loss, and newborn weight.
- Postoperative: Patients were followed daily during hospitalization; some also received a home visit. We assessed pain using the Visual Analogue Scale (VAS), noted the return of bowel function, monitored mobility, documented any complications, and evaluated patient satisfaction. Patient satisfaction was formally measured across four predefined domains (postoperative autonomy, postoperative pain, duration of hospitalization and home follow-up and monitoring).

2.5. Variables

The studied variables encompassed sociodemographic details, clinical history, admission parameters, and cesarean indications. We also rigorously recorded the ECS success rate, operative duration, blood loss, postoperative pain (VAS score), time to resume intestinal transit and mobility, complications, and neonatal Apgar scores and weight.

2.6. Data Analysis

Data entry and analysis were performed using IBM SPSS Statistics, Version 26.0. For the descriptive analysis, we summarized quantitative variables such as age, operative duration, and VAS scores using means, standard deviations, medians,

and ranges. Qualitative variables, including parity, surgical indications, and complications, were presented as frequencies and percentages.

2.7. Ethical Considerations

Ethical approval was granted by the HGOPY Institutional Ethics Committee (Ref: 107/CIERSH/DM/2021). We obtained written, informed consent from every participant after a detailed explanation of the study's goals, potential benefits, and risks. Anonymity and data confidentiality were strictly maintained throughout the research.

2.8. Operative Procedure

Extraperitoneal Cesarean Section procedure was performed as follows:

The extraperitoneal approach to cesarean delivery is a refined surgical technique that requires a detailed understanding of the retropubic anatomy. The primary objective is to access the lower uterine segment without breaching the parietal peritoneum, thereby confining the surgical field to the space of Retzius.

2.8.1. Patient Positioning and Initial Incision

The patient is positioned in a modest dorsal decubitus, often with left lateral tilt to minimize aortocaval compression. After standard aseptic preparation and draping, a Pfannenstiel incision is favored. This is a curvilinear transverse incision made approximately 2 - 3 cm above the symphysis pubis, extending through the skin and subcutaneous fat. The anterior rectus sheath is then incised transversely, and it is meticulously dissected superiorly and inferiorly to expose the underlying rectus abdominis muscles.

2.8.2. Development of the Retropubic Space (Space of Retzius)

This is the most critical and technically demanding phase of the operation. The rectus muscles are separated in the midline by blunt dissection, revealing the underlying transversalis fascia and the prevesical fat. The key maneuver is the careful, purely blunt dissection to sweep the urinary bladder, along with the underlying parietal peritoneum, away from the posterior aspect of the pubic bone and the lower uterine segment. This is achieved primarily using the surgeon's index finger, gently creating a tunnel in a cephalad direction. The dissection continues until an adequate portion of the lower uterine segment is exposed. The integrity of the peritoneal fold, which appears as a glossy, whitish layer superiorly, must be preserved at all costs. This step effectively creates a "cave" in the retropubic space where the subsequent hysterotomy will be performed.

2.8.3. Uterine Incision and Fetal Extraction

A transverse hysterotomy is then performed within this created space. Due to the confined operative field, the incision might be slightly more cephalad compared to a classic transperitoneal approach. The hysterotomy is carefully extended, often using the surgeon's fingers or bandage scissors, with constant attention to avoid lateral extension into the uterine vessels. The membranes are ruptured, and the

fetus is delivered. Fetal extraction can sometimes be challenging due to the limited space; therefore, adjuvant maneuvers such as fundal pressure, internal podalic version, the use of a vacuum extractor (e.g., Kiwi® cup) or incision of the rectus abdominis muscles may be employed judiciously.

2.8.4. Uterine Closure and Hemostasis

Following the delivery of the fetus and placenta, the uterus is exteriorized through the retropubic space for repair. The hysterotomy is closed in two layers using a continuous, absorbable suture such as polyglactin 910 (e.g., Vicryl®). Hemostasis is meticulously secured. The uterus is then returned to its anatomical position.

2.8.5. Wound Closure

The retropubic space is gently irrigated with warm saline and inspected for hemostasis. A drain is typically not required. The anterior rectus sheath is closed with a continuous suture, followed by routine closure of the subcutaneous tissue and skin.

2.8.6. Postoperative Care

Monitoring during the first two hours was carried out in the immediate postoperative unit by the surgeon and anaesthetist. They recorded haemodynamic parameters, the amount of bleeding and the quality of the uterine globe.

To prevent postpartum haemorrhage, all patients received an infusion of 30 IU of oxytocin (Syntocinon®) in 500 ml of 5% glucose serum.

In stable patients, transfer to the ward's postoperative unit was indicated at the end of the second hour (H2). Subsequent monitoring was carried out by the residents/interns on duty according to the same procedures described above. In addition, the latter were responsible for calculating EVA scores every six hours during the first 24 hours.

A postoperative blood count was systematically performed after 24 hours.

The nurse systematically suggested that the patient get out of bed one hour after surgery and then every hour until the patient felt able to do so.

Oral feeding was authorised as soon as gas was passed and/or peristaltic sounds were heard.

Postoperative pain management followed a single protocol for all patients in the study. Painkillers were not prescribed systematically but were mainly guided by patient requests and pain intensity assessments using the VAS. Patients required pain management if their VAS score was ≥4.

The following regimen was adopted:

- First-line treatment: 100 mg of ketoprofen administered rectally every 6 hours.
- Second-line treatment: 1 gram of paracetamol administered intravenously every 6 hours.
- Third-line treatment: 50 milligrams of tramadol per os every 6 hours.

Postoperative data was collected by the intern assigned to the postoperative unit using an individual assessment form. The surgeons and anaesthetist did not have access to the postoperative follow-up data.

Patients who did not present any particular problems and had regained satisfactory autonomy were offered discharge from the hospital 24 to 48 hours after surgery. Postpartum counselling was provided, emphasising warning signs, as well as a paediatric consultation for the newborn. They remained in constant telephone contact with the principal investigator of the study.

48 hours after the end of the patients' hospital stay. They were offered a choice between a home visit by a doctor or at the hospital. A clinical assessment was carried out for this purpose and a decision on rehospitalisation was considered if necessary.

3. Results

Figure 1 below shows the patient flow diagram.

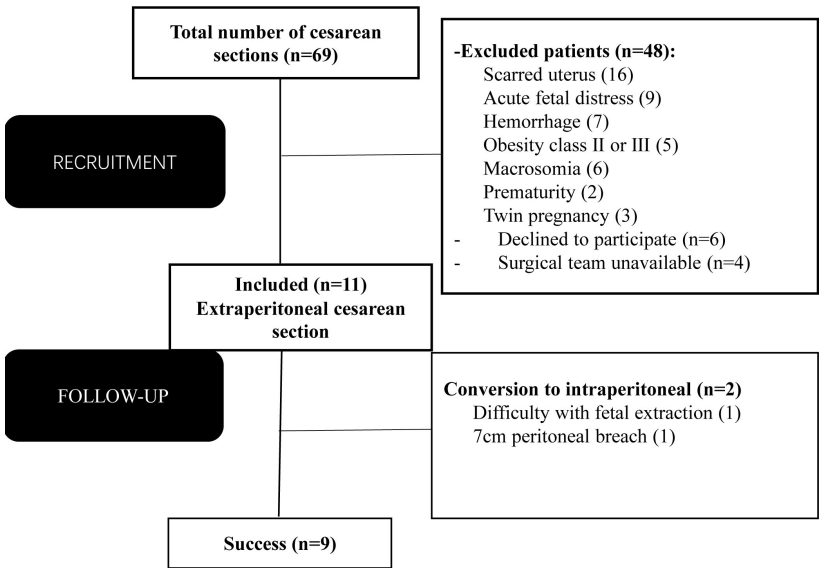

Figure 1. Patient flow diagram.

3.1. Frequency

During the study period, we recorded a total of 201 deliveries. Of these, 69 were cesarean sections, representing 34.32% of the total. Our focus was on the extraperitoneal approach. Among all cesareans performed, 11 were attempted as extraperitoneal procedures. This corresponds to a frequency of 15.94%. The procedure was successful in 9 of these 11 cases. This gives us a success rate of 81.81%. The two remaining cases required conversion to the conventional intraperitoneal technique (Table 1).

Sociodemographic and Clinical Patient Profiles

Table 1. Patient characteristics.

Characteristics	N = 11	%
Age		
Means	**29**	

Continued

Range	26 - 35	
[14 - 25]	3	27.3
[26 - 35]	6	54.5
[36 - 45]	2	18.2
Parity		
Nulliparous	4	36.36
Primiparous	1	9.09
Pauciparous	4	36.36
Multiparous	2	18.18
Marital Status		
Single	8	72.7
Married	3	27.3
Education Level		
Primary		
Secondary		
Higher Education		
Body mass index (BMI)		
<18.5 (underweight)	0	0
18.5 - 24.9 (Normal)	1	9.09
25 - 29.9 (overweight)	**5**	45.45
>30 (Obese)	5	**45.45**
Gestational age		
37 Weeks - 40 weeks	7	63.6
40W01d - 41W06d	4	36.4
Presentation		
Cephalic	10	91
Breech	1	9
Membranes status		
Ruptured	3	27
Unruptured	8	73

- The 26 - 35 age group was the most represented with 54.50%, and the average age was 29.
- Only 18.18% of our sample consisted of multiparous women.
- 91% of foetal presentations were cephalic.

3.2. Intraoperative Patient Profiles (Table 2)

Table 2. Intraoperative data.

Characteristics	N = 11	%
Type of cesarean section		
Emergency	6	54.55
Scheduled	5	45.45
Surgical indication		
Cephalopelvic disproportion	2	18.18
Severe preeclampsia	2	18.18
Non-reassurant fetals tatus	3	27.27

Continued

Cord round the neck	2	18.18
Oblic lie in labor	1	9.09
Large baby in breech	1	9.09
Mean operative times		
Incision to hysterotomy	9min 37s (6 min 40 s – 13 min 24 s)	
Hysterotomy to fetal extraction	1 min 56 s (45 s – 4 min 35 s)	
Total surgery duration	34 min 17 s (23 min 35 s - 52 min 40 s)	
Difficulty with extraction		
Yes	4	36.40
No	7	63.60
Conversion to intraperitoneal		
Yes	2	18.19
No	9	81.81
Estimated blood loss		
<500cc	9	81.81
500 - 1000cc	2	18.19
Intraoperative complications	5	
Peritoneal Breaches	2	18.19
Plaie vésicale	1	9.09
Fetal weight		
<2500 g	1	9.09
2500 - 3499 g	4	36.36
3500 - 3999 g	6	54.55
Apgar Score (5 min)		
≤ 7	1	9.09
> 7	10	90.91

- More than half of our patients were admitted for emergency caesarean sections, with 6 cases (54.55).
- Difficulty in foetal extraction was encountered 4 times out of 11 (36.40%).
- Only 2 out of 11 cases (18, 19) % of extraperitoneal caesarean sections, were converted to intraperitoneal.
- Intraoperative complications included bladder injury in one patient and two accidental openings in the peritoneum measuring 2 cm and 3 cm respectively, which were repaired.
- 90.91% of newborns had an Apgar score above 7.

3.3. Postoperative Characteristics (Table 3)

Table 3. Postoperative data.

Characteristics	N = 11	%
Postoperative pain		
Max VAS		
Mild pain [1 - 3]	4	36.36
Moderate pain [4 - 6]	4	36.36

Continued

Severe Pain [8 - 10]	3	27.27
Need for analgesics within 24 h		
No	5	45.45
Yes	6	54.55
Postoperative mobility	9	
<3 h	4	45
3 – 6 h	2	22
>6 h	3	33
Return of bowel function		
immediate	8	72,73
≤ 3 h	1	9.09
Late (>12 h)	2	18.18
Length of hospital stay		
48 h	8	72.73
> 48 h	3	27.27
Readmission	0	0
Postoperative Complications	0	0
Postoperative Satisfaction		
Satisfaction with autonomy		
Yes	8	72.73
No	3	27.27
Postoperative pain		
Yes	8	72.73
No	3	27.27

- Patients with a successful ECP (n = 9) reported mild to moderate postoperative pain scores in 88.88% (8/9).
- 45.45% did not require painkillers during the first 24 hours after surgery.
- 67% of patients were up within 6 hours after surgery.
- 72.73% of our patients experienced immediate recovery of bowel function in the immediate postoperative period.

4. Discussion

Our study represents one of the first formal evaluations of the extraperitoneal cesarean section (ECS) in Central Africa. It demonstrates that this technique is not only feasible but also promising within a Cameroonian reference hospital setting. We found a success rate of 81.8% and a favourable safety profile, suggesting its potential to reduce postoperative maternal morbidity.

4.1. Feasibility and Success Rate

The rate of ECS among all cesarean sections was 15.9% (11/69). This figure reflects our initial implementation phase and the strict patient selection criteria we applied. Nearly half of the potential candidates were excluded, primarily for contraindications like a scarred uterus or suspected acute fetal distress. Our 81.8% success rate aligns well with existing literature. Series from Asia show rates between 79.63% and 93.10% [9] [13]. The two conversions in our series were due to diffi-

cult fetal extraction and an extensive peritoneal breach. These cases highlight the learning curve inherent to this technique and underscore the need for careful patient selection, particularly in avoiding confirmed macrosomia.

4.2. Patient Profile and Clinical Aspects

Our patients were typically young, with an average age of 29 years. The majority were nulliparous or pauciparous (72.7%). This is an ideal profile for ECS, as the technique can help preserve future fertility by reducing the risk of adhesions [3]. A high proportion of our procedures (45.5%) were prophylactic, allowing for optimal surgical planning. This selective approach differs from some studies where ECS was performed as an emergency procedure [13], but it is a prudent strategy during the initial learning phase, where mastering the technique is paramount.

4.3. Operational Data and Complications

The average delivery time in our series was 11 minutes. It is slightly longer than the 4.96 minutes reported by Sharma *et al.* [9]. This reasonable duration can be attributed to the careful and meticulous dissection of the vesico-uterine space.

We recorded a minor intraoperative complication rate, including two peritoneal breaches and one bladder injury. This is a direct indicator of the procedure's technical difficulty. Our peritoneal breach frequency (18.19%) aligns well with existing literature [9] [13]. These incidents, which were repaired immediately without sequelae, are part of the expected learning curve. Difficult fetal extraction (36.4%) was managed with ancillary maneuvers, confirming that the restricted working space can pose a challenge, especially with abnormal fetal presentation or a larger baby. In such challenging cases of fetal extraction, our primary ancillary maneuver was the distal sectioning of the left rectus abdominis muscle. This controlled enlargement of the surgical field provided the additional space needed to safely complete the delivery without converting to a transperitoneal approach.

4.4. Postoperative Recovery and Outcomes

The most striking benefits of ECS were observed in the postoperative period. Patients with a successful ECP (n = 9) reported mild to moderate postoperative pain scores in 88.88%. This key finding supports the conclusions of a meta-analysis by Tappauf *et al.*, which associated ECS with a marked reduction in analgesic consumption [14]. Postoperative recovery was remarkably swift. Most patients resumed oral intake within 6 hours, experienced an almost immediate return of bowel function, and could care for their newborns independently within 12 hours. These figures surpass what is typically seen after conventional intraperitoneal cesarean sections. The benefits stem from avoiding intestinal manipulation and peritoneal injury, which significantly reduces reflexive ileus [15].

We recorded no cases of endometritis or peritoneal infection. This result is consistent with the core principle of the technique: containing uterine secretions. Di-

allo *et al*. in Mali similarly reported an absence of surgical site infections in their series [11]. Neonatal outcomes were satisfactory, with only one case of neonatal asphyxia linked to severe preeclampsia and intrauterine growth restriction, rather than the surgical technique itself.

4.5. Patient Satisfaction

Overall patient satisfaction was high (72.7%). Women particularly valued the reduced pain, their quickly regained autonomy, and the shorter hospital stay. This subjective yet crucial parameter is increasingly recognized as a vital indicator of quality in obstetric care [16] [17].

4.6. Strengths, Limitations, and Future Directions

The primary strength of our work lies in its prospective data collection and detailed analysis of postoperative recovery, providing valuable insights for an African context. We must, however, acknowledge its limitations. The small sample size and the absence of a control group limit the statistical power and generalizability of our findings, as well as the strict exclusion criteria. The impact of the learning curve on operative times and complications cannot be overlooked.

Despite these limitations, our results are highly encouraging. They justify the continued practice and further evaluation of ECS. The essential next step is a randomized controlled trial, comparing ECS directly with the conventional intraperitoneal technique within the same centre. This would provide a higher level of evidence for its benefits. Standardizing the procedure, training more surgeons, and cautiously expanding the indications as expertise grows could allow more women to benefit from this promising alternative.

5. Conclusion

This study demonstrates that the extraperitoneal cesarean section is far more than a technical curiosity. It is a viable and highly beneficial surgical alternative in the Cameroonian obstetric context. The technique proved both feasible and safe at HGOPY. Despite an inevitable learning curve, reflected in an 18.19% conversion rate, ECS revealed its transformative potential for the mother's postoperative experience. The most notable benefit was an accelerated maternal recovery. Mothers experienced less pain, an almost immediate return of bowel function, and regained autonomy within hours. This allowed them to focus on bonding with and caring for their newborns much sooner. The absence of endometritis and high patient satisfaction further confirm the postoperative comfort and immediate safety. Its reasoned and evaluated adoption presents a concrete and exciting opportunity to improve the quality of obstetric care in Cameroon and across sub-Saharan Africa.

Conflicts of Interest

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

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