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ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

Surgical complications of cesarean section

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SUMMARY

Introduction/Objective Cesarean section birth rate has been constantly increasing worldwide over the last decades. The complications of cesarean section that require relaparotomy are rather serious and relatively rare. The aim of this paper is to present the incidence of surgical complications after Cesarean section at the Clinic of Gynecology and Obstetrics, Clinical Center of Serbia, Belgrade, Serbia, during a three-year period (2013–2015).

Methods This is a retrospective study. Data obtained from the medical records/histories were used and processed according to descriptive statistical methods.

Results During the observed period, relaparotomy was necessary in 29 (0.44%) women who had a CS. Relaparotomy was performed due to clinically and ultrasonographically evidenced hematoma of the anterior abdominal wall, retroperitoneal hematoma, hemoperitoneum, and development of hemorrhagic shock, complete wound dehiscence or diffuse peritonitis. There were no lethal outcomes after CS followed by these complications at the Clinic of Gynecology and Obstetrics, Clinical Center of Serbia in Belgrade.

Conclusion The incidence of relaparotomy in our study is similar to other tertiary institutions, as well as the indications for relaparotomy. While generally observed mortality rate after post-cesarean relaparotomy in developed countries is 2.7%, in our study there were no lethal outcomes.

Keywords: surgical complications; caesarean section; relaparotomy

INTRODUCTION

Cesarean section (CS) birth rate has been constantly increasing worldwide over the last decades [1]. At the Clinic of Gynecology and Obstetrics, Clinical Center of Serbia in Belgrade, this rate has increased over the last years from 30% to 37% in 2015. The increase is attributed to maternal and fetal risk factors, pathological course of pregnancy, and the obstetricians' experience and attitude [2]. More recently, previous delivery by CS frequently imposes the need for every subsequent pregnancy to be delivered in the same way. Maternal morbidity associated with emergency CS is higher compared to elective CS, and maternal complications are more frequent in repeated CS [3].

CS complications requiring relaparotomy are rather serious and relatively rare. The most commonly encountered complications of CS are bleeding and infection [4, 5]. Prolonged labor, longer time period after rupture of the membranes and greater number of vaginal examinations favor postoperative infections, while some risk factors for hemorrhage at CS are uterine atony, *placenta previa*, *placenta accreta*, and the history of previous postpartum hemorrhage [4].

The paper is aimed at presenting incidence of surgical complications after CS at the Clinic of Gynecology and Obstetrics, Clinical Center of Serbia in Belgrade, Serbia, during a three-year period (2013–2015).

METHODS

The retrospective case study included patients who underwent relaparotomy during a three-year period (2013–2015) aimed at management of complications associated with CS performed due to relevant indications at the Clinic of Gynecology and Obstetrics, Clinical Center of Serbia. Over the aforementioned period, relaparotomy was necessary in 29 patients delivered by CS. Twenty-four women had CS at the Clinic of Gynecology and Obstetrics, Clinical Center of Serbia, while five patients were transferred to our Clinic after CS was performed at some other maternity hospital in Serbia. Therapeutic relaparotomy was necessary in all of the aforementioned women due to immediate postoperative complications and vital threats.

Indications for relaparotomy, time of onset of complications, intraoperative findings, and the type of reintervention were determined. Postoperative period in the intensive care unit, blood and blood derivative transfusions, choice of antibiotic therapy, total duration of stay in the intensive care unit, total duration of recovery period, and outcome of treatment were followed-up.

The obtained data were processed according to descriptive statistic methods using MS Excel (Microsoft Corporation, Redmond, WA, USA) and SPSS Version 10 (SPSS Inc., Chicago, IL, USA). The investigations were done in accord

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with standards of the institutional committee on ethics. The data were obtained from the patients' medical records/histories. The anonymity of the patients was respected. No intervention was conducted apart from standard clinical procedures, in the best interest of patients.

RESULTS

During the 2013–2015 period, 19,511 deliveries were carried out at the Clinic of Gynecology and Obstetrics. CS was performed in 6,589 women. CS rate was 34%. It was determined that relaparotomy was necessary in 29 patients after CS (0.44%). Out of that number, CS was performed in 24 patients (0.36%) at the Clinic of Gynecology and Obstetrics, Clinical Center of Serbia, while five patients were transferred to our clinic after CS performed elsewhere in Serbia. In all the women, CS was performed under general anesthesia. Patients who had CS at our Clinic were prophylactically treated with nadroparin (2850 IU) starting 10–12 hours after CS and with antibiotics immediately after the umbilical cord clamping.

The most common indications for CS included previous CS (in most of the patients it was second CS, while in one patient is was fifth CS) and twin pregnancy resulting from *in vitro* fertilization. In 55% of women, emergency CS was performed, while in 45% it was an elective CS.

In 12 women who underwent CS, relaparotomy was performed due to ultrasonographically evidenced hematoma of the anterior abdominal wall. In two of these patients, postoperative course was complicated by the subfebrile condition. Relaparotomy was indicated due to retroperitoneal hematoma in two patients. In four patients urgent relaparotomy was performed due to hemoperitoneum and the development of hemorrhagic shock. Reintervention was necessitated due to complete wound dehiscence in seven patients. In one patient, relaparotomy was required due to the development of diffuse peritonitis, and in one due to the application of Mikulicz tamponade for the correction of hemostasis (Figure 1).

The average time between CS and relaparotomy was 143 hours – i.e. approximately 5.9 days. In the case of wound dehiscence, time to reintervention was approximately 13.2 days, 3.9 days in the case of hematoma. In cases of hemoperitoneum and hemorrhagic shock, the average time before relaparotomy was seven hours, while in the case of diffuse peritonitis it was 158 hours – i.e. approximately 6.5 days.

In all the cases where hematoma was present, its evacuation, complete abdominal cavity exploration, revision of hemostasis, and resuture of the anterior abdominal wall were performed. In two cases, evacuation of hematoma and resuture of the uterus were sufficient for the correction of hemostasis. Ligature of the uterine artery was more frequently needed (in three patients), i.e. ligature of the hypogastric artery (in two patients). Postpartal hysterectomy with adnexal conservation was required in two cases, out of which in one case it was accompanied by Mikulicz tamponade due to iatrogenic injury of the common iliac artery (Table 1).

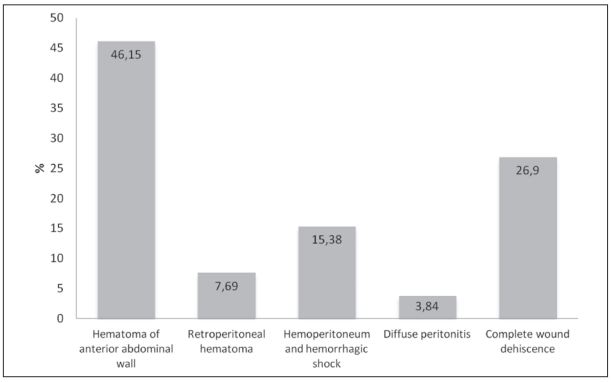

Figure 1. Indications for relaparotomy

Table 1. Type of intervention

Type of intervention	n
Debridement and resuture	9
Evacuation of hematoma, exploration of abdominal cavity, revision of hemostasis and resuture	12 (29)
Suture of the uterus	2
Ligature of the uterine artery	3
Ligature of the hypogastric artery	2
Postpartal hysterectomy	4
Mikulicz tamponade	1

Reintervention was necessary in all five patients admitted to our clinic after CS performed in other institutions. Indications were the following: wound dehiscence (two cases), anterior abdominal wall hematoma (two cases), and diffuse peritonitis associated with the development of sepsis (two cases). Wound dehiscence with or without hematoma was resolved by wound debridement and resuture – evacuation of hematoma that was always accompanied by exploration of the abdominal cavity and revision of the anterior abdominal wall hemostasis. Resuture of the uterus was performed in one case and in two patients who developed peritonitis and sepsis, postpartal hysterectomy with adnexal conservation was mandatory.

In women who underwent relaparotomy due to hematoperitoneum or retroperitoneal hematoma, the intraoperative blood salvage / cell saver procedure was followed. This method is associated with fewer adverse effects compared to allogeneic blood transfusion. Autologous salvaged blood provides better quality red blood cells that have not been subjected to the detrimental effects of blood storage.

In all the patients with massive hemorrhage, the following procedures were conducted:

– preservation of intravascular volume, either by intraoperative blood salvage, or by using plasma expanders;
– use of antifibrinolytics (tranexamic acid);
– use of tissue adhesives and fibrin glues;
– administration of desmopressin;
– if necessary, inotropic drugs.

Perioperatively, as a relevant method of assessing coagulation, rotational thromboelastometry was used.

In the course of reintervention, the patients received 875 mL of blood and 425 mL of plasma on average, as

well as 4.6 doses of cryoprecipitate on average. During the immediate postoperative course, all the patients were on intensive care units, with their stay averagely lasting 3.2 days, and received over the period additional 405 mL of blood and 315 mL of plasma on average as well as four average doses of cryoprecipitates. They were most commonly treated with triple antibiotic therapy. All the patients responded well to the applied measures and all were discharged to outpatient treatment in good general condition. There were no lethal outcomes.

DISCUSSION

Based on the literature data, relaparotomy rate after CS ranges 0.2–0.9% [4, 6, 7, 8]. In our study, relaparotomy was indicated in 0.44% of the patients, which falls within the range observed in other countries. The difference in relaparotomy rates in different settings may be explained by conditions offered by the medical institutions of higher level, possibilities of appropriate diagnostic measures and monitoring in intensive care units, technical and staff potentials and experience related to the treatment of these patients. As a rule, the rate is lower in tertiary level institutions [5].

Hemodynamic instability as a consequence of suspected intraabdominal and/or vaginal bleeding is reported to be the most common indication for relaparotomy after CS, accounting for approximately 66–68% of the cases [9, 10, 11]. For these reasons, relaparotomy is most commonly performed within the first five hours of CS, which corresponds to clinical picture of hemodynamic instability [6]. In our study, hemoperitoneum and hemorrhagic shock were not so common. They were recorded in 15.38% of all surgically corrected complications of CS, and they were resolved within 10 hours of CS. Somewhat longer period of approximately two weeks before treatment is reported in cases of infected hematomas. In all our studied patients with wound dehiscence, time to reintervention was approximately 13 days, while in cases with hematomas it was approximately four days.

In a large study that included 28,799 patients, relaparotomy was performed after CS in 35 patients for the following indications: intraabdominal bleeding (34.2%), intraabdominal hematoma (22.8%), and atony (8.6%) [11]. In a study by Ragab et al. [7], the most common indication for post-cesarean relaparotomy was internal hemorrhage (hemoperitoneum) (66.6%), while maternal mortality occurred in 16.6% of the patients. Also, in a study by Huras et al. [8], hematoperitoneum was the main indication for post-CS relaparotomy. On the other hand, the most predominant indications in our study were hematoma (46.15%) and wound dehiscence (26.92%), followed by hemorrhagic shock (15.38%) and diffuse peritonitis (3.84%), and there were no lethal outcomes. Evidenced risk factors in a study by Gedikbasi et al. [12] included three and more previous CS, placental abruption, and multifetal pregnancies, which is consistent with our findings. If hysterectomy is necessary after CS, it is most commonly the result of uterine atony accompanied by severe bleeding with *placenta accreta* also being a significant risk factor [13].

In women who underwent relaparotomy due to hematoperitoneum or retroperitoneal hematoma, the intraoperative blood salvage / cell saver procedure was conducted. This is now standard procedure even for routine cesarean delivery in tertiary centers [14]. However, current guidelines do not support the routine use of cell salvage during caesarean section, but its use is considered rational in women at high risk of hemorrhage or if unanticipated bleeding develops during CS [15].

Assumption that the duration of CS may be associated with the higher risk of relaparotomy was not confirmed in our study [5]. The incidence of maternal mortality after CS in developed countries (USA) is 13.3 per 100,000 inhabitants, while in vaginal delivery the incidence is 3.6 per 100,000. General incidence of severe complications associated with CS is 9.2%, with total maternal mortality being 2.7% [6, 16, 17, 18]. During the three-year period (2013–2015) there were no lethal outcomes after CS at the Clinic of Gynecology and Obstetrics, Clinical Center of Serbia in Belgrade.

CONCLUSION

The incidence of relaparotomy in our study is similar to other tertiary institutions, as well as the indications for relaparotomy. While generally observed mortality rate after post-cesarean relaparotomy in developed countries is 2.7%, there were no lethal outcomes in our study.

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Conflict of interest: None declared.

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Хируршке компликације царског реза

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САЖЕТАК

Увод/Циљ Број порођаја путем царског реза (ЦР) стално се повећава широм света током последњих деценија. Компликације царског реза које захтевају релапаротомију релативно су ретке али прилично озбиљне. Циљ овог рада је да се покажу инциденције хируршких компликација након ЦР на Клиници за гинекологију и акушерство Клиничког центра Србије у Београду током трогодишњег периода (2013–2015).

Методе Студија је дизајнирана по ретроспективном типу. Коришћени подаци добијени су из медицинске документације и обрађени према дескриптивним статистичким методама.

Резултати Током посматраног периода релапаротомија је била неопходна код 29 (0,44%) жена код којих је рађен царски рез. Релапаротомија је извршена због клинички и ултрасонографски доказаног хематома предњег трбушног зида, ретроперитонеалног хематома, интраабдоминалног крварења и развоја хеморагичног шока, потпуне дехисценције ране или дифузног перитонитиса. На Клиници за гинекологију и акушерство Клиничког центра Србије у Београду у проучаваном периоду није било смртних исхода услед компликација ЦР.

Закључак Инциденција релапаротомије у овој студији слична је као у другим терцијарним установама, као и индикације за релапаротомију. Генерално гледајући, стопа морталитета после релапаротомије због компликација ЦР у развијеним земљама износи 2,7%, док у овој студији није било смртоносних исхода.

Кључне речи: хируршке компликације; царски рез; релапаротомија