RESEARCH ARTICLE

Improving the Outcome of Cesarean Hysterectomy for Adhesive Placenta with Internal Iliac Artery Ligation Procedure

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Abstract

Introduction: The increased rate of cesarean delivery has been related to increased incidence of the adhesive placenta in the last three decades. Improved management of adhesive placenta will increase the survival rate. Internal iliac artery or hypogastric artery (HA) ligation was one of the prophylactic techniques to prevent massive bleeding and expected to increase the survival rate.

Aims: To determine whether HA or internal iliac artery ligation can improve the outcome of cesarean hysterectomy in cases with the adhesive placenta.

Methods: This is a retrospective descriptive study involving 50 patients with confirmed adhesive placenta who underwent cesarean hysterectomy from March 2017 to January 2021 in Sanglah General Hospital. Data were presented in percentage and analyzed using the Chi-square test or Fisher's exact test.

Results: The patients had a mean age of 32.5 years, with a median number of children being two and a median history of cesarean section of two times. None of the patients had a previous history of curettage. Based on the comparison of the results of patients who underwent iliac artery ligation, it was found that patients who were not treated had more complications of bladder rupture, repeated laparotomy, and had more internal bleeding (*p*-value 0.643, 0.630, and 0.645, consecutively).

Conclusion: Patients who were not treated had more complications of bladder rupture, repeated laparotomy, and had more internal bleeding.

Keywords: Adhesive placenta, Artery ligation, Cesarean section.

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Introduction

Morbidly adherent placenta or adhesive placenta is one of the risk factors which contribute to complications at delivery. Adhesive placenta, often classified into placenta accreta, placenta increta, and placenta percreta used to describe the placenta that failed to separate spontaneously at delivery. Prior to cesarean section, other uterine surgeries, assisted reproduction techniques, and placenta previa are all risk factors for placental adhesion and their prevalence has increased steadily.[1] The global incidence of the adhesive placenta is unknown due to data limitations from developing countries. In the United States, the incidence of adhesive placenta increased rapidly from 1 in 2,510 to 1 in 4,017 between 1970s and 1980s to 1 in 272 in 2016 in the last three to four decades, approximately 10–15-fold.[2–4] This increasing rate is likely related to the increased rate of cesarean delivery as one of the placenta adhesive risk factors.[5] The pathophysiology of adhesive placenta started as chorionic villous penetration to basal decidua without Nitabuch's layer.[1,5] Early diagnosis is important for the management of adhesive placenta. The International Federation of Gynaecology and Obstetrics (FIGO) classified the management of adhesive placenta as conservative and hysterectomy as the gold standard for placenta accreta.[6–8]

Intraoperative bleeding had become one of the major risks during procedures involving adhesive placenta. Intraoperative bleeding occurs due to partial separation of the placenta in an attempt to confirm the diagnosis or in cases of unconfirmed partial accreta. Therefore, a planned approach to overcome this surgical challenge is needed.[9] Hypogastric or internal iliac artery ligation is one of the procedures performed to reduce intraoperative bleeding.[9–12]

Internal iliac artery or HA ligation was one of the prophylactic techniques to prevent massive bleeding by ligating the HA that vascularized the visceral part of the pelvic. In obstetric bleeding HA, ligation can decrease pelvic arterial blood supply and pressure as much as 58 and 85%, consecutively.[13] Refaie et al. reported that appropriate hemostasis can be observed in 82.4% of the patients treated with HA ligation.[7] Yildiz et al. also found that 15 patients with the adhesive placenta and placenta previa that were treated with HA ligation and hysterectomy had a similar outcome with patients

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that were treated without hysterectomy.[14] A systematic review done by Chitragari et al. found that the complication rate decreased significantly when treated with HA ligation.[15] Compared to uterine artery ligation, HA ligation was more effective in diminishing uterine, cervical, and vagina blood flow and pressure. HA ligation was effective, safe, and fast that only take around 5–7 minutes to perform while preserving uterus and fertility function.[16] This study is aimed to determine whether HA or internal iliac artery ligation can improve the outcome of cesarean hysterectomy in cases with the adhesive placenta. The results of this study are expected to have an impact in the future to reduce maternal mortality and morbidity due to adhesive placenta.

Methods

Design

This is a retrospective descriptive study involving all patients with adhesive placenta who underwent cesarean hysterectomy with or without temporary internal iliac artery ligation in the Division of Maternal–Fetal Medicine, Department of Obstetrics and Gynecology Sanglah General Hospital/Faculty of Medicine Udayana University, Bali, Indonesia.

Patient Selection

Subjects with suspect adhesive placenta who underwent cesarean hysterectomy with or without temporary internal iliac artery ligation from March 2017 to January 2021 were recruited into the study population. Inclusion criteria include all subjects with the adhesive placenta (placenta accreta, increta, or percreta) that have been proven pathologically by two senior histopathologists in our center. Exclusion criteria include any missing data on the medical records (socio-demography, clinical history, intraoperative, and postoperative findings).

Data Collection

Data about socio-demography (age, gravidity, and parity), clinical history (risk factors for adhesive placenta, placenta accreta index score, and histopathology), intraoperative, and postoperative findings were all obtained from the medical records. Information about temporary internal iliac artery ligation was obtained from the operative report included in the medical records. The temporary internal iliac artery ligation was performed by a senior thoracic and cardiovascular surgeon before the commencement of cesarean hysterectomy.

Statistical Analysis

Numeric data were tested for normality using the Shapiro Wilk test. Normally distributed data were presented in mean ± SD and analyzed using the independent Student *t*-test while non-normally distributed data were presented in median (interquartile range/IQR) and analyzed using the Mann–Whitney *U* test. Categorical data were presented in percentage and analyzed using the Chi-square test or Fisher's exact test. All data were compared between the two groups (with vs without temporary internal iliac artery ligation).

Results

A total of 50 subjects with confirmed adhesive placenta were analyzed. Table 1 summarizes the baseline characteristics of the study population. Table 2 summarizes the comparison of outcomes between the two groups of subjects.

Discussion

The placental adhesive disorders (PADs), including placenta accreta, placenta increta, and placenta percreta, are frequent etiologies of serious obstetrics complications such as postpartum hemorrhage. Traditionally, abnormal placentation has been classified into accreta, increta, and percreta based on the depth of myometrial invasion: superficial, deep, and through the uterine serosa, respectively, and the greater the invasion, the greater the risks for hemorrhage and maternal morbidity.

According to Goh,[17] all invasive procedures on the uterus or the uterine cavity have been associated with the subsequent development of placenta adhesive disorder including uterine curettage, hysteroscopic surgery, endometrial ablation, uterine

Table 1: Characteristics of the study population

		Temporary internal iliac artery ligation		
	All subject (n = 50)	*Yes (n = 7)*	*No (n = 43)*	*p-value*
Age, years (mean ± SD)	32.5 ± 5.3	28.6 ± 2.5	33.0 ± 5.4	0.184
Gravidity, median (IQR)	3 (1)	3 (1)	3 (1)	0.978
Parity, median (IQR)	2 (1)	2 (0.5)	2 (1)	0.827
No. of previous CS, median (IQR)	2 (1)	2 (1)	2 (1)	0.622
No. of previous curettage, median (IQR)	0 (1)	0 (1)	0 (1)	0.584
PAI score, (mean ± SD)	5.6 ± 2.4	7.5 ± 1.7	5.4 ± 2.4	0.061

Table 2: Comparison of outcome among the study population

		Temporary internal iliac artery ligation		
	All subject (n = 50)	*Yes (n = 7)*	*No (n = 43)*	*p-value*
Complication				
Bladder rupture, *n* (%)	14 (50.0)	2 (28.6)	12 (27.9)	0.643*
Relaparotomy, *n* (%)	3 (6.0)	0 (0)	3 (7.0)	0.630*
Intraoperative bleeding, mL (mean ± SD)	2531 ± 2369	2142 ± 899.7	2594 ± 2531	0.645
Length of ICU stay, days (mean ± SD)	1.85 ± 2.1	2.14 ± 1.0	1.80 ± 2.3	0.239

*Fisher's exact test

artery embolization, and myomectomy. However, the most important risk factor for the development of placenta adhesive is a prior cesarean delivery and the continued rise in the cesarean section rates worldwide ensures that placenta adhesive will remain a troublesome clinical issue. The adhesive is present in 0.24, 0.31, 0.57, 2.13, 2.33, and 6.74% of women undergoing their first, second, third, fourth, fifth, and sixth or more cesarean deliveries, respectively. The risk of placenta adhesive formation is markedly increased with a history of a prior cesarean delivery and the presence of a placenta previa.[17] Similar to the research conducted by Goh[17] in this study, it is described that most cases have a history of cesarean birth with the median total cesarean being two. This illustrates that all patients do have a high risk of experiencing adhesive placenta.

The morbidly adherent placenta with its variants is one of the most common causes of high morbidity and mortality in obstetrics. Short-term morbidity (intensive care unit admission, massive blood transfusion, coagulopathy, urological injury, and relaparotomy) associated with an attempt at removing the placenta first and repairing the lower uterine segment is less likely to occur if a planned cesarean hysterectomy is performed. Another management option for patients who seek preservation of fertility is leaving the placenta in place as attempting placental separation may increase the risk for hysterectomy in up to 100% of cases.

Surgical internal iliac artery ligation is often used to attempt to control otherwise intractable obstetric hemorrhage. Therefore, a huge amount of blood loss has already occurred before hemorrhage can be controlled by arterial ligation. In this study, early prophylactic intraoperative bilateral internal iliac artery ligation was performed before any attempt to remove the abnormally adherent placenta, which is the main source of severe blood loss that might occur in such a situation, a technique to reduce the pulse pressure distal to the site of ligation, thus minimizing blood loss during cesarean delivery in placenta adhesive. According to Refaie et al., it seemed to be successful in patients with placenta accreta as none of the patients ($n = 29$) required hysterectomy or suffered morbidity; however, five patients with placenta increta (5/17, 29.4%) required a hysterectomy, with more blood loss, and in one of them, maternal morbidities in the form of bladder and ureteric injury occurred.

Based on this study, it was found that out of 50 adhesive placenta patients, 14 patients had complications in the form of bladder rupture. Based on these figures, 12 cases where no iliac artery ligation and two patients after the iliac artery ligation was performed. This represents a very significant reduction in the number of complications using the iliac artery ligation procedure. Relaparotomy was also found in three patients who did not undergo iliac artery ligation compared to patients who did the procedure.

Aggarwal et al. reported massive blood loss as the prominent feature in all women with morbidly adherent placenta, with a mean blood loss of 2710 mL, and an average of 6 units of whole blood were transfused. Thus, internal iliac artery ligation may not only limit blood loss but may also minimize the risk of transfusion reactions and blood-borne infections.[18] In contrast, Berg et al. reported that ligation of the internal iliac arteries appears to be effective for bleeding because of uterine atony; it is less effective for placenta accreta. The efficacy of ligation is limited by the rapid recruitment of an extensive collateral system in the pelvis.[19] In this study, the amount of blood loss is lower among the group with internal iliac artery ligation although it did not statistically significant.

Conclusion

Internal iliac artery or HA ligation was one of the prophylactic techniques to prevent massive bleeding by ligating the HA that vascularized the visceral part of the pelvic. A total of 50 subjects with confirmed adhesive placenta were analyzed. Based on demographic data, it was found that the patients had a mean age of 32.5 years, with a median number of children being two and a median history of a cesarean section of two times. None of the patients had a previous history of curettage. Based on the comparison of the results of patients who underwent iliac artery ligation, it was found that patients who were not treated had more complications of bladder rupture, repeated laparotomy, and had more internal bleeding. Patients who underwent arterial ligation procedures found it longer to stay in the ICU but with little effect.

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