

Manual Placental Removal versus Cord Traction for Placental Delivery at Caesarean Section in Correlation to Blood Loss

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ABSTRACT

Background: Delivery by cesarean section is one of the most commonly performed obstetrical operations all over the world, but it exposes women to the inherent risks of major abdominal surgery, e.g., injury to the pelvic structures, infection, and the need for blood transfusion etc. Antepartum physiological adaptation in preparation for blood loss at delivery includes a 42% increase in plasma volume and a 24% increase in red blood cell volume by the third trimester. **Objective:** The aim of this work was to compare the manual removal of placenta and spontaneous placental delivery combined with cord traction at caesarean section. **Patients and Methods:** We compare between both groups using computer programs to evaluate the safety and efficacy of each method. **Results:** There was a significantly higher estimated intraoperative blood loss in women who had their placentae manually separated when compared to women who had spontaneous placental separation. **Conclusion:** There was a statistically significant drop of hematocrit level in both groups with no statistically significant drop of hemoglobin. In addition, there was increased incidence of endometritis.

Keywords: Caesarean Section, placental delivery, blood Loss.

INTRODUCTION

Caesarean section is the most common major operation performed on women. Some of the short term morbidities of caesarean section include hemorrhage ⁽¹⁾, need for blood transfusion, post-operative fever and endometritis ⁽²⁾. Long term morbidities include placenta previa, placenta accreta and ectopic pregnancy. Some of complications mentioned increased by different ways of performing caesarean section operation and variation in techniques ⁽³⁾.

The method of removing the placenta is one such procedure that may increase or decrease in the morbidity of caesarean section ⁽⁴⁾.

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 denuded placental bed are compressed by continued contraction and retraction of uterine muscle to reduce the bleeding and oxytocin is given after delivery of the baby to minimize blood loss ⁽⁵⁾.

Placental delivery types at caesarean section have been described as, placental drainage with

spontaneous delivery, cord traction with spontaneous placental separation and manual removal ⁽⁶⁾.

In placental drainage, the end of the umbilical cord is left unclamped, placental blood drained and placenta delivers spontaneously through uterine incision, this method is not widely used ⁽⁷⁾.

The two methods most frequently used are cord traction combined with external uterine massage or expression of the uterus, and manual removal. Cord traction involves gentle traction on the umbilical cord with external uterine massage after delivery of the baby and oxytocic has been given this method takes about three to five minutes. Manual removal of the placenta done by the use of gloved hand with gentle sawing action to separate the placenta from its placental bed; this method takes about two minutes to be done. Some obstetricians practice manual removal as they consider it quicker to deliver than cord traction. The process of manual removal of the placenta cause more bleeding and may increase the risk of infection, so there is some studies, have found manual removal of placenta to increase postoperative morbidity, while other studies have not. So the primary objective is to compare the risk of significant blood loss associated with spontaneous and manual removal of the placenta during caesarean

section. The secondary outcome measures are duration of the surgery, need for blood transfusion and duration of hospital stay⁽⁵⁾.

AIM OF THE WORK

The aim of this work is to compare the manual removal of placenta and spontaneous placental delivery combined with cord traction at caesarean section.

Patients and Methods

The present study is prospective comparative study which was conducted at Al- Azhar University Hospital (El Hussein) and New Cairo Police Hospital, Obstetrics & Gynecology Department in the period between December 2017 and June 2018. One hundred pregnant females, scheduled for elective cesarean section.

The study was approved by the Ethics Board of Al-Azhar University.

A) Inclusion criteria: 1- Women aging from 18 years to 35 years. 2- Normal fetal heart rate tracing. 3- Singleton pregnancy. 4- Pregnant at term (37-40 weeks).

B) Exclusion criteria: 1- Gestational age less than 37 weeks and more than 40 weeks. 2- Abnormally adherent placenta whether placenta accreta, percreta or placenta preavia. 3- Suspected chorioamnionitis and polyhydramnios. 4. Emergency caesarean section and caesarean hysterectomy. 5. Rupture of membrane for more than 12 hours. 6. Bleeding diathesis. 7. Previous history of postpartum hemorrhage. 8. Women with multiple pregnancy 9- women with medical illness e.g anemia (Hb less than 10.5 gm/dl), DM, Cardiac, Hepatic, Renal ... etc.

Randomization was undertaken by means of computer generated random number in sealed opaque envelopes. Each patient was given a study information sheet and a consent form was signed.

After taking written consent, all patients were subjected to full history taking and excluding criteria that mention above, full general, abdominal examination and basic lab investigations e.g. CBC, liver, kidney, bleeding profile ... etc. All patients were given spinal or epidural anesthesia.

Women included in this study were randomized into two equal groups: Group A:

50 pregnant women underwent elective caesarean section in which placenta was removed manually by the use of the primary surgeon dominant hand was introduced into the uterine cavity and cleavage plane created between the placenta and the decidua basalis following which the placenta was grasped and removed. With the use of oxytocic by intravenous drip 20 units after delivery of the baby.

Group B: 50 pregnant women underwent elective caesarean section through placental delivery with cord traction at caesarean section by uterine massage externally on the abdominal wall with the use of oxytocic by intravenous drip 20 units after delivery of the baby.

Statistical analysis

Analysis of data was done by IBM computer using SPSS (statistical program for social science version 12) as follows: Description of quantitative variables as mean, SD. Description of qualitative variables as number and percentage. 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 regard quantitative variables in parametric data (SD < 50% mean). P value >0.05= insignificant, P value <0.05= significant, P value <0.01= highly significant.

RESULTS

Table (1): Preoperative Vital Signs and Laboratory Investigations of All Included Women

Preoperative Pulse rate (bpm): Mean ± SD	83.94 ± 4.97
Preoperative Systolic Blood Pressure (mm Hg): Mean ± SD	115.53 ± 7.68
Preoperative Diastolic Blood Pressure (mm Hg): Mean ± SD	74.8 ± 6.41
Preoperative Temperature (° C): Mean ± SD	37.06 ± 0.24
Preoperative Hemoglobin (g/dl): Mean ± SD	11.47 ± 1.1
Preoperative Hematocrit: Mean ± SD	35.33 ± 2.94

Table (2): Difference between Study Groups concerning Demographic Data

		Group I [Manual Separation of Placenta] (n=50)	Group II [Spontaneous Placental Separation] (n=50)	P Value
Age (Years)	Mean ± SD	25.34 ± 5.224	25.60 ± 5.48	0.809 NS
Gestational age (Weeks)	Mean ± SD	38.71 ± 1.13	38.31 ± 1.12	0.426 NS
Parity	Mean ± SD	1.000±0.7824	1.120±0.7182	0.851 NS
BMI (Kg/M3)	Mean ± SD	28.1 ± 2.6	28.0 ± 2.5	0.738 NS

NS: non-significant.

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

		Group I [Manual Separation of Placenta] (n=50)	Group II [Spontaneous Placental Separation] (n=50)	P value
Preoperative pulse rate (bpm)	Mean ± SD	85.14 ± 5.13	84.73 ± 4.79	0.651 NS
Preoperative systolic blood pressure (mm Hg)	Mean ± SD	118.14 ± 7.27	116.89 ± 8.06	0.851 NS
Preoperative diastolic blood pressure (mm Hg)	Mean ± SD	77.03 ± 6.5	76.56 ± 6.33	0.871 NS
Preoperative temperature (°C)	Mean ± SD	36.09 ± 0.24	36.03 ± 0.25	0.809 NS
Preoperative Hemoglobin (g/dl)	Mean ± SD	11.61 ± 1.11	11.32 ± 1.07	0.684 NS
Preoperative Hematocrit	Mean ± SD	35.97 ± 2.52	34.46 ± 3.16	0.906 NS

NS: non-significant.

Table (4): Difference between study groups concerning intraoperative blood loss and postoperative laboratory investigations

		Group I [Manual Separation of Placenta] (n=50)	Group II [Spontaneous Placental Separation] (n=50)	P Value
Estimated intraoperative blood loss (ml)	Mean ± SD	505.08±150.14	434.09±178.52	<0.001 HS
Postoperative Hemoglobin (g/dl)	Mean ± SD	10.62 ± 0.9665	10.53 ± 1.19	0.963 NS
Postoperative Hematocrit	Mean ± SD	30.91 ± 2.49	32.6 ± 3.12	0.001 S
Postoperative Hemoglobin Drop (g/dl)	Mean ± SD	1.23 ± 0.54	0.96 ± 0.23	0.069 NS
Postoperative Hematocrit Drop	Mean ± SD	3.06 ± 1.04	2.02 ± 1.47	0.003 S

HS: Highly significant, S: Significant, NS: Not significant

Table (5): Difference between Study Groups concerning Duration of Placental Delivery and the Whole CS Procedure

		Group I [Manual Separation of Placenta] (n=50)	Group II [Spontaneous Placental Separation] (n=50)	P Value
Duration of Placental Delivery (min)	Mean ± SD	0.28 ± 0.15	3.65 ± 2.75	<0.001 HS

Duration of CS Procedure (min)	Mean ± SD	56.900 ± 6.89	56.5100 ± 7.57108	0.956 NS
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Table (6): Difference between Study Groups concerning, need for blood transfusion, hospital stay, need for additional ecbolics.

		Group I [Manual Separation of Placenta] (n=50)	Group II [Spontaneous Placental Separation] (n=50)	P Value
Hospital Stay (days)	Mean+/-SD	2.3+/-0.8	2.6+/-0.73	0.27
Need for additional ecbolics	IV Oxytocin	13 (28.76%)	11 (29.25%)	0.78 NS
	Rectal Misoprostol	4 (2.6%)	3(0.68%)	0.49
Need for Blood Transfusion		2 (4%)	1(2%)	0.558 NS

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).

In the current study we found that, there was a significantly higher estimated blood loss intraoperative in women whom gone for manual separation compared to spontaneous separation group.

The type of uterine incision is an additional important factor in determining the amount of blood loss during cesarean section. A low transverse uterine incision has less operative blood loss compared with lower vertical or classical incisions.

Postoperative hematocrite and postoperative hematocrite drop were significantly lower in women who had there placentae manually separated when compared to women who had spontaneous separation.

The duration of placental delivery was shorter in manual separated group than spontanously separated group.

In the other side there were no statistically diffrences between the two groups concerning: Postoperative Hg, Postoperative Hg drop, duration of whole CS procedure, hospital stay, need for additional ecbolics and the need for blood transfusion intra or postoperative.

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. 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 ⁽⁸⁾. This mechanism can explain why blood loss is less in spontanous separation.

The concern that measurement or estimation of blood loss may have been subject to observer bias is addressed by the fact that there were significantly greater absolute and relative falls in haematocrit levels in the manual removal group. Change in haematocrit 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.

Studies of the relationship between placental delivery mode and intraoperative blood loss have been carried out. *McCurdy et al.* ⁽⁹⁾ 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.

In this current study there was a significantly higher estimated intraoperative blood loss in women who manual separated group of the placenta when compared to spontaneous placental separation group ($p < 0.001$). The amount of blood loss in manual placental separation group was $(505.08 \pm 150.14 \text{ ml})$, but in spontaneous placental separation group the amount of blood loss was $(434.09 \pm 178.52 \text{ ml})$. These results were similar to that obtained by other studies ^(9,10). They have found that Women who had manual removal of the placenta lost significantly more blood than those who had cord traction. **Ramadani** ⁽¹¹⁾ found that the amount of blood loss associated with manual removal and spontaneous separation of the placenta was 713 ± 240 and 669 ± 253 ml, respectively.

McCurdy et al. ⁽⁹⁾ concludes that manual shearing of placenta from deciduas basalis before significant involution of implantation bed, theoretically may result in unaltered perfusion to this area and an increase in blood loss.

There were no statistically significant differences between women of both groups concerning preoperative, postoperative hemoglobin and postoperative hemoglobin drop ($p > 0.05$). The preoperative hemoglobin in manual separation group was (11.63 ± 1.11) and in spontaneous separation group was (11.3 ± 1.07) , postoperative hemoglobin in manual separation group was (10.47 ± 0.95) and in spontaneous separation group was (10.3 ± 1.25) and postoperative hemoglobin drop in manual separation group was (1.23 ± 0.54) and in spontaneous separation group was (0.96 ± 0.23) . **Gol et al.** ⁽⁸⁾ and **Ramdani** ⁽¹¹⁾ have found no statistically significant difference in preoperative or postoperative hemoglobin as some patients gone for midline incision in contrast to **McCurdy et al.** ⁽⁹⁾ there were greater fall in hemoglobin level postoperative, both studies specified that cord traction was combined with uterine massage. This suggests that uterine massage may have added to the protective effect of cord traction.

Postoperative hematocrit drop [3.06 ± 1.04 vs. 2.02 ± 1.47 , respectively, $p = 0.003$] was, however, significantly lower in manual

separation group compared to spontaneous separation group which is the same results produced by **Magann et al.** ⁽¹³⁾.

In present study, there was significantly less operative blood loss, less decrease in the hematocrite level in the spontaneous separation group, despite the slightly longer operative time.

In the current study There was a significantly shorter mean duration of placental delivery [0.28 ± 0.15 min vs. 3.65 ± 2.75 min, respectively, $p < 0.001$] this agree with **Morales (2004)** reported the interval from birth of the baby to delivery of the placenta, which was significantly shorter in the manual removal of the placenta group ($P = 0.0001$). Also **Gol et al.** ⁽⁸⁾ found that the mean interval between delivery of the newborn and the placenta was shorter in manual separation group (vs 50.5 vs 62.02 seconds) which did not result in a longer operative time overall.

Ramadani ⁽¹¹⁾ found the operating time to be significantly shorter in the manual removal group, which are opposite to **Gol** ⁽⁸⁾; **McCurdy et al.** ⁽⁹⁾; **Chandra et al.** ⁽¹⁰⁾ as they found no significant difference in the duration of operation as 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 shows no statistically significant difference between women of both groups concerning hospital stay. The same results reported by **Ramadani** ⁽¹¹⁾.

The current study shows that no statistically significant difference between both groups was found as regard the use of additional oxytocic drugs and need for blood transfusion intraoperative or postoperative. Only (2) patients in manual separation group and (1) patient in spontaneous separation group have been taken blood transfusion postpartum. These results were similar to that obtained by **Gol et al.** ⁽⁸⁾; **Ramadani** ⁽¹¹⁾ there was no significant difference in the rate of transfusion when the placenta was delivered by manual removal or by cord traction.

Gol et al. ⁽⁸⁾ observed no significantly difference between the two groups concerning

intraoperative blood loss that is disagree with our results that may be due to some of this patents had a mid-line incision which causes a greater blood loss than a low transverse incision.

In contrast to *Huppertz* ⁽¹²⁾ 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.

The type of uterine incision is an additional important factor in determining the amount of blood loss during cesarean section. A low transverse uterine incision has less operative blood loss compared with lower vertical or classical incisions ^(9,13). Lower vertical and classical incisions were used in a number of patients which could result in increased operative blood loss.

Gol et al. ⁽⁸⁾, *McCurdy et al.* ⁽⁹⁾ where they reported that the duration of hospital stay was significantly longer when the placenta was delivered by manual removal than by cord traction as there was more blood loss and some patient needed blood transfusion also some patient were feverish which need more hospital stay.

Limitation of our 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. Its imposible to have one obstetrician performe all this operations to reduce inter- operator skill valiabilty. Also the number of patients was less than enough and the postoperative observation period was 48 hours only which is short time.

CONCLUSION

In this randomized study a statistically significantly increased amount of blood loss with manual removal of the placenta compared to the spontaneous placental separation group with shorter time of placental delivery, while the duration of surgery was statistically not significantly differs in both groups.

REFERENCES

1. **Saccone G, Caissutti C, Ciardulli A and Barghella V (2018):** Uterine massage for preventing potpartum hemorrhage at cesarean delivery: Which evidence? *Eu J Obstet Gynecol Rep Bio.*, 152: 509.
2. **Newton ER, Prioda TJ, Gibbs RS (2015):** A clinical and microbiological analysis and risk factors or puerperal endometritis. *Obstetrics & Gynecology*, 75:402–6.
3. **Mathai M and Hofmeyr GJ (2007):** Abdominal surgical incisions for ceasearan section. DOI: 10.1002 / 14651858.
4. **Anderson ER, Gates S (2004):** Techniques and materials for closure of the abdominal wall in caesarean section. *Cochrane Database of Systematic Reviews*, 4(4): 4663-4666.
5. **Cotter A, Ness A, Tolosa J (2001):** Prophylactic oxytocin for the third stage of labour. *Cochrane Database of Systematic Reviews*, <https://www.ncbi.nlm.nih.gov/pubmed/11687123>
6. **Dodd JM, Anderson ER, Gates S (2004):** Surgical techniques involving the uterus at the time of caesarean section. *Cochrane Database of Systematic Reviews, Journal of Obstetrics and Gynecology* ,171(4):1022–5.
7. **Maher M and Abdelaziz A (2017):** Comparison between two management protocols for postpartum hemorrhage during cesarean section in placenta previa: Balloon protocol versus non-balloon protocol. *Journal of Obstetrics and Gynaecology*, 43 (3): 447-455.
8. **Gol M, Baloglu A, Aydin C, Ova L, Yensel U and Karci L (2004):** Does manual removal of the placenta affect operative blood loss during cesarean section? *European Journal of Obstetrics and Gynecology and Reproductive Biology*, 112: 57-60.
9. **McCurdy CM, Magann EF, McCurdy CJ and Saltzman AK (1992):** The effect of placental management at cesarean delivery on operative blood loss. *Am J Obstet Gynecol.*, 167: 1363 – 1367.
10. **Chandra P, Schiavello HJ, Kluge JE and Holloway SL (2002):** Manualremoval of the placenta and postcesarean endometritis. *J Reprod Med.*, 47: 101-106.
11. **Ramadani H (2004):** Cesarean section intraoperative blood loss and mode of placental separation. *Int J Gynecol Obstet.*, 87: 114-8.

12. Huppertz B (2008): The anatomy of the normal placenta. *J Clin Pathol.*, 61: 1296-1302.

13. Magann EF, Washburne JF, Harris RL, Bass JD, Duff WP, and Morrison JC. (1995): Infectious morbidity, operative blood loss, and length of the operative procedure after cesarean delivery by method of placental removal and site of uterine repair. *J Am Coll Surg.*, 181:517- 520.