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Original Article

Surgical Strategies in Placenta Accreta Spectrum; A Quasi-experimental study

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ABSTRACT

Objective: To evaluate maternal outcome in placenta accrete spectrum with bilateral internal iliac artery ligation before and after obstetric hysterectomy.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Obstetrics and Gynaecology, Combined Military Hospital, Kharian Pakistan, from Oct 2022 to Sep 2023.

Methodology: Seventy patients enrolled in the study underwent peripartum hysterectomy. Bilateral Internal Iliac Ligation was performed before obstetrical hysterectomy in 40 patients of Group -1, whereas it was done after hysterectomy in 37 patients of Group-2. In all cases, the baby was delivered via classical caesarean section, with the placenta left in situ, followed by the closure of the uterine incision. The number of blood transfusions, Intensive care unit stay, post-operative haemoglobin level, post- operative recovery events, and duration of hospital stay, along with demographic details, were noted.

Results: Out of 77 patients, the mean age of patients was 28.79±3.05. Most patients (n=36, 46.8%) had the previous three scars. Fifty-four cases (70.1%) had bladder injury involving mucosa. 22(28.6%) females had post- operative haemoglobin ≤7g/dl. Our study revealed statistically significant differences in the type of bladder injury *(p*=0.024) and post- operative severe anaemia, i.e. Hb≤7g/dl *(p*=0.006) among the two groups.

Conclusion: Bilateral internal iliac artery ligation prior to obstetrical hysterectomy leads to a reduction in post-operative severe anaemia and mucosal involvement in bladder injury.

Keywords: Anemia, Iliac artery, Placenta, Placenta accreta, Hysterectomy, Cesarean section, Length of stay.

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INTRODUCTION

The Placenta accreta spectrum, formerly morbidly adherent placenta, indicates a range of pathologic adherence of the placenta, including placenta increta, placenta percreta, and placenta accreta.[1] It is defined as a variety of malformations in which there is a faulty attachment of the placenta (decidua trophoblastic) with the uterine wall, mostly in the case of previous scars.[2,3]

Maternal morbidity and mortality rise with the increase in extension of myometrial invasion. PAS is a grave condition and results in massive obstetrical haemorrhage due to the incomplete separation of the placenta.4 Studies suggest that the mean estimated blood loss is between 2000-7800ml.[5,6]

The prevalence of abnormal placentation has increased by thirteen since the advent of the previous century and is linked with the soaring rates of caesarean sections.[7] As per an Italian study, the rate of placenta accretion rose to 1 per 322 maternity cases by 2013.[8]

Clinicians must investigate all pregnancies, especially previous scarred uterus, for low-lying placenta at the time of anomaly ultrasound.[9] Additionally, high-risk patients (e.g., those with multiple prior caesarean sections) should undergo formal evaluation for AIP. Of the maternal complications, there is primarily the risk of substantial blood loss. On average, 5-6 units of blood are transfused.[10]

There are knowledge gaps in optimal management of AIP, particularly in diagnosis, antenatal care, time of delivery, and surgical procedures. The vast majority of recommendations stem from differing opinions rather than objective evidence. Further trials are required to address these deficiencies and improve outcomes. The current study aims to compare maternal outcomes in bilateral internal iliac artery ligation before or after obstetric hysterectomy in pregnant women with placenta accrete spectrum.

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METHODOLOGY

The quasi-experimental study was carried out at the Department of Obstetrics and Gynaecology at Combined Military Hospital, Kharian Pakistan, from August 2022 to September 2023, after obtaining approval from Ethical Review Committee (IERC OBS 24/1-10-23). Sample size was calculated keeping the expected proportion of MAP 5%.[11]

Inclusion Criteria: Pregnant women with Uterine scars after one or more Caesarean-sections, post-myomectomy and history of hysterectomy associated with anterior placenta accrete spectrum were included.

Exclusion Criteria: Nulliparous women and those with posterior placenta previa and uterine Mullerian duct malformation were excluded.

Our hospital receives many high-risk obstetric cases, most with a history of multiple caesarean sections from the surrounding districts as well, resulting in a higher than usual proportion of morbidly adherent placenta. Patients were selected through non-probability consecutive sampling. Written informed consent was taken from all patients regarding risks of midline skin incision, massive Blood Transfusion, bladder repair, visceral injury, Intensive Care Unit admission, ventilator support and peripartum hysterectomy. Moreover, counselling for fetal prematurity was also undertaken.

Diagnosis of placenta acreta was made by Grey-scale ultrasound with Doppler flow studies. Out of 77 patients, Group-1 included 40 patients (Bilateral Internal Iliac Ligation prior to obstetrical hysterectomy), and Group-2 (bilateral Internal Iliac Ligation after obstetrical hysterectomy) had 37 after randomization through random numbers table (Figure).

All patients recruited for elective surgery between 35 and 36 weeks were admitted one day before surgery. Antenatal steroid cover was administered at 34 weeks of gestation. Twelve cases were operated on in an emergency before 35 weeks due to antepartum haemorrhage or preterm labour. Two patients in Group-A had emergency surgery due to uterine rupture. Nineteen cases undergoing planned surgery had pre-operative ureteric stenting. The multidisciplinary team approach was adopted in all cases involving two obstetricians: an anaesthetist, urologist, paediatrician and haematologists operated under general anaesthesia. A midline infra-umbilical skin incision was given, with upward extension as required. To avoid bladder separation, a classical incision is made on the uterus to deliver the baby. The placenta was left in situ after tying the umbilical cord with silk 1/0. The uterus was sutured in a single layer using continuous vicryl 1/0 sutures.

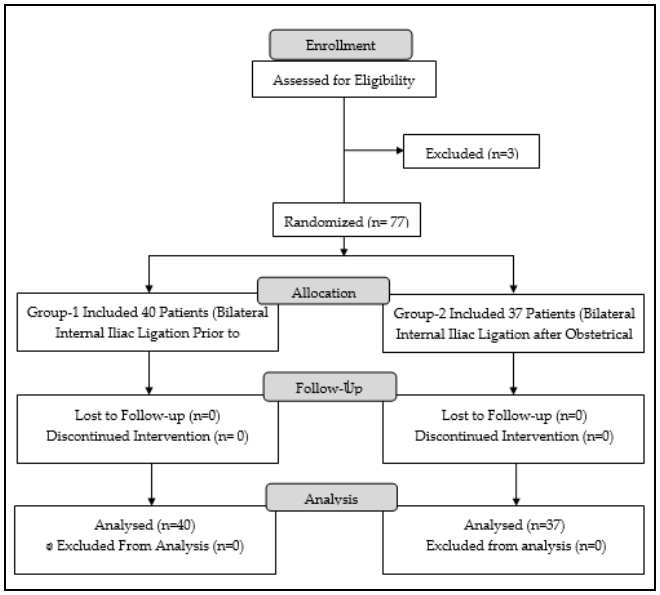

Figure: Patient Flow Diagram (n=77)

The abdomen was packed using roll gauze; the uterus was exteriorized and kept in an anteverted position by an assistant. In Group-1, bilateral hypogastric artery ligation was performed before obstetric hysterectomy. In Group-2, an obstetric hysterectomy was commenced right after the delivery of the infant, followed by bilateral internal iliac artery ligation. First, the bifurcation of the common iliac artery was located with the ureter crossing it. An opening was made in the peritoneum, and the retroperitoneal space entered at the pouch of Douglas lateral to the sacral promontory. An O'Shaughnessy forceps was passed from lateral to medial between the artery and the vein and threaded by a non-absorbable suture 1-0 silk around the anterior division of the internal iliac arteries. In order to avoid accidental ligation of the external iliac artery, before tying the knots, palpation of the femoral artery on the inguinal ligament was performed by the operating surgeon, along with a record of dorsalis pedis artery pulsation by the anaesthesia team. The bladder was carefully separated from the lower uterine segment with concomitant application of hemostatic sutures using vicryl 2/0. Any bladder injury identified and repaired with urologist involvement as deemed appropriate by

the operating team. Bladder integrity was checked in all cases.

On a predesigned proforma demographic character of the patients, several intraoperative blood transfusions, urinary bladder damage and repair (either whole bladder wall or serosa), pre-operative ureteric stenting, need for intensive care, post-operative anaemia and fever, hospital stay and wound infection was recorded. Intraoperative and post-operative complications were analyzed between the two groups.

IBM Statistical Package Social Sciences (SPSS) version 22.0 was used for data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Chi-square test was applied to explore the inferential statistics.

RESULTS

Seventy-seven cases were included in the study, with 40 patients in Group-1 and 37 in Group-2. Table-I shows that most cases 45(58.4%) were para 3 or more and had previous three cesarean deliveries 36(46.8%). 54(70.1%) had bladder injury involving the whole bladder wall. The majority 70(90.9%) had an ICU stay of less than 48 hours, and all patients had a hospital stay of less than seven days.

Table-I: Demographic and Clinical Characteristics of the Patients (n=77)

Parameters		Values
Age in Years	Mean±SD	28.79±3.05
	Range	23 - 35
Parity	1-3	45(58.4%)
	4- 5	32(41.6%)
Previous caesareans	1	3(3.9%)
	2	31(40.3%)
	3	36(46.8%)
	4	7(9.1%)
Number of Blood Transfusions	2	12(15.6%)
	3	33(42.9%)
	4	26(33.8%)
	5	6(7.8%)
Type of Bladder Injury	Serosal Involvement	23(29.9%)
	Complete Rent	54(70.1%)
Preoperative Ureteric Stenting	Yes	19(24.7%)
	No	58(75.3%)
ICU Stay >48 Hours	Yes	70(90.9%)
	No	7(9.1%)
Post-operative Temperature >38o	Yes	14(18.2%)
	No	63(81.8%)
Post- operative Haemoglobin <8 g/dl	Yes	22(28.6%)
	No	55(71.4%)
Surgical site infection	Yes	20(26.0%)

As shown in Table-II, 22(28.6%) had post-operative severe anaemia (haemoglobin less than 7g/dl), with a significant difference between the two groups (p=0.006). 41.6% received more than four intra-operative blood transfusions. However, there was no significant statistical difference between the two groups. Intensive care unit admission for more than 48 hours in both groups was similar, 34(85.0%) and 36(97.3%), respectively. Both groups had similar rates of ureteric stenting and similar bladder injury. 18.2% had a post-operative fever, and 26% had a surgical site infection. However, there was no statistical difference between the two groups.

Table-II: Comparison of Demographic and Clinical Characteristics of the Patients (n=77)

Parameters	Group-A (n=40)	Group-B (n=37)	p-value
Age			
20 – 30 Years	26(65.0%)	14(35.0%)	0.306
31 – 40 Years	14(35.0%)	9(24.3%)	
Parity			
≤3	24(60.0%)	21(56.8%)	0.773
>3	16(40.0%)	16(43.2%)	
Previous Caesareans			
1	2(5.0%)	1(2.7%)	0.924
2	16(40.0%)	15(40.5%)	
3	18(45.0%)	18(48.6%)	
4	4(10.0%)	3(8.1%)	
Number of Blood Transfusions			
2	9(22.5%)	3(8.1%)	0.098
3	18(45.0%)	15(40.5%)	
4	9(22.5%)	17(45.9%)	
5	4(10.0%)	2(5.4%)	
Type of Bladder Injury			
Serosal Involvement	7 (17.5%)	16(43.2%)	0.024

DISCUSSION

Due to the serious morbidity after the placenta acreta spectrum, many researchers have aimed to find the optimum surgical strategies to deal with the condition.[12,13] An astute clinical evaluation and adequate preparation for the surgery are the most effective pre-operative measures to prevent its catastrophic sequelae. Bilateral internal iliac artery ligation is a life-saving procedure to address massive obstetric haemorrhage.[14,15]

In one such study 15, all 58 cases underwent bilateral hypogastric artery ligation. Emergent caesarean hysterectomy was carried out in 9 instead of 14 patients in our study. Unlike our results (70%), only 6.9% had bladder damage. One patient (1.7%) underwent re-operation because of postoperative

bleeding, whereas none needed re-laparotomy in our study. Contrary to our results (i.e.7.8%), 29.3% of patients were transfused more than four units of red blood cells. Like our study, no ureteral damage or maternal death occurred.

A meta-analysis of 749 cases,[16] revealed that internal iliac artery ligation does not remarkably affect bleeding control (p=0.54). At the same time, our study showed that this intervention reduced the incidence of severe post-partum anaemia (p=0.006). They found that uterine artery ligation notably decreased blood loss and saved the uterus (p<0.001). Bleeding was best controlled by combining both.

A study of various surgical options in the management of placenta acreta revealed that additional blood supplies from external iliac arteries are the culprit behind major haemorrhage during surgery, even in experienced hands. In China, routine placement of an infrarenal aortic balloon efficiently reduces blood loss and allows uterine conservation by segmental resection.[17]

A parallel-randomized control trial,[18] which had aimed to discern the role of bilateral internal iliac artery ligation on the reduction of haemorrhage, did not recommend its routine. Fifty-seven patients were randomized between two groups; in one group (n=29 cases), bilateral IIA ligation was performed before caesarean hysterectomies, while the Control group (n=28 cases) underwent caesarean hysterectomy only. Contrary to our findings, there was no discernable difference between the two groups regarding intraoperative blood loss (1632±804 versus 1698±1251, p=0.83).

A two-year retrospective cohort study from Turkey involved 96 patients diagnosed with placenta percreta who were scheduled for Cesarean Hysterectomy (CH). Bilateral IIAL prior to CH was carried out in the study group, while only CH was in the control group. No statistically supported disparity was found between the two groups regarding the average blood loss, transfusion of blood products, operation time and the number of complications. In contrast to our findings, they concluded that prophylactic bilateral IIAL before CH in placenta percreta does not have a favourable impact on blood loss.[19]

CONCLUSION

Our study has shown that performing bilateral internal iliac artery ligation prior to obstetric hysterectomy in cases of placenta accrete spectrum leads to a statistically pertinent reduction in post-operative severe anaemia. However, no significant reduction in blood transfusions was noticed. It also correlated with reduced bladder mucosal involvement in preoperative bladder injuries. However, no difference in surgical site infection, postoperative fever, and length of ICU stay has been revealed. We conclude that each case merits individual surgical planning, and operative strategies must be flexible enough to conform to the demands of intraoperative findings.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

US & NA: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

RQA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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