

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

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### ABSTRACT

**Background:** Cesarean section (CS) rates have increased; this is especially concerning in developing countries. The mode of placental delivery contributes to morbidity associated with CS, and determines blood loss during CS.

**Objective:** The aim of the work was to compare spontaneous placental delivery with cord traction and manual removal of placenta as regards amount of blood loss during elective cesarean section.

**Patients and Methods:** This prospective Cohort study included a total of 48 Women prepared for elective cesarean section, attending at Zagazig University Hospitals and Zagazig General Hospital. This study was conducted between April 2019 to October 2019. The included subjects were divided into two groups (24 each) regarding methods of placental delivery. Group A; placenta was allowed to be separated spontaneously and removed by gentle cord traction. Group B; 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, ( $p < 0.01$ ). The preoperative hemoglobin (g/dl) 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  $(9.42 \pm 0.74)$ .

**Conclusion:** Manual removal of placenta only seems to be superior in saving the time taken to extract out placenta. Manual removal of placenta adds to the post-operative complications in form of greater blood loss and infections.

**Keywords;** Cesarean section, Manual placental removal, Blood loss

### INTRODUCTION

A cesarean section is a surgical intervention in which incisions are made through woman's abdomen then uterus to give birth. This procedure is done when vaginal delivery is considered dangerous to the baby or the mother, so it is a life-saving operation <sup>(1)</sup>.

The rate of cesarean section has increased from 5% to more than 20% over the last 3 decades as a belief that cesarean section will reduce perinatal mortality. This rate has been increasing and continue in future to the extent that cesarean section can be done as an elective as well as emergency procedure <sup>(2,3)</sup>.

Cesarean section may be associated with complications like hemorrhage, fever and endometritis, venous thromboembolism, and abnormal placentation in the following pregnancies. Women undergoing cesarean delivery have higher risk of hemorrhage compared to those undergoing normal delivery <sup>(4)</sup>.

The process of placental separation starts immediately after delivery of the baby by contraction and retraction of uterine muscle which result in reduction in the size of the uterus consequently, the placental bed to which the placenta is attached become smaller than the incompressible placenta. The placenta sheared off and blood vessels supplying the naked placental bed are compressed by continued contraction and retraction of uterine muscle to reduce the bleeding.

So the degree of blood loss depends on timing of the placental separation from the uterine wall and the time of uterine muscle contraction <sup>(5)</sup>.

The method of placental removal is one of the factors that may increase or decrease in the morbidity of cesarean section <sup>(6)</sup>.

The aim of this study was to compare spontaneous placental delivery with cord traction and manual removal of placenta as regards amount of blood loss during elective cesarean section.

### PATIENTS AND METHODS

This prospective Cohort study included a total of 48 Women prepared for elective cesarean section, attending at Zagazig University Hospitals and Zagazig General Hospital. This study was conducted between April 2019 to October 2019.

### Ethical approval:

Written informed consent was obtained from all participants and **the study was accepted by the Research Ethics Committee of the Faculty of Medicine, Zagazig University. Study has been carried out on experiments involving human subjects in compliance with the Code of Ethics of the World Medical Association (Declaration Helsinki).**



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**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 ... etc.

#### **Pre-operative:**

The selected patients were subjected to careful history taking including age, parity, date of the last menstrual period from which the gestational age was calculated, general examination, a bdominal palpation including the fundal level, fundal grip, pelvic grip, umbilical grip to assess the fetal lie, presentation, and position. Assessment of the head engagement, head above brim, expected fetal weight. Auscultation of fetal heart rate. Vaginal examination was performed at time of delivery to exclude PROM. Routine laboratory investigations for antenatal care: e.g. Hemoglobin (g/dl), hematocrit (%) before delivery, random plasma 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 subjects included cases as spinal anesthetic technique has the advantage of simplicity, rapid onset, low failure rate, minimal drug dose and the provision of excellent muscle relaxation during surgery. 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 care:**

Complete blood count was done 24 hours after operation to evaluate post-operative hemoglobin concentration, hemoglobin drop, hematocrit and hematocrit drop. 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 which reported by **Vitello et al.** (7). This method assumes that the density of blood and water are equal as 1g =1ml. So blood volume = weight of blood soaked towels – weight of dry towels, then this was added to collected volume from suction bottle in addition to our observation to the amount of blood loss which could not be collected.

The need for additional ecobolics, operating time, placental separation time, need for blood transfusion, and any significant puerperal morbidity were also recorded. Vital signs were monitored continuously during surgery and every 30 min until the patient was transferred to the postpartum ward. The main outcome measures for each case in each group were registered in the patient input form.

#### **Follow-up:**

Hemoglobin and Hematocrit values were determined before and 24 hours after delivery. Duration of cesarean section was estimated from time of skin incision till the time of last stitch. Duration of placental separation was measured from time of complete delivery of the fetus till the time of complete delivery of placenta. Need of extra uterotonics and blood transfusion.

#### **Statistical analysis**

Analysis of data was done by IBM computer using SPSS (statistical program for social science version 25) . Chi-square test was used to compare qualitative variables between groups. Fisher exact test was used instead of chi-square test when one expected cell < 5. Unpaired t-test was used to compare two groups as regards quantitative variables in parametric data (SD < 30% mean). P value >0.05 non significant, P value <0.05 significant, P value <0.001 highly significant.

#### **RESULTS**

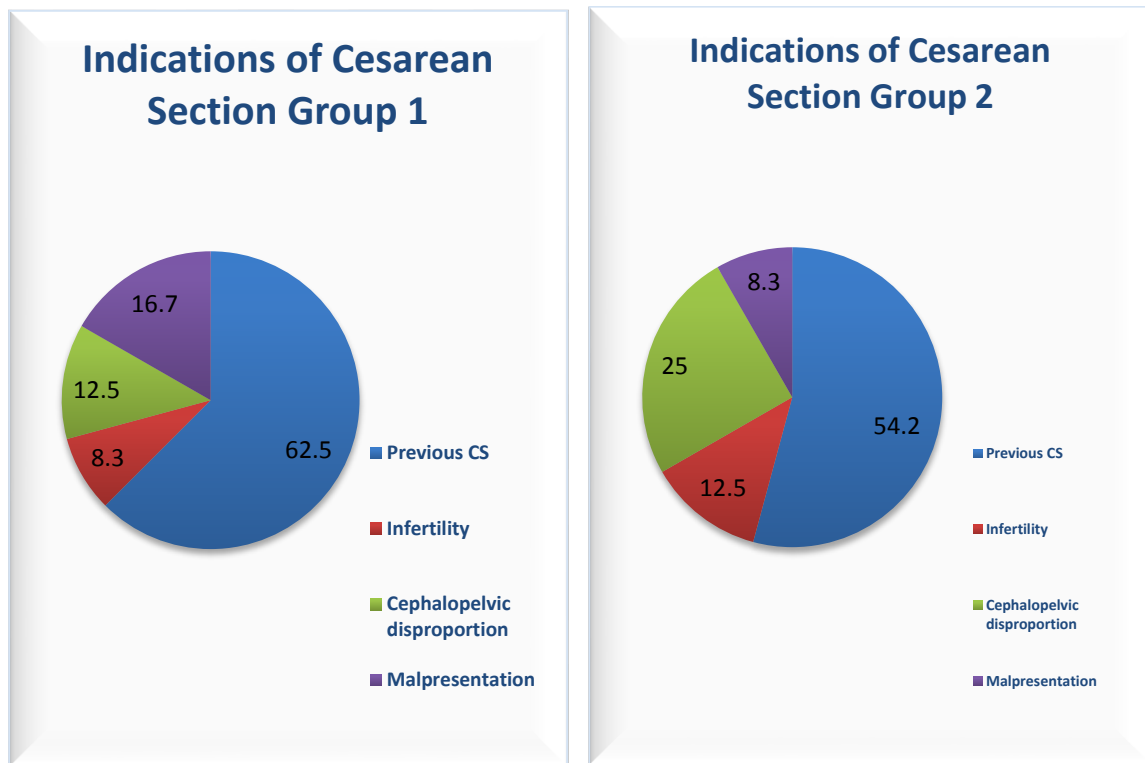
This study showed that there were no statistically significant differences between the studied groups in maternal age, gestational age and parity, table 1.

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

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

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, figure 1.



**Figure (1):** Pie-Chart showing Indications of Cesarean Section among the studied groups.

This study showed that there were no statistically significant differences between women of both groups concerning preoperative vital signs and laboratory investigations, table 2.

**Table (2):** Difference between study groups concerning preoperative vital signs and laboratory investigations.

Variable		Group (1) (Spontaneous Placental Separation) (n=24)	Group (2) (Manual Placental Separation) (n=24)	p <sup>\$</sup>
Pulse rate (bpm)	Mean± SD	81.97 ± 10.72	81.05 ± 12.93	>0.05 NS
Systolic blood pressure (mm Hg)	Mean± SD	114.89 ± 8.06	116.14 ± 7.27	>0.05 NS
Diastolic blood pressure (mm Hg)	Mean± SD	74.56 ± 6.33	75.03 ± 6.5	>0.05 NS
Temperature (°C)	Mean± SD	37.03 ± 0.25	37.09 ± 0.24	>0.05 NS
Hemoglobin (g/dl)	Mean± SD	11.3 ± 1.07	11.63 ± 1.11	>0.05 NS
Hematocrit (%)	Mean± SD	34.46 ± 3.16	35.97 ± 2.52	>0.05 NS

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

**Table 3,** shows 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 (3):** Difference between Study Groups concerning 24 hrs Postoperative Vital Signs:

Variable		Group (1) (Spontaneous Placental)	Group (2) (Manual Placental)	P <sup>\$</sup>
Pulse (bpm)	Mean ± SD	83 ± 7.14	88.58 ± 11.05	<0.05 S
Systolic blood Pressure (mmHg)	Mean ± SD	115.5 ± 11.54	113.2 ± 11.3	>0.05 NS
Diastolic blood pressure(mmHg)	Mean ± SD	71.69 ± 7.34	72.88 ± 7.75	>0.05 NS
Temperature (°C)	Mean ± SD	37.05 ± 0.41	37.46 ± 0.52	<0.01 S

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

**Table 4** shows 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 (4):** 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) (n=24)	P
Duration of Placental Delivery (min)	Mean ±SD	2.84 ± 1.69	0.38 ± 0.29	<0.001 ^ HS
Duration of CS Procedure (min)	Mean ±SD	53.1 ± 6.04	47.08 ± 6.95	<0.01 <sup>\$</sup> S

SD: Standard deviation \$:Independent t test ^: Mann Whitney test S: Significant HS: Highly significant

**Table 5** shows 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 (5):** Difference between Study Groups concerning blood splashing, need for additional ecobolics and need for blood transfusion.

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

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

## DISCUSSION

In this study there were no statistically significant differences with respect to maternal baseline demographic characteristics such as maternal age. These results matched with that of **Gün et al.** (8) 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**(9) 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 (g/dl) (p>0.05). The preoperative hemoglobin in spontaneous separation group was (11.3 ± 1.07) and in manual separation group was (11.63 ± 1.11), postoperative hemoglobin in spontaneous separation group was (10.3 ± 0.83) and in manual separation group was (9.42 ± 0.74). Similar results were reported by **Gol et al.** (10) 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 was no statistically significant difference in preoperative or postoperative hemoglobin. The preoperative hemoglobin in spontaneous separation group was (10.9 ± 1.3) and in manual separation group was (11.1 ± 1.11), postoperative hemoglobin in spontaneous separation group was (10.1 ± 1.4) and in manual separation group was (10.4 ± 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.** (8) in their study which was about the effect of placental removal method on perioperative hemorrhage at cesarean delivery had found that there was 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.**(11) 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.

( $3.06 \pm 1.04$ ) 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.**<sup>(12)</sup> 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 ( $4.4 \pm 2.1$ ) in spontaneous exteriorization group vs. ( $8.1 \pm 2.5$ ) 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<sup>(13)</sup>.

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**<sup>(14)</sup> 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.**<sup>(11)</sup> 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.

Also in contrast to our results **Huppertz**<sup>(15)</sup> 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.**<sup>(16)</sup> 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 ( $0.28 \pm 0.15$ ) min vs. ( $2.84 \pm 1.69$ ) min, respectively, ( $p < 0.001$ ). This agrees with **Morales et al.**<sup>(17)</sup> 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 ( $1.9 \pm 1.2$ ) min vs. ( $3.4 \pm 2.8$ ) min, respectively ( $P < 0.001$ ). Also **Ajay and Suman**<sup>(18)</sup> 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.**<sup>(11)</sup> 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 ( $47.08 \pm 6.95$ ) min than spontaneous separation group ( $53.1 \pm 6.04$ ) min. This was similar to **Ramadani**<sup>(14)</sup> study which found that the operating time was significantly shorter in the manual removal group ( $40.2 \pm 3.2$ ) min than spontaneous separation group ( $45.5 \pm 3.9$ ) min. Different results were reported by **Sekhavat et al.**<sup>(19)</sup> 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 ( $22.7 \pm 4.2$ ) min and spontaneous separation group ( $22.5 \pm 5.7$ ) min. Also **Manoj et al.**<sup>(11)</sup> found that there was no significant difference in the duration of operation as the mean duration in manual removal group was ( $34.35 \pm 8$ ) min and in spontaneous separation group was ( $34.54 \pm 7.96$ ) 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<sup>(14)</sup>** 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.<sup>(20)</sup>** in which they reported that there was a statistically significant higher need for using extra ecobolics among the group of spontaneous separation of placenta.

### Limitation:

Limitation of this work included variability in the skill of obstetrician performing the CS even though obstetrician performing the procedure had the same training and had the same hospital ranking; it's difficult to quantify talent and speed. It is impossible to have one obstetrician perform all this operations to reduce inter-operator skill variability. Also the postoperative observation period was 24 hours only which is short time.

### CONCLUSIONS

It could be concluded that manual removal of placenta only seems to be superior in saving the time taken to extract out placenta, but it is actually not so. The overall duration of surgery remains comparable. Manual removal of placenta adds to the post-operative complications in form of greater blood loss and infections.

Blood loss in cesarean delivery is increased by manual removal of the placenta as compared to the spontaneous method of placental removal. So spontaneous separation of the placenta during cesarean section is more beneficial than manual separation. Thus the current study recommend to wait for spontaneous separation of placenta during cesarean section so as to decrease the morbidity associated with cesarean section. Manual removal of placenta should be reserved for those cases in whom placenta does not separate spontaneously till 5 minutes.

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