

Management of anesthesia for cesarean section in parturients with placenta previa with/without placenta accreta: A retrospective study

Znieczulenie do cięcia cesarskiego u rodzących z łożyskiem przodującym z/bez łożyska wrośniętego – badanie retrospektywne

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Abstract

Objectives: The aim of this retrospective study was to review placenta previa cases and determine the prognostic factors effective on morbidity and mortality and to evaluate the strategy of anesthetic management.

Material and methods: 65 women with placenta previa scheduled for elective or emergency cesarean sections from 2004 to 2009 were examined. Patient demographic data, surgery and obstetric characteristics, anesthetic techniques, blood transfusions, the values of hemoglobin and complications were recorded.

Results: Mostly, general anesthesia was preferred in the parturients with placenta previa (86.2%, 56/65). 9 patients (13.8%), 2 of whom were converted to general anesthesia due to bleeding and prolonged surgery, received regional anesthesia. 37 of 65 women (56.9%) with placenta previa had had cesarean sections previously. More than half of these patients (21/37, 56.7%) had abnormally invasive placentation and 16 of 21 cases underwent cesarean hysterectomy. The incidence of complications in women with previous cesarean section with abnormally invasive placentation was higher than in the other women ($p < 0.0001$). Three patients were transferred to the intensive care unit; 2 were intubated and mechanical ventilation was applied, and 1 died of hemorrhage.

Conclusions: Anesthetic management is important for parturients with placenta previa who had previous cesarean section or abnormally invasive placentation. We found that general anesthesia was our method of preference for placenta previa as we wished to avoid the risk of bleeding. However, regional anesthesia can be safe in patients lacking any abnormally invasive placentation.

Key words: **placenta previa / placenta accreta / cesarean section / anesthesia /**

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Streszczenie

Cel pracy: Celem tego retrospektywnego badania była analiza przypadków łożyska przodującego pod kątem oceny czynników prognostycznych wpływających na zachorowalność i śmiertelność oraz ocena postępowania anestetycznego.

Materiał: Przeanalizowano 65 przypadków kobiet z łożyskiem przodującym zakwalifikowanych do elektywnego lub pilnego cięcia cesarskiego w latach 2004-2009. Zebrano następujące dane: demograficzne, wywiad operacyjny i położniczy, techniki anestetyczne, transfuzje krwi, poziomy hemoglobiny i powikłania.

Wyniki: Preferowaną metodą znieczulenia u rodzących z łożyskiem przodującym było znieczulenie ogólne (86,2%; 56/65). Przewodowe znieczulenie otrzymało 9 pacjentek (13,8%) ale u 2 z nich trzeba było przejść na znieczulenie ogólne z uwagi na krwawienie i przedłużony czas operacji. 37 z 65 kobiet (56,9%) z łożyskiem przodującym miało cięcie cesarskie w poprzedniej ciąży. Więcej niż połowa tych pacjentek (21/37, 56,7%) miała nieprawidłowo utworzone łożysko a 16 z 21 przeszło histerektomię położniczą. Częstość powikłań u kobiet po cięciu cesarskim w wywiadzie i z nieprawidłowo utworzonym łożyskiem w analizowanym materiale była wyższa niż u innych pacjentek ($p < 0,0001$). Trzy pacjentki przekazano do oddziału intensywnej opieki medycznej, 2 zaintubowano i wentylowano mechanicznie, 1 zmarła z powodu krwotoku.

Wnioski: Postępowanie anestetyczne jest istotne u rodzących z łożyskiem przodującym po przebytych cięciu cesarskim lub nieprawidłowo utworzonym łożyskiem. Preferowaną metodą anestetyczną było znieczulenie ogólne w przypadkach łożyska przodującego w celu uniknięcia ryzyka krwawienia. Znieczulenie przewodowe może być bezpieczną metodą u pacjentek bez nieprawidłowości łożyska.

Słowa kluczowe: łożysko przodujące / łożysko wrosnięte / cięcie cesarskie / znieczulenie /

Introduction

Primary cesarean section (C/S) often leads to repeat C/S, which may lead to placenta previa and abnormally invasive placentation [1]. Placenta previa, with an incidence of 0.3-0.6%, occurs when part of the placenta implants within the lower uterine segment. It is one of the major causes of massive obstetric hemorrhage and can result in increased maternal, fetal and neonatal morbidity or mortality [1, 2]. Placenta previa is also a risk factor for abnormally invasive placentation and can cause increased hysterectomy rate [2, 3].

Abnormally invasive placentation, comprised of placenta accreta, increta, and percreta, is a leading cause of postpartum hemorrhage and is also associated with significant maternal morbidity. Surgical morbidity may be related to the degree of placental invasion [3]. In the literature, the term "placenta accreta" or "abnormal placentation" are used to define any degree of placental invasion, but we prefer the term "abnormally invasive placentation" [3-5]. The incidence of abnormally invasive placentation ranges from 1 in 540 to 1 in 93.000 deliveries [6]. This incidence appears to be increasing, most likely as a consequence of the rising cesarean delivery rate over the past several decades [3]. There is a need for reliable antenatal diagnosis for these serious conditions because it is necessary to be prepared for managing a major hemorrhage [1, 7, 8]. If these pregnancies can be identified before delivery, the place and time of delivery, as well as the surgical approach can be planned ahead and decrease the blood loss [9].

The aim of this retrospective study was to evaluate the incidence of placenta previa and abnormally invasive placentation, anesthetic management and preparations before surgery, blood transfusion requirements, and the rate of complications, and to determine the prognostic factors effective on the involved morbidity and mortality and define the strategy of anesthetic management in our institution.

Materials and Methods

After ethics committee approval, a retrospective study for years 2004 to 2009 was carried out in our university hospital with the help of a computerized obstetric database and hospital records. All cases with placenta previa were reviewed. For each patient, the following information was recorded: age, gravidity, parity, gestational age, duration of surgery, number of previous C/Ss, the nature of the surgery (emergency or elective), abnormally invasive placentation, anesthetic technique, placed intravenous lines, amount of blood products transfused, preoperative and postoperative blood hemoglobin concentrations, maternal mortality and morbidity, and length of hospital stay.

Placenta previa was defined by ultrasound as a partial or complete covering of the internal cervical os by the placenta. Abnormally invasive placentation was diagnosed by histopathological or clinical criteria, the latter including clinical symptoms and findings of imaging techniques.

Statistical analysis was performed with the SPSS (SPSS for Windows, release 16.0) statistical package. The results are presented as means±standard deviation, medians (range) or numbers (%), as appropriate. Due to the lack of agreement with normal distribution, demographic data and obstetric characteristics were presented as medians (range) and percentages. Intraoperative complications were compared between the groups using Chi-Square test. Hemoglobin values and blood transfusions were analyzed using Kruskal Wallis and Mann-Whitney tests. Blood and blood product transfusion between patients who received general and regional anesthesia were analyzed using Chi-Square test confirmed by Fisher's Exact test. P value of <0.05 was considered statistically significant.

Results

In the 6-year analysis, 65 women with placenta previa scheduled for elective or emergency C/S were examined. The incidence of placenta previa was found to be 0.5% of all

parturitions. One case (1.5%; 1/65) was fatal. Placenta previa marginalis was detected in 3 (4.6%) patients. Demographic data of these patients, operation time and length of hospital stay are shown in Table I.

Table I. Principal clinical characteristics of the studied population (N = 65).

Clinical data	Median (range)
Age (years)	31 (22-42)
Patient weight (kg)	74 (40-111)
Patient height (cm)	162 (138-174)
Gravidity	3 (1-6)
Parity	1 (0-3)
Gestational age (weeks)	34 (18-39)
Duration of surgery (min)	75 (60-195)
Postoperative stay (days)	3 (1-17)

Forty two (64.6%) patients were elective cases, and 37 (56.9%) women with placenta previa had experienced previous C/S. More than half of these patients (21/37, 56.7%) had abnormally invasive placentation. Intrauterine fetal death occurred in case of 3 babies (Table II). Only 1 patient with primary C/S underwent subtotal hysterectomy. She had a history of 4 dilatation and curettage procedures and was diagnosed postoperatively with placenta increta.

The incidence of intraoperative complications in the women with previous C/S with abnormally invasive placentation was higher than in the other women ($p < 0.0001$). In this group, 3 patients who had placenta percreta were transferred to the intensive care unit; 2 were intubated and received mechanical ventilation, and 1 died from uncontrolled hemorrhage.

General anesthesia was performed in 56 of 65 (86.1%) patients, whereas 9 (13.9%) patients had regional anesthesia (in 2 cases spinal anesthesia was converted to general anesthesia owing to excessive bleeding and prolonged surgery). One of the two who received spinal anesthesia was diagnosed with placenta percreta histopathologically, and total abdominal hysterectomy, bladder repair and uterine artery ligation were performed. Subtotal hysterectomy was performed in the second patient who received spinal anesthesia due to placenta increta. These two patients had had previous C/S.

There was no statistically significant difference in the values of baseline hemoglobin concentration between the groups ($p = 0.13$), but other hemoglobin variables, except for the highest value in the postoperative period, were significantly lower in the group of previous C/S with abnormally invasive placentation. The amounts of transfused red blood cells and fresh frozen plasma were higher in this group ($p < 0.05$) (Table III). Extensive blood and blood product transfusions were performed only in 2 patients. In one of them, spinal anesthesia was converted to general anesthesia and the patient was diagnosed with placenta percreta. This patient died from bleeding in the postoperative period. The second patient received general anesthesia and was also diagnosed with placenta percreta. However, these 2 cases of utmost severity did not create significant differences between the groups in total blood and blood product transfusions according to the anesthetic technique used (Table IV).

As a result of our study, we established that in most of the cases (62%, 40/65) two or more large-bore intravenous lines were placed prior to the beginning of surgery. In addition, arterial lines were inserted in 19 (29.2%) patients, and central venous catheters after anesthesia induction in another 10 (15.4%).

Discussion

This retrospective study found the incidence of placenta previa to be 0.5%, in accordance with other reports [10, 11]. General anesthesia was our method of preference for placenta previa as we feared increased intraoperative blood loss. Most of

Table II. Details of medical, surgical, and obstetrical patient characteristics (N = 65). C/S: cesarean section.

Clinical data	Number of patients (%)
Medical history:	
Unremarkable	50 (76.9%)
Positive for hypertension or endocrine and renal disease	15 (23.1%)
Positive for emergency/elective C/S (n,%)	23 (35.4%) / 42 (64.6%)
With no previous C/S (n,%)	28 (43.1%)
With previous C/S (n,%)	37 (56.9%)
Abnormally invasive placentation	28 (43.1%)
Placenta accreta	12 (18.5%)
Placenta increta	8 (12.3%)
Placenta percreta	8 (12.3%)
Abnormally invasive placentation and previous C/S	21/37 (56.7%)
Abnormally invasive placentation and no previous C/S	7/28 (25%)
Maternal mortality rate	1/65 (1.5%)
Intrauterine fetal death rate	3/65 (4.6%)

the patients had undergone a previous C/S, and these patients had abnormally invasive placentation. We found that intraoperative complications in women with previous C/S with abnormally invasive placentation were higher than in other patients.

When placenta previa is accompanied by a history of C/S, the risk of abnormally invasive placentation increases [3, 10, 12]. Miller et al. showed that placenta accreta occurred in 9.3% of women with placenta previa and in 1 of 22154 without placenta previa [13]. Placenta previa-accreta is associated with higher maternal morbidity but, fortunately, neonatal outcome is similar when compared to patients with placenta previa alone [14]. The choice of the best technique of anesthesia for C/S in women with placenta previa remains a controversial issue [15]. There has been extensive administration of general anesthesia for C/S whenever

placenta previa is the indication, as women with placenta previa may constitute a clinical dilemma for an anesthetist [16]. However, regional anesthesia in women with placenta previa is also safe [17]. Parekh et al. reported that regional anesthetic technique was used in 210 out of 350 (60%) patients and they preferred spinal anesthesia [1]. Moreover, Imarengiaye et al. suggested that spinal anesthesia, which was used in 29 out of 81 women (35.8%), may be useful in patients with placenta previa [16]. McShane et al. reported that the incidence of regional anesthesia with no maternal morbidity or mortality in women with placenta previa was 25% [2]. Generally, it is believed that the sympathetic blockade induced by regional anesthesia can make it difficult or impossible to control arterial pressure, resulting in severe hemorrhage, and that general anesthesia is preferable in the light of possible increased

Table III. Surgical and anesthetic patient characteristics (N = 65) with division into subgroups according to history of cesarean section (C/S) and presence of abnormally invasive placentation. Data are presented as: number of patients (n) and percentage (%), or median (range).

*p <0.05 for women with previous C/S with abnormally invasive placentation versus other groups.

Clinical feature	Previous C/S, with abnormally invasive placenta (N = 21)	Previous C/S, without abnormally invasive placenta (N = 16)	No previous C/S, with abnormally invasive placenta (N = 7)	No previous C/S, without abnormally invasive placenta (N = 21)
Intraoperative complications (n, %)	17 (81%)	0*	1 (14.3%)*	0*
<i>Total hysterectomy</i>	13	0	1	0
<i>Subtotal hysterectomy</i>	3	0	0	0
<i>Bladder repair</i>	7	0	0	0
<i>Uterine artery ligation</i>	6	0	0	0
No complication at all (n, %)	4 (19%)	16 (100%)	6 (85.7%)	21 (100%)
General anesthesia (n, %)	18 (85.7%)	14 (87.5%)	6 (85.7%)	18 (85.7%)
Spinal anesthesia (n, %)	3 (14.3%)	1 (6.25%)	1 (14.3%)	2 (9.5%)
Epidural anesthesia (n, %)	0	1 (6.25%)	0	1 (4.8%)
Hemoglobin concentration (median)				
<i>Preoperative values (g/dL)</i>	11 (8-13)	11.3 (9-14)	12 (10-14)	11.1 (9-13)
<i>Lowest intraoperative value (g/dL)</i>	8 (5-11)	9.9 (8-12)*	10 (7-12)*	9.9 (8-11)*
<i>Highest intraoperative value (g/dL)</i>	9 (6-11.4)	10.2 (8.1-12)*	11 (8.5-12.5)*	10 (8.8-12)*
<i>Lowest postoperative value (g/dL)</i>	9 (5-12)	9.8 (7.5-12.8)*	10 (9.6-12)*	10 (8.9-12)*
<i>Highest postoperative value (g/dL)</i>	10.2 (7-12)	11 (8.5-13)	12 (10-12.4)*	11 (9.4-12)
Blood product transfusion (median)				
<i>Red blood cells (units)</i>	5 (0-30)	0 (0-4)*	0 (0-4)*	0 (0-4)*
<i>Fresh frozen plasma (units)</i>	1 (0-18)	0 (0-2)*	0*	0*

Table IV. Amount of blood products transfused in the two anesthetic groups, according to the technique used. Data are presented as medians (range). Fisher's Exact test was used for statistical analysis. No significant differences between the groups were noted.

Blood product	General anesthesia (N = 56)		Regional anesthesia (N = 9)	
	Number of patients	Number of units used	Number of patients	Number of units used
Red blood cells	29	4 (1-20)	6	2 (1-30)
Donor blood	10	1.5 (1-5)	1	10
Fresh frozen plasma	12	3 (1-13)	1	18
Platelets	1	1	1	5

blood loss [1, 18]. Yet, Hong et al. compared general and epidural anesthesia in terms of maternal hemodynamics and blood loss for C/S with placenta previa [8]. Intraoperative blood loss did not differ significantly between the groups, whereas general anesthesia resulted in lower immediate postoperative hematocrit level, and the patients in the general anesthesia group received significantly more transfusions than in the epidural anesthesia group. The authors concluded that epidural anesthesia is superior to general anesthesia in elective C/S for placenta previa with regard to maternal hemodynamics and blood loss. Parekh et al. reported that 205 of 350 patients with placenta previa received regional anesthesia with no problem in blood pressure control [1]. In their study, there was a significant difference in estimated blood loss between regional and general anesthesia groups (613 ± 367 mL versus 756 ± 518 mL, respectively).

Noteworthy, placenta previa combined with abnormally invasive placentation is associated with severe hemorrhage [19]. However, in most of the studies cited above, parturients with placenta previa alone. In our hospital, total intraoperative blood loss was not recorded in the follow-up documentation. Thus, we were only able to evaluate hemoglobin values, the amounts of transfused red blood cells and fresh frozen plasma. Although there were no significant differences with regard to hemoglobin, total blood and blood product transfusions between regional and general anesthesia groups; differences were found for the group of women with history of previous C/S and abnormally invasive placentation. These data lead us to the conclusion that obstetric characteristics are more important than anesthetic techniques in intraoperative blood loss for placenta previa.

In patients with peripartum hemorrhage, the primary goal is early treatment of the cause of bleeding. Placement of wide-bore venous access and, if necessary, central venous catheters, are the essential prerequisites for effective treatment [20]. In our study, we established that two or more large-bore intravenous lines had been placed prior to the beginning of surgery in the majority of cases (62%), while arterial lines inserted in 19 (29.2%) patients, and central venous catheters in 10 (15.4%) patients. This was a reassuring finding.

Generally, maternal morbidity and mortality significantly increase with abnormally invasive placentation, rather than anesthetic technique used in the parturients with placenta previa [2, 21]. Risk factors for hysterectomy in these women include placenta accreta and previous C/S [8]. As mentioned, in some careful studies [1, 2], no maternal morbidity attributable to the anesthetic techniques used was established. We found that the risk of abnormally invasive placentation increases even more with previous C/S with the presence of placenta previa. In line, the incidence of maternal morbidity was higher in patients with previous C/S and abnormally invasive placentation.

The results of this retrospective analysis show that in our hospital general anesthesia was often preferred for placenta previa in order to decrease the risk of bleeding. However, this view may be challenged and regional anesthesia may be preferred, except for women with previous gynecologic surgery or C/S, since then intraoperative complications and abnormally invasive placentation occur more often. In order to reduce anxiety, however, a possibility of prolonged surgery should be explained to parturients who are going to receive regional anesthesia. For women that are in high risk groups, two or more large-bore

intravenous lines should be placed and both fresh frozen plasma and red blood cells should be prepared before surgery.

The management of obstetric hemorrhage requires a multidisciplinary approach. The obstetrician and the anesthesiologist should both be aware of the possibility of massive hemorrhage and intra- or postpartum complications requiring hysterectomy in these high risk patients. Thus, in the antenatal period, the obstetrician should evaluate the patients in terms of placental adhesion criteria and share this information with the anesthesiologist. The management of anesthesia in patients with a high risk for bleeding should begin in the antenatal period and precautions should be taken against possible complications.

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