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Comparison between Bladder Dissection at the Beginning of Cesarean Section for Morbidly Adherent Placenta and between Delaying Dissection Until Planning for Cesarean Hysterectomy

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ABSTRACT

Background: Abnormally invasive placentas are a leading cause of maternal morbidity and death. The most common surgical treatment is Cesarean hysterectomy. However, there is little data to suggest the most effective care of this illness. The extant literature consists primarily of case reports and studies conducted utilizing retrospective evaluation of medical data over a period of years in a single or limited number of tertiary-care facilities.

Objective: This study aimed to provide preliminary data to judge between two different approaches during Cesarean section (CS) for morbidly adherent placenta, which are bladder dissection before and after uterine incision as regards operative time, blood loss and incidence of bladder injury.

Materials and methods: This randomized controlled trial (RCT) included 60 cases of morbid placental adherence managed at Ain Shams Maternity hospital, Cairo, Egypt. We divided the cases into 2 groups: Group A included 30 patients had bladder dissection at the start of SC for morbidly adherent placenta and group B that involved 30 patients who had bladder dissection after closing uterine incision and just before clamping uterine artery for Cesarean hysterectomy. Main outcome measures were estimated blood loss, transfusion requirements, operative time and incidence of urological injury.

Results: The study includes 60 cases who were diagnosed by ultrasound and Doppler as abnormally invasive placenta (AIP). The mean blood loss in group A (bladder dissected before uterine incision) was 1791.17 ml, while group B (bladder dissected after uterine incision) was 2368.33 ml, also 33.3% of group A needed blood transfusion while 76.7% in group B. The mean operative time in minutes in group A was 139 while 166 in group B. The incidence of urological injury was 6.7% in group A and 20% in group B.

Conclusion: The study showed that dissection of the bladder before uterine incision during CS of morbidly adherent placenta was associated with less blood loss than delaying dissection after uterine incision. But there was no statistical significance between both groups as regards incidence of urological injury and total operative time despite the noted clinical significant differences.

Keywords: Bladder dissection, Cesarean section, Morbidly adherent placenta, Delaying dissection until planning, Cesarean hysterectomy.

INTRODUCTION

One known cause of maternal morbidity and death is abnormally invasive placenta [(1)].

Irving and Hertig [(2)] reported the first case series of placenta accrete (PA) in 1937. They examined eighteen instances, characterizing them histologically as "the complete or partial absence of the decidua basalis" and clinically as "the abnormal adherence of the afterbirth in whole or in parts to the underlying uterine wall".

Sepsis, fistula development, urologic and intestinal damage, and systemic problems related to significant blood loss and transfusion are examples of surgical complications. According to certain research, the death rates might reach 6% [(3, 4)].

Abnormally invasive placentas have been much more common over the past three decades. In the United States, they have been reported to occur in 1 in 533 births [(5)]. It is believed that the primary contributing element is the growing CS rate in the industrialized world [(6)]. The most significant risk factor for AIP is prior Cesarean sections, and the risk is closely correlated with the number of prior Cesarean births [(7, 8)].

A prior Cesarean birth and placenta previa seem to be additive risk factors, although any operation or event that results in a uterine scar increases the likelihood of developing AIP. The primary surgical treatment for abnormally invasive placenta is Cesarean hysterectomy, but this procedure can be very challenging because multiple Cesarean deliveries frequently result in pelvic adherences, a thin and hypervascular lower uterine segment, a bulky in-situ placenta, deep pelvis neovascularization, and the potential for invasion to the bladder, bowel, cervix, and parametrium in cases of placenta percreta [(9)].

There are minimal interventional studies dealing with surgical steps of Caesarian section of abnormally invasive placenta, most studies are of retrospective types, so actual surgical management of these case needs to be more consolidated by interventional studies.

In this study, we tried to add valuable information to the management of placenta accrete through a randomized controlled trial comparing between bladder dissection before uterine incision and after delivering the baby as regards operative time, blood loss and incidence of urological injuries.

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PATIENTS AND METHODS

This study was RCT and was held at Ain Shams Maternity Hospital over one year. The study included 60 subjects divided into 2 groups: Group A included 30 patients who had bladder dissection at the start of CS for morbidly adherent placenta. Group B involved 30 patients who had bladder dissection after closing uterine incision and just before clamping uterine artery for Cesarean hysterectomy.

Inclusion criteria: All pregnant women who had CS for a morbidly adherent placenta, as determined by ultrasound criteria and Doppler on the placental bed. Placenta previa, which is found in over 80% of accretas in the majority of big series was also detected [10, 11, 12]. Multiple vascular lacunae within the placenta, loss of the normal hypoechoic zone between the placenta and myometrium, decreased retroplacental myometrial thickness (less than 1 mm), abnormalities of the uterine serosa–bladder interface, and placenta extension into the myometrium, serosa, or bladder are additional gray-scale abnormalities linked to placenta accreta spectrum. Women having a BMI of 35 kg/m^2 or less, a history of at least one CS, a gestational age of more than 32 weeks with a viable fetus, any degree of placenta previa, and patients with a morbidly adherent placenta on a Cesarean scar alone were also included [13, 14].

Exclusion criteria: Patients having a history of bladder damage, those with a clinically noticeable intra-amniotic infection, and those who were hemodynamically unstable before skin incision.

The diagnosis might be made easier using Doppler imaging. The most frequent observation of the placenta accreta spectrum on color flow Doppler imaging is turbulent lacunar blood flow. Increased subplacental vascularity, myometrial blood flow gaps, and arteries connecting the placenta to the uterine border are additional Doppler findings of placenta accreta spectrum [11, 12].

All Caesarean sections were performed by a surgeon who had experience in performing Cesarean hysterectomy (lecturer doctor who has got at least 6 years of training) in both groups. Sub-umbilical midline skin incision was the rule but pfannsteil incision was chosen according to surgeon preference, which is one of the limitations of the study being a surgical one with difficulty to generalize all the surgical steps among the surgeons. In group A careful bladder dissection was done before uterine incision with ensuring hemostasis, uterine incision was done above the placenta, after delivering the baby awaiting for placental separation if not, we proceeded for Cesarean hysterectomy. In group B classic upper segment uterine incision was done above the placenta and after delivering the baby awaiting for placental separation if not proceeded to Cesarean hysterectomy and dissecting bladder just before clamping uterine artery.

We determined the blood loss by weighing the soaked towels both before and after they were soaked, calculating the difference in grams as the blood loss, and comparing the Hb level, hematocrit level, and number of packed red blood cells transfused before and after surgery. We also calculated the time needed to generate the bladder flap and the overall operation time. Additionally, we reported the frequency of urological injuries that were found during surgery and required correction, as well as late complications such as fistula development. Other secondary outcomes included 3 months post-operative filling cystogram which we could not do for all cases of bladder injury and any other postoperative complications reported of which mainly incidence of urinary tract infections was followed up.

Randomization was achieved through a computer–generated randomization plan. The assignment code was written on a separate piece of paper that would be sealed within the opaque envelope containing the 60 consecutive patient numbers. When CS arrived, the responsible party opened the envelope to see the assignment and took the appropriate action.

Ethical approval: The protocol and all related documentation were approved for ethical and research purposes by the OB/GYN Department Council at Ain Shams University prior to the start of the study and any compliance with local regulations. Before completing an informed consent form from the patient and her partner, each participant received a thorough explanation of the study's goals. Throughout its implementation, the study complied with the Helsinki Declaration.

Statistical analysis

SPSS 20.0 was used to update, code, tabulate, and present the gathered data on a PC. Quantitative data were given as mean ± SD, whereas qualitative data were provided as frequency and percentage. The numeric data were analyzed using the Student T test, while the qualitative data were analyzed using the Fisher exact test and the Chi square test. Pearson Coefficient Correlation (r): The degree of a linear relationship between two quantitative variables was gauged using correlation. There is no correlation between the two variables when the value is 0. A positive relationship is shown by a value larger than 0; that is, as one variable's value rises, the other variable's value rises as well. A negative relationship is shown by a value less than 0; that is, as one variable's value rises, the other variable's value falls. A P-value ≤ 0.05 is considered statistically significant.

RESULTS

These results showed that there was a statistically insignificant difference between group A & group B as regards No. of previous CS, D & C, CS hysterectomy & skin incision ($P > 0.05$) (Table 1).

Table (1): Comparison between group A & group B as regards No. of previous CS, D & C, CS hysterectomy & skin incision

Variables		Group				Chi square test	P-value
		Group A		Group B			
		No.	%	No.	%		
Number of Previous CS	1	3	10.0%	4	13.3%	1.689 FE (#)	0.695
	2	12	40.0%	8	26.7%		
	3	10	33.3%	10	33.3%		
	> 3	5	16.7%	8	26.7%		
Previous D & C	No	26	86.7%	27	90.0%	0.162 FE (#)	1.000
	Yes	4	13.3%	3	10.0%		
CS Hysterectomy	No	12	40.0%	6	20.0%	2.857	0.091
	Yes	18	60.0%	24	80.0%		
Skin Incision	Midline	21	70.0%	26	86.7%	2.455	0.117
	PF	9	30.0%	4	13.3%		

(#) Fisher Exact test was used as (20%) of the cells or more have expected count less than 5.

These results showed that there was a highly statistically significant difference between group A & group B as regards blood transfusion (P < 0.01) where group B had higher percentage of blood transfusion than group A (76.7% Versus 33.3% respectively). On contrast, there was a statistically insignificant difference between group A & group B as regards incidence of urological-injury, fistula, UTI, septic wound & ICU admission (P>0.05) (Table 2).

Table (2): Comparison between group A & group B as regards blood transfusion, uro-injury, fistula, UTI, septic wound & ICU admission

Variables		Group				Chi square test	P-value
		Group A		Group B			
		No.	%	No.	%		
Blood Transfusion	No	20	66.7%	7	23.3%	11.380	0.001**
	Yes	10	33.3%	23	76.7%		
Urological Injury	No	28	93.3%	24	80.0%	2.308 FE (#)	0.129
	Yes	2	6.7%	6	20.0%		
Fistula	No	29	96.7%	30	100.0%	1.017 FE (#)	0.313
	Yes	1	3.3%	0	0.0%		
UTI	No	26	86.7%	24	80.0%	0.480	0.488
	Yes	4	13.3%	6	20.0%		
Septic Wound	No	27	90.0%	30	100.0%	3.158 FE (#)	0.237
	Yes	3	10.0%	0	0.0%		
ICU Admission	No	28	93.3%	25	83.3%	1.456 FE (#)	0.424
	Yes	2	6.7%	5	16.7%		

(**) Highly statistically significant at P<0.01
(#) Fisher Exact test was used as (20%) of the cells or more have expected count less than 5.

These results showed that there was a statistically insignificant difference between group A & group B as regards age, operation time & bleeding time (P > 0.05) (Table 3).

Table (3): Comparison between group A & group B as regards age, operation time & bleeding time

Variables	Group		Independent sample t-test	P-value
	Group A	Group B		
	Mean ± SD (Range)	Mean ± SD (Range)		
Maternal Age	33.07 ± 5.37 (22.00-43.00)	33.03 ± 4.92 (24.00-42.00)	0.025	0.980
Operation Time	139.67 ± 71.79 (65.00-420.00)	166.57 ± 85.88 (90.00-460.00)	-1.316	0.193
Bladder Dissection Time	16.03 ± 11.26 (2.00-45.00)	17.57 ± 12.05 (2.00-60.00)	-0.509	0.613

These results showed that there was a statistically insignificant difference between group A & group B as regards HCT before, HCT after, Hb before & Hb after (P>0.05) (Table 4).

Table (4): Comparison between group A & group B as regard HCT before, HCT after, Hb before & Hb after

Variables	Group		Independent sample t-test	P-value
	Group A	Group B		
	Mean ± SD (Range)	Mean ± SD (Range)		
HCT Before (%)	32.80 ± 3.64	31.90 ± 3.49	0.978	0.332
HCT After (%)	29.97 ± 2.44)	28.60 ± 3.34	1.810	0.076
Hb Before (gm/dl)	10.73 ± 1.01	10.63 ± 1.19	0.350	0.727
Hb After (gm/dl)	9.43 ±0. 94	9.13 ± 1.25	1.051	0.297

These results showed that there was a statistically insignificant difference between group A & group B as regards APGAR 1 min, APGAR 5 min, GA & blood loss (P > 0.05) (Table 5).

Table (5): Comparison between group A & group B as regards APGAR 1 min, APGAR 5 min, GA & blood loss

Variables	Group		Independent sample t-test	P-value
	Group A	Group B		
	Mean ± SD (Range)	Mean ± SD (Range)		
APGAR 1 min	6.00 ± 1.29 (3.00-8.00)	5.83 ± 1.15 (4.00-8.00)	0.530	0.598
APGAR 5 min	7.97 ±. 32 (7.00-9.00)	8.13 ±. 35 (8.00-9.00)	-1.938	0.057
Gestation	35.53 ± 1.80 (31.00-40.00)	36.10 ± 2.07 (29.00-39.00)	-1.132	0.262
Blood Loss (ml)	1791.17 ± 1009.05 (790.00-5.000)	2368.33 ± 1406.30 (870.00-5500.00)	-1.826	0.073

These results showed that there was a highly statistically significant difference between HCT and Hb (Before and after operation) in both groups (A&B) (P<0.01) (Table 6).

Table (6): Comparison between HCT and Hb (Before and after operation) in both groups (A & B)

Variables		Paired Differences				t	Sig. (2-tailed)
		Mean ± SD (Range)	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Pair 1	**HCT Before - HCT After**	3.06667±0.92196	.37722	2.31184	3.82149	8.130	.001**
Pair 2	**Hb Before - Hb After**	1.40±0..23	.12396	1.15195	1.64805	11.294	.001**

(**) Highly statistically significant at P<0.01

These results showed that there was a highly statistically significant correlation between operation time and bladder dissection time & blood loss. Also, bladder dissection time & blood loss. Additionally, HCT before and HCT after, Hb before & Hb after. Moreover, HCT after and Hb before & Hb after as well as Hb before & Hb after in group A (Table 7).

Table (7): Correlation between all studied quantitative variables in group A

Variables		Age	Operation Time	Bladder Dissection Time	HCT Before	HCT After	Hb Before	Hb After	APGAR 1min	APGAR5min	GA	Blood Loss
Age	**r**	1	.198	.019	-.031	.240	-.168	-.164	-.175	.262	.068	.105
	P-value		.293	.922	.871	.202	.376	.387	.356	.161	.722	.580
Operation Time	**r**	.198	1	.516**	.022	.069	.062	-.231	.199	.121	-.224	.737**
	P-value	.293		.003	.909	.717	.746	.220	.293	.524	.233	.000
Bladder Dissection Time	**r**	.019	.516**	1	-.075	.344	.206	.084	.209	.240	-.328	.536**
	P-value	.922	.003		.692	.063	.275	.660	.267	.202	.076	.002
HCT Before	**r**	-.031	.022	-.075	1	.600**	.806**	.472**	.052	.112	.022	-.127
	P-value	.871	.909	.692		.000	.000	.009	.787	.554	.908	.505
HCT After	**r**	.240	.069	.344	.600**	1	.650**	.595**	.121	.175	-.287	-.078
	P-value	.202	.717	.063	.000		.000	.001	.525	.355	.124	.683
Hb Before	**r**	-.168	.062	.206	.806**	.650**	1	.707**	.132	.184	-.241	-.039
	P-value	.376	.746	.275	.000	.000		.000	.487	.330	.200	.837
Hb After	**r**	-.164	-.231	.084	.472**	.595**	.707**	1	.143	.050	-.307	-.347
	P-value	.387	.220	.660	.009	.001	.000		.450	.793	.099	.060
APGAR 1min	**r**	-.175	.199	.209	.052	.121	.132	.143	1	.335	-.194	.109
	P-value	.356	.293	.267	.787	.525	.487	.450		.070	.304	.566
APGAR 5min	**r**	.262	.121	.240	.112	.175	.184	.050	.335	1	-.148	-.008
	P-value	.161	.524	.202	.554	.355	.330	.793	.070		.435	.967
Gestation	**r**	.068	-.224	-.328	.022	-.287	-.241	-.307	-.194	-.148	1	-.129
	P-value	.722	.233	.076	.908	.124	.200	.099	.304	.435		.496
Blood Loss	**r**	.105	.737**	.536**	-.127	-.078	-.039	-.347	.109	-.008	-.129	1
	P-value	.580	.000	.002	.505	.683	.837	.060	.566	.967	.496	

**. Correlation is significant at the 0.01 level (2-tailed).

These results showed that there was a highly statistically significant correlation between operation time & bladder dissection time. Also, HCT before and HCT after, Hb before & Hb after, as well as HCT after and Hb before, Hb after & blood loss. Moreover, Hb before & Hb after and Hb after & blood loss in group B (Table 8).

Table (8): Correlation between all studied quantitative variables in group B

Variables		Age	Operation Time	Bladder Dissection Time	HCT Before	HCT After	Hb Before	Hb After	APGAR 1min	APGAR 5min	GA	Blood Loss
Age	**r**	1	-.254	.016	.153	.102	.002	.189	-.017	-.043	-.027	.052
	P-value		.176	.933	.420	.593	.991	.316	.928	.821	.886	.786
Operation Time	**r**	-.254	1	.582**	-.145	-.233	-.155	-.267	.266	-.181	-.109	.360
	P-value	.176		.001	.446	.216	.412	.154	.155	.337	.566	.051
Bladder Dissection Time	**r**	.016	.582**	1	.092	.139	.080	.274	.329	-.308	.089	.028
	P-value	.933	.001		.627	.465	.674	.143	.076	.097	.641	.882
HCT Before	**r**	.153	-.145	.092	1	.627**	.856**	.485**	.134	-.046	.121	-.123
	P-value	.420	.446	.627		.000	.000	.007	.482	.810	.525	.519
HCT After	**r**	.102	-.233	.139	.627**	1	.640**	.805**	.279	-.102	.061	-.465**
	P-value	.593	.216	.465	.000		.000	.000	.135	.593	.750	.010
Hb Before	**r**	.002	-.155	.080	.856**	.640**	1	.567**	.207	-.045	.085	-.123
	P-value	.991	.412	.674	.000	.000		.001	.274	.814	.654	.517
Hb After	**r**	.189	-.267	.274	.485**	.805**	.567**	1	.184	-.202	.114	-.467**
	P-value	.316	.154	.143	.007	.000	.001		.330	.285	.548	.009
APGAR 1min	**r**	-.017	.266	.329	.134	.279	.207	.184	1	-.029	.123	.030
	P-value	.928	.155	.076	.482	.135	.274	.330		.879	.517	.874
APGAR 5min	**r**	-.043	-.181	-.308	-.046	-.102	-.045	-.202	-.029	1	.173	.033
	P-value	.821	.337	.097	.810	.593	.814	.285	.879		.360	.862
Gestation	**r**	-.027	-.109	.089	.121	.061	.085	.114	.123	.173	1	.028
	P-value	.886	.566	.641	.525	.750	.654	.548	.517	.360		.883
Blood Loss	**r**	.052	.360	.028	-.123	-.465**	-.123	-.467**	.030	.033	.028	1
	P-value	.786	.051	.882	.519	.010	.517	.009	.874	.862	.883	

**. Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

In our study, the results showed that dissection of the bladder before uterine incision during CS of morbidly adherent placenta is associated with a less blood loss than delaying dissection after uterine incision. It has been a long debate about time of bladder flap creation in CS of morbidly adherent placenta, and there is no standard surgical way of management of these cases.

The proposed hypothesis was initially that delaying bladder dissection until after delivering the baby would make significant difference as regards the primary outcome of the study, the reason behind this hypothesis is that not all the cases would require CS hysterectomy and also knowing that the blood supply of the bladder vessels is different from the uterine supply also assuming that easier bladder dissection could be achieved if the uterus is smaller in size after delivery of the baby but looking at the study results, the opposite occurred and the reason for that was mainly the difficulty of bladder dissection after bleeding from placental bed making the operative field difficult to control and also affecting the surgeon level of stress. Also, the nature of the study being surgical one with difficulty of controlling many variables like the diversity of bladder adhesions and neovascularization as well.

Of notice that the blood loss and operative time were mainly affected by presence of Percreta and or CS hysterectomy in both groups explained by more surgical difficulty and challenging neovascularization in these cases. There was no statistically significant difference in hemoglobin levels and hematocrit levels before and after the delivery between both groups despite the significant blood loss difference between both groups, what can be explained by adequate blood volume replacement using blood products and unfortunately the cell salvage was not available at the time of study in the hospital, where the study was held. The clinical importance of our study is that it suggested a standard surgical way for dealing with bladder dissection in morbidly adherent placenta. It is considered one of few interventional studies to deal with this dilemma.

According to a comprehensive study by **Tam and colleagues** [15], the most recent FIGO consensus recommendations for placenta accreta spectrum illnesses suggest that bladder dissection at the outset of surgery may be preferable. Their study has mentioned only 2 cases with bladder dissected at the start of the surgery either due to lack of surgical details or actual low rate of performing this way of dissection and they reported no urinary tract injury in both cases [15].

In our study, urinary tract injuries occurred in 6,7% and 20% in both groups A and B respectively in a retrospective study of **Alanwar and his colleagues** [16] detected 21.7% with urinary tract injuries among all cases of placenta accreta enrolled in this retrospective study, which was held at the same hospital with no available operative details.

In a retrospective study by **Brennan and his colleagues** [17] comparing management by oncologist led surgery with others they dissected bladder before uterine incision in all cases. Median estimated blood loss for the entire cohort was 2150 mL, while in our investigation, group A estimated mean blood loss was 1791.17. The difference may be attributed to surgeon skills as they were comparing surgeon skills not surgical details. For example group 2 had a significantly higher blood loss than the other groups ($p = 0.001$) (median 4400 mL) where the oncologist was called intraoperative suggesting marked surgical difficulty.

LIMITATIONS

In our study, variations in surgical experience of the surgeons with cases of morbidly adherent placenta also preference of some surgeons has led to intentionally treat 3 cases of group B with surgical dissecting of the bladder from the start and 2 cases of group A with delayed dissection. The whole 5 cases were left at their group to which they were originally allocated. Also, the subject number is relatively small in relation to high prevalence of morbidly adherent placenta nowadays. Also, only 3 patients with bladder injury were compliant to have cystogram, which can be improved in future studies of notice, the actual number of cases that had urological injury was small so the study could not find statistically significant difference between both groups despite the recognizable clinically significant difference in the percentage of cases who had urological injury in favor of group A also the same applies to the incidence of septic wound but it was in favor of group B.

There was no statistical significance between both groups as regards the operative time and the time needed to create the bladder flab owing to the small number of cases so further studies with larger number of subjects would be needed to try to show any differences. According to the results of this study and looking at its limitations, future studies will be needed with larger sample size over more extended time to try to get statistical difference results for the urological injury in particular.

CONCLUSION

The study showed that dissection of the bladder before uterine incision during CS of morbidly adherent placenta is associated with a lesser amount of blood loss than delaying dissection after uterine incision. But there was no statistical significance between both groups as regards urological injury and total operative time.

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