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Long-Term Sequelae of Hypogastric Artery Ligation or Embolization in Patients with Morbidly Adherent Placenta Following Cesarean-Hysterectomy

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Abstract

Severe hemorrhage can occur during the delivery of patients with morbidly adherent placenta (MAP), and techniques such as adjuvant intraoperative hypogastric artery ligation at the time of cesarean-hysterectomy (C-hyst) have been implemented with the goal of decreasing intraoperative blood loss. However, little research has been dedicated to long-term post-surgical sequelae as a result of elective hypogastric artery ligation or embolization in the setting of a Chyst. Interruption of the hypogastric artery has classically been performed in trauma cases or as an undesired side effect of vascular operations and although generally considered benign, can cause ischemic complications, including buttock claudication, spinal cord ischemia, and sexual dysfunction. Findings from this retrospective cohort study show no significant long-term sequelae of hypogastric artery ligation or embolization in patients with MAP treated with C-hyst.

Keywords: *Invasvie Placenta; Hypogastric artery ligation; Cesarean hysterectomy.*

Introduction

Hemorrhage is a concern when treating patients with morbidly adherent placenta (MAP), condition where the placental chorionic villi implant directly into the uterine wall. The incidence of MAP has increased drastically in the last decade, now affecting approximately 1 in 300 pregnancies (1). The average blood loss at delivery without adjunctive procedures such as hypogastric artery ligation or balloon occlusion is 3,000 – 5,000 mL, and the maternal mortality rate has been reported to be as high as 7% (2).

Planned cesarean hysterectomy (C-hyst) is the most common surgical treatment option for patients with MAP. Several adjunctive procedures such as hypogastric artery ligation, occlusion balloon placement, or embolization can be performed which have been shown to decrease blood loss, in some cases by up to 1000 mL (3,4).

However, little is known regarding the long-term sequelae of hypogastric artery ligation or embolization in the setting of C-hyst. Interruption of the hypogastric artery may cause ischemic complications, including buttock claudication, spinal cord ischemia, and sexual dysfunction (5,6). The purpose of this study was to evaluate long-term sequelae of patients with MAP who underwent C-hyst with concurrent hypogastric artery ligation or embolization.

Methods

This study was approved by the Institutional Review Board at our intuition. A retrospective cohort analysis of all consecutive patients with MAP who underwent C-hyst at a single institution between January 2011 – 2016 was performed. A total of 35 patients were identified and contacted for a phone survey discussing post-procedural symptoms potentially related to

hypogastric artery ligation or embolization. Patient demographics, operative reports, and clinical notes were also reviewed.

The control group consisted of patients with MAP who underwent C-hyst without concurrent hypogastric artery ligation or embolization. The study group included patients with MAP who underwent C-hyst with concurrent hypogastric artery ligation or embolization.

Continuous variables were compared using the Student *t* test and Wilcoxon nonparametric test for means. Categorical variables were compared using the Fisher Exact test for proportions. A p value of <0.05 was considered statistically significant.

Results

Of the 35 patients contacted, a total of 14 patients completed the survey, (median age: 34.5, range: 27-40) for a 40% response rate. Of the 14 patients, seven underwent C-hyst with concurrent hypogastric artery ligation (n=4) or embolization (n=3) and the remaining seven underwent C-hyst without any adjunctive interventions. Patient demographics are listed in Table 1. Table 2 outlines the survey questions.

Patient responses to the survey questions are illustrated in Table 3. Weight gain was the most commonly reported symptom, reported by 57% of patients in both the control and the study groups. Hot flashes (28% in control group vs 43% in study group), sleep disturbances (14% in the control group vs 28% in study group), vaginal dryness (28% in control group vs 14% in study group), and change in enjoyment of sexual intercourse (14% in both control and study group) were also among the more commonly reported symptoms by patients.

Table 1. *Patient Characteristics*

	C-hyst with hypogastric artery ligation or embolization *n* = 7	C-hystwithout hypogastric artery ligation or embolization *n* = 7	P-value
Age, median years, (range)	34 (27 – 40)	35 (31 – 42)	0.59
Gestational age, weeks	32.5	32.6	1
Gravidity	4	3	0.47
Parity	3	2	0.35
Type of placental pathology	5 (72%)accreta 1 (14%) increta 1 (14%)percreta	6 (86%)accreta 1 (14%) increta 0 (0%)percreta	0.51
EBL during surgery, L	3.8	2.4	0.35
Time to follow-up, mo	41	30.6	0.31

EBL = estimated blood loss

Table 2. *Survey Questions*

	The following questions pertain to symptoms you may have experienced after your surgery.
1.	Did you experience pain in your buttocks while exerting yourself or exercising after your surgery?
1a.	If yes, how would you rate your pain on a scale of 1 to 10, with 1 being mild and 10 being severe?
2.	Have you experienced buttock pain so severe that it caused you to stop walking/exercising/exerting yourself?
3.	Did you experience hot flashes?
4.	Did you experience sleep disturbances or change in the quality of your sleep?
5.	Did you note vaginal dryness?
6.	Did you note weight gain?
7.	Have you taken hormone replacement since your surgery?
8.	Have you noted a change in sensation, including numbness or tingling, in your inner thighs, labial, or vaginal region?

9.	Have you noticed a change in your enjoyment of sexual intercourse?
10.	Did you have the ability to climax during sexual intercourse before surgery?
11.	Do you still have the ability to climax during sexual intercourse after surgery?
11b.	Have you noticed an increased time to climax during sexual intercourse?
12.	Did you notice difficulty breathing after surgery?
13.	Did you notice calf pain after surgery?

Table 3. *Reported Symptoms*

	C-hyst with hypogastric artery ligation or embolization, *n* = 7	C-hyst alone, *n* = 7	P-value
Pain in buttocks during exertion	0 (0%)	0 (0%)	1.0
Difficulty with activities due to buttock pain	0 (0%)	0 (0%)	1.0
Hot flashes	3 (43%)	2 (28%)	0.311
Sleep disturbances	2 (28%)	1 (14%)	0.42
Vaginal dryness	1 (14%)	2 (28%)	0.42
Weight gain	4 (57%)	4 (57%)	1.0
Hormone replacement	1 (14%)	0 (0%)	0.91
Numbness in inner thigh/vaginal region	0 (0%)	0 (0%)	1.0
Change in enjoyment of sexual intercourse	2 (28%)	1 (14%)	0.42
Change in ability to climax during sexual intercourse	1 (14%)	0 (0%)	0.91
Shortness of breath	1 (14%)	0 (0%)	0.91
Calf pain	1 (14%)	1 (14%)	1.0

No significant difference was seen in reported ischemic symptoms between the control and the study groups, (71% vs 57%, P=0.65). No difference was noted in the remaining symptoms compared between the control versus the study group including buttock claudication (0% vs. 0%, P=1.0); hot flashes (71% vs. 57%, P=0.71); sexual dysfunction (28% vs. 41%, P=0.36); and venous thromboembolism (14% vs. 14%, P=1.0).

Discussion

Hypogastric artery ligation or embolization performed with C-hyst has the potential of decreasing intraoperative blood loss although conflicting results have been reported. Recent studies have suggested no significant contribution by hypogastric artery ligation to hemostasis in the setting of a C-hyst (7). In addition, potential ischemic complications of hypogastric artery ligation are unknown. Based on the findings of this retrospective study, no significant long term sequelae of hypogastric artery ligation or embolization was noted in patients treated with C-hyst for IP.

This finding is consistent with prior literature describing minimal ischemic effects in younger, relatively healthy gynecology patients in comparison to older vascular surgery and oncology patients with increased co-morbidities (5). Patients in the setting of pelvic trauma were also more likely to develop ischemic complications when compared to gynecology patients 5. A strength of this study is the description of the effect on sexual dysfunction in women, a previously understudied outcome. Here no significant difference in sexual function was seen between the two groups.

Several factors are likely responsible for the minimal difference seen between the two groups with regards to long term ischemic sequelae. The average age at time of surgery for patients included in this study was 34.8, with few co-morbidities. The mean time from ligation/embolization to survey was 41 months, enough time to expect to see long term effects. There was no history of atherosclerotic disease in either group recorded at time of surgery. As a result, patent collateral arteries at time of surgery may be able to provide adequate blood supply to the pelvis during the recovery period.

This study is limited by the rare nature of MAO and thus the small sample size. In addition, outcomes were patient reported via phone survey. Due to the sensitive nature of many of the questions, complications may have been underreported. In addition, a description nature of symptoms rather than a scale of sexual dysfunction was used. Finally, as with all studies involving surgical procedures, standardization of each intra-operative course is not possible.

Conclusion

Based on the findings of this study, no significant long term sequelae of hypogastric artery ligation or embolization were noted in patients treated with C-hyst for MAP. As the prevalence of MAP increases, many tertiary referral centers will be forming coordinated teams to prepare for hysterectomy and hemorrhage. Surgical management of bleeding remains a mainstay, as does interventional radiology embolization. The results of this study suggest that we may continue with our current strategies of hemostasis to minimize maternal morbidity and mortality. Larger long term studies are needed to confirm these results.

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