Spontaneous Versus Manual Removal of Placenta During Elective Cesarean Section Regarding Blood Loss

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ABSTRACT

Background: Although manual removal of the placenta is commonly carried out, opinions differ about the best technique for delivery of the placenta at caesarean section. This study aimed to compare blood loss associated with spontaneous and manual removal of the placenta during cesarean section. **Methods**: A prospective Cohort study was conducted at Zagazig University Hospitals and Zagazig General Hospital in the period from April 2019 to October 2019. included 48 patients were divided into two groups regarding methods of placental delivery. Group (1) placenta was allowed to be separated spontaneously and removed by gentle cord traction. Group (2) placenta was removed manually by the surgeon's hand introduced into the uterine cavity and cleavage plane was created between the placenta and decidua basalis following which the placenta was grasped and removed. With the use of oxytocin by intravenous infusion 20 units after delivery of the baby in both groups. **Results**: Blood loss in spontaneous placental separation group was (881.67 \pm 74.54) ml, but in manual placental separation group was (962.79 \pm 116.11) ml, (p<0.01). **Conclusion**: Manual removal of the placenta only seems to be superior in saving the time taken to extract out placenta.

Key words; Cesarean section, Blood Loss, Manual Removal, Placenta

I. INTRODUCTION

The rates of CS are of concern in developing countries, reaching as high as 40.5% in Latin America, and the Caribbean. The average global rates of CS has increased 12.4% from 1990 - 2014, with an annual increase rate of 4.4% ^[1].

The high rate of CS is evitable associated with excessive use of CS, which imposes health risk to pregnant women and children. CS, as a large operation, has more accidents and slower recovery than vaginal birth^[2]. There are two main methods for placental delivery during CS. Some obstetricians practice manual removal of the placenta as they believe it to be quicker than awaiting spontaneous placental delivery^[3].

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International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 10, 2020 ISSN: 1475-7192

This becomes an important issue especially in developing countries where resources in tertiary referral centers are limited, and there is a high load of CS referrals daily, making operative time an important issue. Blood loss was significantly greater following manual removal of the placenta. In the third stage of labour, the reduction in the uterine size leads to reduction of the surface area of the placental bed. This causes shearing of the relatively incompressible placenta. Release of endogenous oxytocin causes continued retraction of the myometrium and the compression of the blood vessels supplying the placental site by the oblique muscles of the middle layer of the myometrium which need time to occure. This process leads to haemostasis. When the placenta is grasped and manually detached from the uterine wall it leaves no time for the described physiological process of haemostasis to take place. This leaves open dilated sinuses, which bleed until the uterine musculature eventually compresses them^[4]. This mechanism can explain why blood loss is less in spontenous separation. The current study was done to compare blood loss associated with spontaneous and manual removal of the placenta during cesarean section.

II. PATIENTS & METHODS

The study protocol was approved by the Scientific Research Committee, and informed consent was obtained from all participants. **Inclusion criteria:** Age (18 - 35) years, singleton pregnancy, living baby, pregnant at term (37 - 40 weeks), intact membrane. **Exclusion criteria:** Emergency cesarean section and cesarean hysterectomy. Abnormally adherent placenta whether placenta accreta, percreta or placenta previa. Suspected chorioamnionitis. Bleeding tendency. Previous history of postpartum hemorrhage. Women with medical illness e.g pre-eclampsia, anemia (Hb less than 11 gm/dl), DM, Cardiac, Renal.

Pre-operative:

Vaginal examination was performed at time of delivery to exclude PROM. Routine laboratory investigations for antenatal care: e.g. Complete blood count (Hb g/dl & Hct %) before delivery, random blood sugar, urine analysis, blood group and RH typing. Abdominal ultrasound for detection of gestational Age, placental location, amniotic fluid. expected fetal body weight, exclude congenital fetal malformation.

Regional spinal anesthesia was used for all included cases, the cesarean section was performed as follows, a Pfannenstiel abdominal incision was used, the skin and rectus sheath were opened transversely using sharp dissection, the rectus sheath was dissected free from the underlying rectus abdominus muscles, the peritoneum was opened longitudinally using sharp dissection, the uterus was opened with a transverse lower segment incision then delivery of the fetus was done.

At this stage patients were divided (by alternation) into two groups, 24 patients, Group 1: Placenta was allowed to be separated spontaneously and removed by gentle cord traction. Group 2: Placenta was removed manually by the surgeon's hand introduced into the uterine cavity and cleavage plane was created between the placenta and decidua basalis following which the placenta was grasped and removed. With the use of oxytocin by intravenous infusion 20 units after delivery of the baby in both groups. After placental delivery the uterine incision was closed with two layers of continuous sutures. Both peritoneal layers are closed with continuous sutures. The fascia was closed with continuous or interrupted sutures. The skin was closed with continuous subcutaneous suture.

Postoperative:

International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 10, 2020 ISSN: 1475-7192

The blood loss during cesarean section and in the first 24 hours postoperatively was assessed in a standard manner. Blood was measured after suction of the amount of amniotic fluid in a separate suction bottle. Amount of blood which collected from towels was measured according to gravimetric method. This method assumes that the density of blood and water are equal as 1gm=1ml. So blood volume = weight of blood soaked towels – weight of dry towels, then this was added to collected volume from suction bottle. Also hemoglobin and hematocrit values were noted before and 24 hours after delivery. The need for additional ecobolics, operating time, placental separation time, need for blood transfusion, and any significant puerperal morbidity were also recorded.

Statistical analysis

Analysis of data was done by IBM computer using SPSS (statistical program for social science version 25).

III. RESULTS

This study showed that there were no statistical significance differences between the studied groups in maternal age, gestational age and parity, table 1.

Variable		Group (1) [Spontaneous Placental Separation] (n=24)	Group (2) [Manual Placental Separation] (n=24)	Р
Maternal age (Years)	Range	18 - 35	18 - 33	>0.05 ^{\$}
	Mean± SD	26.58 ± 4.68	25.38 ± 4.69	NS
Gestational age (Weeks)	Range	37 - 40	37 - 40	>0.05\$
	Mean± SD	38.29 ± 0.96	38.21 ± 0.98	NS
Parity:	Range	0 - 4	0 - 4	>0.05^
	Mean± SD	2.46 ± 1.18	2 ± 1.1	NS

Table (1): Demographic data of patients among the two studied groups:

SD: Standard deviation \$:Independent t test ^: Mann Whitney test

NS: Non significant

This study showed that previous cesarean section was the most common indication for elective CS in both groups and no difference was found between the studied groups in indication of CS table 2.

Indication	Group (1) [Spontaneous Placental Separation] (n=24)	Group (2) [Manual Placental Separation] (n=24)	Р
Previous CS	15 (62.5%)	13 (54.2%)	
Infertility	2 (8.3%)	3 (12.5%)	>0.05 [#]
Cephalopelvic disproportion	3 (12.5%)	6 (25%)	ONI
Malpresentation	4 (16.7%)	2 (8.3%)	

Table (2): Indications of CS in women patients in the two studied groups:

#: Chai square test NS: Non significant

This study showed that there were no statistically significant differences between women of both groups concerning preoperative vital signs and laboratory investigations, table 3.

 Table (3): Difference between Study Groups concerning Preoperative Vital Signs and Laboratory

 Investigations

		Group (1) [Spontaneous Placental Separation] (n=24)	Group (2) [Manual Placental Separation] (n=24)	p ^{\$}
Pulse rate (bpm)	Range	74 - 100	72 - 100	>0.05
	Mean± SD	81.97 ± 10.72	81.05 ± 12.93	NS
Systolic blood pressure	Range	90 - 130	90 - 120	>0.05
(mm Hg)	Mean± SD	114.89 ± 8.06	116.14 ± 7.27	NS
Diastolic blood pressure	Range	60 - 80	60 - 80	>0.05
(mm Hg)	Mean± SD	74.56 ± 6.33	75.03 ± 6.5	NS
Temperature (C)	Range	36 - 37.7	36.5 - 37.7	>0.05
	Mean± SD	37.03 ± 0.25	37.09 ± 0.24	NS

Hemoglobin (g/dl)	Range	10.1 – 13.5	10 - 13.5	>0.05
	Mean± SD	11.3 ± 1.07	11.63 ± 1.11	NS
	Range	25.5 - 39.6	27.5 - 39	>0.05
Hematocrit (%)	Mean± SD	34.46 ± 3.16	35.97 ± 2.52	NS

SD: Standard deviation \$: Independent t test NS: Non significant

Table 4, showed that there were a significantly higher estimated intraoperative blood loss and postoperative hematocrit drop in women who had their placentae manually separated. It also shows that there were no statistically significant differences between women of both groups concerning postoperative hemoglobin and postoperative hemoglobin drop.

 Table (4): Difference between Study Groups concerning intraoperative blood loss and Postoperative

 Laboratory Investigations

Variat	ble	Group (1) [Spontaneous Placental Separation] (n=24)	Group (2) [Manual Placental Separation] (n=24)	Р
Estimated	Range	800 - 1120	823 - 1351	
loss (ml)	Mean± SD	881.67 ± 74.54	962.79 ± 116.11	< 0.01 ^{\$}
Hemoglobin (g/dl)	Range	9.2 - 11.4	9 - 10.8	
	Mean± SD	10.3 ± 0.83	9.42 ± 0.74	>0.05 ^{\$}
Hematocrit (%)	Range	25.5 - 37.4	24 - 36.3	
	Mean± SD	32.6 ± 3.12	30.91 ± 2.49	<0.01 ^{\$}
Hemoglobin	Range	0.1 - 2.6	0 – 3.7	
Drop(g/dl) M	Mean± SD	0.96 ± 0.23	1.23 ± 0.54	>0.05 ^
Hematocrit Drop	Range	0.3 – 5.7	0.5 – 7.2	
(%)	Mean± SD	2.02 ± 1.47	3.06 ± 1.04	<0.01 ^

SD: Standard deviation \$:Independent t test ^: Mann Whitney test

NS: Non significant S: Significant

International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 10, 2020 ISSN: 1475-7192

Table 5, showed that there were no statistically significant differences between women of both groups

 concerning postoperative blood pressure. However, there were statistically significant differences regarding

 postoperative temperature and pulse as both were higher in women who had manual separation of placenta.

 Table (5): Difference between Study Groups concerning 24 hrs Postoperative Vital

 Signs:

Variable		Group (1) [Spontaneous Placental Separation] (n=24)	Group (2) [Manual Placental Separation] (n=24)	P ^s
Pulse (bpm)	Range	70 - 100	74 - 108	<0.05
	Mean ± SD	83 ± 7.14	88.58 ± 11.05	S
Systolic blood	Range	90 - 120	90 - 130	>0.05
Pressure (mmHg)	Mean ± SD	115.5 ± 11.54	113.2 ± 11.3	NS
Diastolic blood	Range	60 - 80	60 - 80	>0.05
pressure(mmHg)	Mean ± SD	71.69 ± 7.34	72.88 ± 7.75	NS
Temperature	Range	36.1 - 38.0	36.8 - 39	
k	Mean ± SD	37.05 ± 0.41	37.46 ± 0.52	< 0.01

SD: Standard deviation \$:Independent t test

NS: Non significant S: Significant

Table 6, showed that there were statistically significant differences between both groups regarding duration of placental delivery and duration of c.s procedure with increase both among Group 1.

 Table (6): Difference between Study Groups concerning Duration of Placental Delivery and the

 Whole CS Procedure

Variable		Group (1) [Spontaneous Placental Separation] (n=24)	Group (2) [Manual Placental Separation]	Р
Duration of Placental	Range	0.1 – 5	0.1 - 1.05	

Delivery (min)	Mean ±SD	2.84 ± 1.69	0.38 ± 0.29	<0.001 ^
Duration of CS	Range	44 - 65	35 - 60	
Procedure (min)	Mean ±SD	53.1 ± 6.04	47.08 ± 6.95	<0.01 ^{\$}

SD: Standard deviation \$:Independent t test ^: Mann Whitney test

S: Significant HS: Highly significant

Table 7, showed that there was a significantly higher risk of splashing as detected on gowns of physicians performing CS in women who had their placentae manually separated than those who await spontaneous separation. And shows that there were no statistically significant differences between both groups as regards the use of additional ecobolics as well as need for blood transfusion.

 Table (7): Difference between Study Groups concerning blood splashing, need for additional ecolics and need for blood transfusion.

Variable		Group (1) [Spontaneous Placental Separation] (n=24) NO.(%)	Group (2) [Manual Separation of Placenta] (n=24) NO.(%)	P#
Blood splashing		3 (12.5%)	9 (37.5%)	<0.05 S
	IV Oxytocin	7(29.1%)	8(33.3%)	5
Need for additional ecbolics	Rectal Misoprostol	1 (4.16%)	2 (8.3%)	>0.05 NS
No		16 (66.6%)	14 (58.33%)	
		1 (4.16%)	1 (4.16%)	>0.05
Need for Blood Transfusion				NS

#: Chai square test NS: Non significant S: Significant

IV. DISCUSSION

In this study we compare between two groups of patients concerning placental delivery during CS (manual removal of the placenta and spontaneous placental delivery with gentle cord traction).

In this study there were nostatistically significant differences with respect to maternal base-line demographic characteristics such as maternal age which was the same result submitted by **Gün et al.**^[5] study

which was about the effect of placental removal method on perioperative hemorrhage at cesarean delivery. The main outcome measures were change in hemoglobin levels after cesarean section. The secondary outcomes were operative time, required transfusions and postcesarean endometritis. The study revealed that there was no association between the method of removal of the placenta and postpartum blood loss in cesarean section deliveries.

In this study the main indication for elective cesarean delivery was previous C.S as 15 cases (62.5%) were recorded among spontaneous separation group and 13 cases (54.2%) were recorded among manual separation group. Different results reported by a study carried by **Sethi and Sharma**^[6] which was a retrospective study about rising trends of cesarean section. Data of January to March 2012 and January to March 2017 were collected and recorded. They found that CPD was the first cause by (29.4%) in 2012 and (30.7%) in 2017.

This study showed that there were no statistically significant differences between women of both groups concerning preoperative and postoperative hemoglobin (p>0.05). The preoperative hemoglobin in spontaneous separation group was (11.3 \pm 1.07) and in manual separation group was (11.63 \pm 1.11), postoperative hemoglobin in spontaneous separation group was (10.3 \pm 0.83) and in manual separation group was (9.42 \pm 0.74). Similar results were repoted by **Gol et al.**^[4] which was done to investigate whether manual removal of the placenta was associated with significantly more blood loss compared to spontaneous separation of the placenta during cesarean section. They found that there were no statistically significant difference in preoperative hemoglobin. The preoperative hemoglobin in spontaneous separation group was (10.9 \pm 1.3) and in manual separation group was (11.1 \pm 1.11), postoperative hemoglobin in spontaneous separation group was (10.1 \pm 1.4) and in manual separation group was (10.4 \pm 1.2).

This study showed that there were no statistically significant differences between women of both groups concerning postoperative hemoglobin drop (p>0.05). Postoperative hemoglobin drop in spontaneous separation group was (0.96 ± 0.23) g/dl and in manual separation group was (1.23 ± 0.54) g/dl. Also **Gün et al.** ^[5] in their study which was about the effect of placental removal method on perioperative hemorrhage at cesarean delivery had found that there were no statistically significant differences in the mean decrease in hemoglobin level between both groups. Postoperative hemoglobin drop in spontaneous separation group was (1.6 ± 1.0) g/dl and in manual separation group was (1.5 ± 1.0) g/dl. Different results were reported by a study carried by **Manoj et al.** ^[7] which was a comparative study of effects of spontaneous delivery of placenta versus manual removal of placenta during cesarean section. It showed that the mean fall in hemoglobin was (0.75 ± 0.72) g/dl in spontaneous separation group and (1.01 ± 0.70) g/dl in manual removal group which means that patients in whom placenta was allowed to separate spontaneously had significantly lesser fall in hemoglobin (p value < 0.001).

In this study postoperative hematocrit drop was (2.02 ± 1.47) in spontaneous separation of placenta vs. (3.06 ± 1.04) in manual removal group, which was significantly lower in spontaneous separation group compared to manual separation group. Similar results were reported by **Magann et al.**^[8] in which they compared blood loss during cesarean delivery by method of placental removal and exteriorization versus in situ repair of the uterine incision. There were four groups 1) spontaneous placental detachment in situ uterine repair. 2) spontaneous placental detachment exteriorization uterine repair. 3) manual placental removal in situ uterine

repair. 4) manual placental removal exteriorization uterine repair. Postoperative hematocrit drop was (4.4 ± 2.1) in spontaneous exteriorization group vs. (8.1 ± 2.5) in manual exteriorization group.

The concern that measurement or estimation of blood loss may have been subjected to observer bias is answered by the fact that there were significantly greater absolute and relative falls in hematocrit levels in the manual removal group. Change in hematocrit level is a more objective method of measuring blood loss than estimation of volume of blood loss at operation. Manual removal is therefore associated with significantly greater blood loss compared with delivery of the placenta by cord traction^[9].

In this current study there was a significant difference in estimated intraoperative blood loss in women who had their placentae manual separated when compared to spontaneous placental separation group (p<0.01). The amount of blood loss in spontaneous placental separation group was (881.67 \pm 74.54) ml, but in manual placental separation group was (962.79 \pm 116.11) ml. Similar results were reported by **Ramadani**^[10] study which was about relation between cesarean section intraoperative blood loss and mode of placental separation. He found that the amount of blood loss associated with spontaneous separation and manual removal of the placenta was (669 \pm 253) ml and (713 \pm 240) ml, respectively. Also **Manoj et al.**^[7] found that the amount of blood loss in spontaneous placental separation group was (320.27 \pm 159.12) ml, but in manual placental separation group was (436.49 \pm 213.87) ml.

Many studies of the relationship between placental delivery mode and intraoperative blood loss had been carried out. **McCurdy et al**, ^[8] found that manual removal of the placenta was associated with greater operative blood loss compared with spontaneous separation of the placenta. This agrees with our results.

Also in contrast to our results **Huppertz**^[11] suggested that manual delivery of the placenta is not associated with any significantly greater risk of blood loss and this is probably due to clamping of the incisional angles and use of oxytocin, which are the most important factors in preventing excessive blood loss during cesarean section.

This study showed that there was statistically significant difference between two groups regarding postoperative temperature as it was higher in women who had manual separation of placenta. This result may be related to the increased risk of endometritis. Similar results were reported by **Baksu et al.**^[12] in their study which detect the effect of placental removal method and site of uterine repair on post-cesarean endometritis and operative blood loss. The patients were grouped into four: (1) manual placental delivery + exteriorized uterine repair; (2) spontaneous placental delivery + exteriorized uterine repair; (3) manual placental delivery + in situ uterine repair; (4) spontaneous placental delivery + in situ uterine repair. The incidence of endometritis was 7.3% in spontaneous exteriorization group but 19.6% in manual exteriorization group.

This study showed that there was a significantly shorter mean duration of placental delivery in manual separation group than in spontaneous delivery group (0.28 ± 0.15) min vs. (2.84 ± 1.69) min, respectively, (p <0.001). This agree with **Morales et al.**^[13] in their study which was a randomised controlled trial to compare spontaneous delivery with manual removal of the placenta during cesarean section. They reported that the interval from birth of the baby to delivery of the placenta was significantly shorter in the manual removal of the placenta group than spontaneous separation group (1.9 ± 1.2) min vs. (3.4 ± 2.8) min, respectively (P < 0.001). Also **Ajay and Suman**^[14] in their study compared spontaneous and manual removal of placenta during cesarean section. They found that the mean time taken for placental delivery was shorter in manual separation

group (50.5 \pm 20.5) sec than spontaneous separation group (60.02 \pm 21.68) sec. Furthermore **Manoj et al.**^[7] in their study reported that time taken to remove placenta was (45.68 \pm 15.50) sec in spontaneous separation group and (31.54 \pm 15.02) sec in manual removal of placenta group.

This study revealed that there was statistically significant difference between two groups concerning the whole operative time as it was shorter in the manual removal group (47.08 ± 6.95) min than spontaneous separation group (53.1 ± 6.04) min. This was similar to **Ramadani**^[10] study which found that the operating time was significantly shorter in the manual removal group (40.2 ± 3.2) min than spontaneous separation group (45.5 ± 3.9) min. Different results were reported by **Sekhavat et al.**^[15] which was about the influence of placental removal method on the incidence of post-cesarean infections and operation duration. In which they reported that there was no significant difference in the duration of cesarean delivery between manual removal group (22.7 ± 4.2) min and spontaneous separation group (22.5 ± 5.7) min. Also **Manoj et al.**^[7] found that there was no significant difference in the duration as the mean duration in manual removal group was (34.35 ± 8) min and in spontaneous separation group was (34.54 ± 7.96) min. The difference between our results and these two studies may be attributed to that the duration of operation depends on several factors with time taken to deliver the placenta being just one of them. However, it is possible that time saved by manual removal of the placenta may be counteracted by delays in closure of the uterus related to increased bleeding.

This study showed that there was no statistically significant difference between both groups regarding the use of additional ecobolics and need for blood transfusion intraoperative or postoperative. Only (1) patient in manual separation group and (1) patient in spontaneous separation group had received blood transfusion postpartum. These results were similar to that obtained by **Ramadani**^[10] in which he reported that there was no significant difference in the rate of blood transfusion six patients in spontaneous separation group and five patients in manual removal group received blood transfusions. Different results were reported by **Altraigey et al.**^[16] in which they reported that there was a statistically significant higher need for using extra ecoolics among the group of spontaneous separation of placenta.

V. CONCLUSIONS

Manual removal of the placenta only seems to be superior in saving the time taken to extract out placenta.

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