

Uterine Atony: An Innovative Dutta's Scoring System for Elective Cesarean Section

¹Dilip Kumar Dutta, ²Indranil Dutta

ABSTRACT

Uterine atony appears suddenly and is mostly unpredictable and accounts for 80% of causes of postpartum hemorrhage (PPH), it is also one of the important causes of maternal death.

Objective: To analyze the efficacy of Dutta's score for early diagnosis and management of uterine atony during elective lower segment cesarean section (LSCS) to prevent PPH.

Study methods: This study was undertaken at JNM, NSGH, CN at Kalyani, Nadia, West Bengal, India, from 1st June 2008 to 31st Dec 2012. Six hundred cases undergoing elective LSCS were selected for randomized trial. Clinical observations were made after placental expulsion for scoring which includes shape and size of uterus, rugosity, tone, placental localization and time of placental expulsion. Scores of 0, 1, 2 were given on each observation. Three groups are created depending on scoring: group A (n = 300)—8 to 10, group B (n = 220)—5 to 7 and group C (n = 80)—<5 for better management.

Management protocols were formulated in the three groups for prevention of PPH: group A—oxytocin 10 U (5U IM + 5U IV 30 drops/min in Ringer's lactate 500 ml), group B—oxytocin 15U (5U IM + 10U IV 30 drops/min in Ringer's-lactate 500 ml) + methylergometrine (0.25 mg IM) + anterior posterior uterine wall compression, group C—oxytocin 20 U (5U IM plus 15 U IV 30 drops in ringer lactate 500 ml) + methylergometrine (0.5 mg IM) + carboprost (250 mcg IM) + lateral followed by anterior posterior uterine wall compression + isthmus compression of uterus + misoprostol 800 mg per rectal during postoperative period.

Results: After adopting Dutta's score and management protocols, it was interesting to observe that intra and post-operative, blood loss (within 2 hours) were found to be significantly reduced in group A—73.3% (<300 cc), 88% (<200 cc) and group B—63.6% (<300 cc), 81.8% (<200 cc). Intra-operative blood loss >500 cc were also found to be reduce in group A—14.7%, group B—16.3%. In group C, intraoperative blood loss >500 cc were seen in 41.25% and postoperative —37.5% respectively. Hemoglobin level below 11 gm% were found to be not reduced in group A (1.4%), group B (2.6%) and group C (8.7%) after 24 hours of delivery hemodynamic status

in all groups were found to be uneventful. Maternal mortality was found to be nil.

Conclusion: Early diagnosis and management of uterine atony during elective LSCS after adopting Dutta's score were found to be not only reduce intra- and postoperative blood loss but also was found to maintain a satisfactory hemoglobin level and hemodynamic status. Maternal mortality was found to be nil. This randomized trial highlighted the importance of prompt treatment in group C to reduce intra- and postoperative blood loss and maternal morbidity and mortality.

Keywords: Dutta's score, MMR, PPH, Pregnancy scoring, Uterine atony.

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INTRODUCTION

Paramount importance for every obstetrician is to prevent postpartum hemorrhage (PPH) due to uterine atony during elective lower segment cesarean section (LSCS) by early detection, assessment of the severity and search for specific causes. There may be a clinical scenario which mainly requires consideration is: (1) PPH after delivery of baby, (2) PPH after delivery of placenta and (3) secondary PPH.

Considering above facts, randomized trial was undertaken to review and analyze early diagnosis and management of uterine atony during elective LSCS in an uncomplicated pregnancy to prevent PPH by advocating Dutta's score.

MATERIALS AND METHODS

This randomized trial was undertaken at JNM, NSGH, CN at Kalyani, Nadia, West Bengal, India, from 1st June 2008 to 31st Dec 2012. Six hundred cases, who undergone elective LSCS, were selected for this study and elective cases were selected randomly. Primigravida, 18 to 30 years, 38 to 40 weeks maturity were selected for this randomized trial.

¹Senior Consultant, ²Assistant Professor

¹Department of Obstetrics and Gynecology, Gice Hospital Nadia, West Bengal, India

²Department of Obstetrics and Gynecology, IQ City Medical College, Durgapur, West Bengal, India

Corresponding Author: Dilip Kumar Dutta, Senior Consultant Department of Obstetrics and Gynecology, Gice Hospital Nadia, West Bengal, India, Phone: +919051556424, e-mail: drindranildutta@yahoo.com

During LSCS, clinical observations were advocated on findings of uterine condition after placental expulsion by control cord traction for scoring which includes shape and size, rugosity, tone, placental localization and time of placental expulsion. Score of 0, 1, 2 were given on each observation. Three groups are created: group A (300)—8 to 10, group B (n = 220)—5 to 7 and group C (n = 80)—<5 for prompt management. Management protocols were formulated in the three groups for preventing PPH as follows:

1. *Group A:* Oxytocin 10U (5U IM + 5U IV 30 drops/min in Ringer Lactate 500 ml).
2. *Group B:* Oxytocin 15U (5U IM + 10U IV 30 drops/min in Ringer's lactate 500 ml) + methylergometrine (0.25 mg IM) + anterior-posterior uterine wall compression.
3. *Group C:* Oxytocin 20U (5U IM plus 15U IV 30 drops in ringer lactate 500 ml) + methylergometrine (0.5 mg IM) + carboprost (250 mcg IM) + lateral followed by anterior-posterior uterine wall compression + isthmus compression of uterus + misoprostol 800 mg per rectal during postoperative period.

Postoperatively, oxytocin 5U, 30 drops in DNS for 4 hours in group A, 5 unit for 6 hours in DNS in group B, 10U in divided doses for 12 hours RL and DNS in group C were administered depending on findings on vaginal bleeding and uterine contraction. Continuous bladder drainage by indwelling catheter for 24 hours were advocated in all groups.

- Thorough history taking, clinical assessment, blood profile were done.
- Ultrasonography was advocated to see fetal parameter and placental localization, its shape and size, etc.
- Primigravida, 18 to 30 years, 38 to 40 weeks maturity were selected for this randomized trial.
- One thousand milliliters crystalloid was given before regional spinal anesthesia (bupivacaine 2.5 cc) to prevent hypovolemia.

- Blood sugar in between 100 and 120 mg, normal level of Na, Ca, K, Mg and platelet count above 2 lakh were maintained 12 hours before LSCS.
- After placental expulsion uterus pulled out exteriorly for quick diagnosis. Closure of uterine wound were done in two layers with absorbable chromic 1 suture after securing bleeding in the uterine cavity and ensuring absence of blood clots inside the uterine cavity. Total time taken is 10 to 15 minutes. Uterus is then replaced in the original anatomical position in the abdomen.
- Intraoperative blood loss was estimated from standard mop (50 × 20") weight, blood from suction apparatus and blood clot.
- Postoperative blood loss per vagina was estimated by collecting blood in kidney tray and weight of sanitary pad.
- Informed consent was obtained from the patient and relatives.

Exclusion Criteria

Congenital anomaly of uterus, patient in labor, prolonged and obstructed labor, malnutrition, any medical and surgical complications of pregnancy, twin or triplet pregnancy, hydramnios, fibroid uterus, etc.

OBSERVATIONS

Showing criteria of scoring depending on observations on uterus following placental expulsion—shape and size of uterus, rugosity, tone, placental localization and time of placental expulsion (Table 1).

Distribution of groups, pattern of scoring and score were advocated for better management (Table 2).

Different type of protocols along with drugs, doses, routes, etc. were advocated in three groups for better management (Table 3).

Table 1: Criteria of scoring

Uterus	0	1	2
Shape and size	Broad and flat discoid	Less elevated, narrow, hard and globular shape	More elevated, narrow hard and globular shape
Rugosity	Absent	Present in anterior or posterior surface	Present in both surfaces
Tone	Soft	Firm	Hard, contracted
Placental localization	Lower segment	Fundo anterior	Fundo posterior
Time of placental expulsion	>5 minutes	3–5 minutes	<3 minutes

Table 2: Distribution of scoring in groups

Groups	Pattern of scoring	Score
A (n = 300)	Shape and size (SS)—2, rugosity (R)—2, tone (T)—2, placental localization (PL)—1 to 2, placental expulsion (PE)—1 to 2	8 to 10
B (n = 220)	Shape and size (SS)—1, rugosity (R)—1, tone (T)—1, placental localization (PL)—1 to 2, placental expulsion (PE)—1 to 2	5 to 7
C (n = 80)	Shape and size (SS)—0, rugosity (R)—1, tone (T)—0, placental localization (PL)—1 to 2, placental expulsion (PE)—1 to 2	<5



Table 3: Management protocols

Groups	Oxyt*	Methylerg**	Carboprost	Lateral compression on upper segment of uterine wall	Anterior-posterior uterine wall compression	Isthmus compression	Misoprostol 800 mcg per rectal
A	10 U	—	—	—	—	—	—
B	15 U	0.25 mg	—	—	Yes	—	—
C	20 U	0.5 mg	250 mcg	Yes	Yes	Yes	Yes

*Oxyt: Oxytocin; **Methylerg: Methylergometrine

Intraoperative blood loss <300 cc was found to be significantly reduced in group A—73.3% and group B—63.6%. Intraoperative blood loss >500 cc were reduced in group A—4.7%, group B—16.3%. In group C—intraoperative blood loss >500 cc were seen in 41.25% cases (Table 4).

Postoperative blood loss within 2 hours was found to be less <200 cc in 88% (group A), 81.8% in group B as compared to 25% in group C. In group C, blood loss in between 201 and 500 cc was found to be more—37.5% compared to group A—12% and group B—18.2%. Blood loss above 500 cc was seen in group C managed by blood transfusion (Table 5).

Hemoglobin level, after 24 hours, below 11 gm% were found to be less reduced in group A (1.4%), group B (2.6%) and group C (8.7%) from preoperative to postoperative period (Table 6).

Hemodynamic status in all groups was found to be uneventful except hypotension observed mainly in group C which was managed by replacement by fluid. No maternal death was reported (Table 7).

DISCUSSION

It is very much paramount importance for every obstetrician is to observe condition of uterus and to assess

the severity and specific causes that lead to uterine atony during elective LSCS.

Evidence-based study showed that exogenous oxytocin is a strong uterotonic agent, induces the rapid onset of strong rhythmic uterine contractions mainly on upper uterine segment which last for 15 to 20 minutes and its action on gravid uterus in late pregnancy may be due to fall in the level of oxytocinase,^{1,2} rise of estrogen³ and fall of progesterone level.⁴ It was also important to know that excessive use of oxytocin produces a transient vascular smooth muscle relaxant effect may lead to mild brief reduction in blood pressure because of the reduced total peripheral resistance.

A randomized trial was undertaken by author for early detection of uterine atony and its immediate management during elective LSCS to prevent intra- and postpartum hemorrhage. It is very much important to maintain normal electrolyte balance (Na, Ca, K, Mg), blood sugar (100–120 mg) and platelet count > 2 lac before advocating LSCS.^{5,6}

Oxytocin, used in all groups in increasing dose (IM and IV) depending on scoring, is the recommended drug for prevention of PPH in cesarean section.⁷ A systematic review^{8,9} of 39 trials including more than 7,900 women addresses different drugs, route, doses and time for

Table 4: Intraoperative blood loss

Groups	<300 cc	301–500 cc	>500 cc
A (n = 300)	220 (73.3%)	66 (22%)	14 (4.7%)
B (n = 220)	140 (63.6%)	44 (20%)	36 (16.3%)
C (n = 80)	11 (13.7%)	36 (45%)	33 (41.25%)

Table 5: Postoperative blood loss within 2 hours

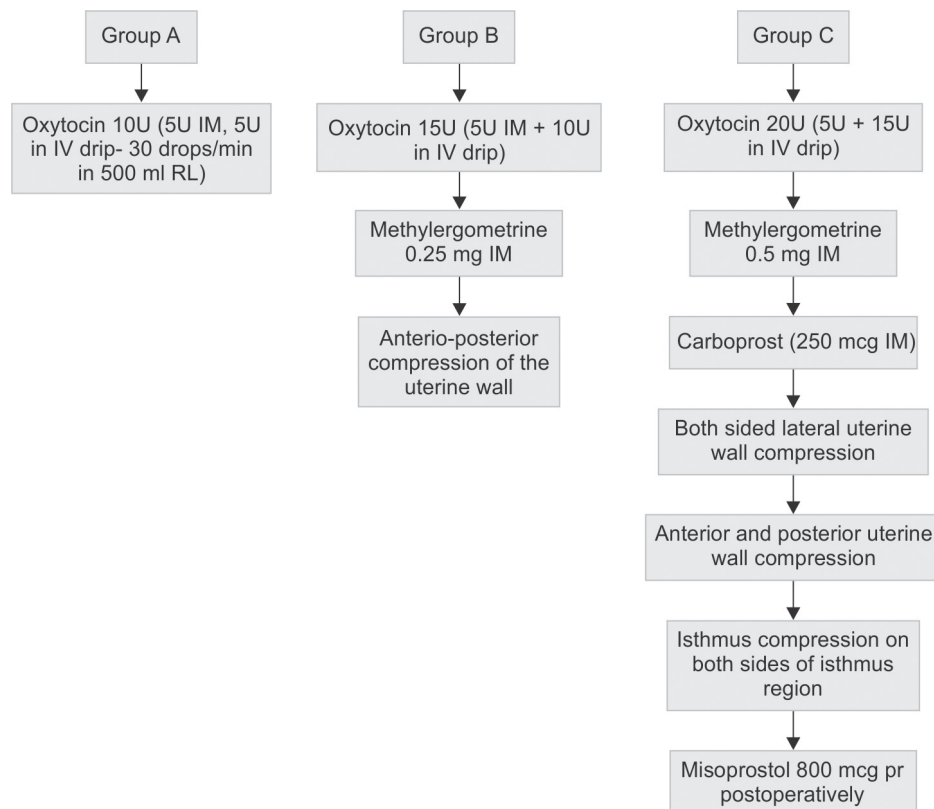
Groups	<200 cc	201–500 cc	>500 cc
A (n = 300)	264 (88%)	36 (12%)	—
B (n = 220)	180 (81.8%)	40 (18.2%)	—
C (n = 80)	20 (25%)	30 (37.5%)	30 (37.5%)

Table 6: Hemoglobin level in gm%

Groups	Preoperative		Postoperative	
	<11 gm%	>11 gm%	<11 gm%	>11 gm%
A (n = 300)	232 (77.3%)	68 (22.7%)	236 (78.7%)	64 (21.3%)
B (n = 220)	144 (65.5%)	76 (34.5%)	150 (68.1%)	70 (33.9%)
C (n = 80)	58 (72.5%)	22 (27.5%)	65 (81.3%)	15 (18.7%)

Table 7: Hemodynamic status and maternal death

Groups	Hypotension	Cardiac arrest	Pulmonary edema	Renal failure	Maternal death
A	2 (0.6%)	—	—	—	—
B	3 (1.3%)	—	—	—	—
C	5 (6.3%)	—	—	—	—

Flow Chart 1: Management protocols to prevent PPH due to uterine atony during elective cesarean section

preventing PPH at both elective and emergency cesarean section, were found to be reduce the need for additional uterotonic agents which was observed in group A but does not affect the overall occurrence of major obstetrical hemorrhage as seen in groups B and C. In group B, additional use of methylergometrine 0.25 mg IM produces prolonged uterine contractions in both upper and lower uterine segments with a duration of 60 to 120 minutes in a normotensive women; whereas in group C, methylergometrine 0.5 mg IM and in addition injection of carboprost 250 mcg IM were found to be a strong uterotonic effect with a duration of action is up to 6 hours.¹⁰

Anterio-posterior uterine wall compression for 2 to 5 minutes were found to be effective in group B, whereas in group C at first lateral compression for 1 to 2 minutes to be followed by anterior-posterior compression 2 to 3 minutes, and isthmus compression (compression of both uterine arteries at the isthmus region) were found to be effective. Misoprostol 800 mcg per rectal during postoperative period were found to be additional advantages to reduce intra- and postoperative blood loss as it was observed in this study.

It is very much significant to observe that after adopting Dutta's score and subsequent management—intra- and postoperative blood loss within 2 hours were found to significantly reduce in group A—73.3% (<300 cc), 88% (<200 cc) and group B—63.6% (<300 cc), 81.8% (<200 cc). Intraoperative blood loss > 500 cc were also found to be

reduce in group A—14.7% group B—16.3%. In group C blood loss > 500 cc during operation—41.2% and postoperative blood loss—37.5% were found to be increased, as compared to groups A and B.

This study also showed that hemoglobin level below 11 gm% were not found to be reduced significantly either in group A (1.4%), group B (2.6%) and group C (5%). Hemodynamic effects^{11,12} in the form of hypotension were observed in group A (6%), group B (1.3%) and group C (6.25%) which were controlled by immediate management. Pulmonary edema, cardiac arrest, renal failure and maternal death¹³ were found to be absent. A Flow Chart 1 has been made to show the series of process to be followed as explained below.

CONCLUSION

Early diagnosis and management of uterine atony during elective LSCS, after advocating Dutta's score, were found to be not only reduce intra- and postoperative blood loss but also showed to maintain good hemoglobin level and hemodynamic status. Maternal death was found to be absent.

This randomized trial has also highlighted the importance of prompt treatment in group C to reduce intra- and postoperative blood loss and maternal death.

It also appears from this trial that Dutta's scoring system is helpful in early diagnosis and treatment of primary PPH during elective LSCS. Further study may

be multicentric will give more insight regarding the scoring system.

Flow Chart 1 created depending on the scoring system 0, 1, 2 after observation of uterus following placental expulsion which includes: (1) shape and size, (2) rugosity, (3) tone, (4) placental localization and (5) time of placental expulsion.

Three groups are formed according to the scoring system as follows:

- *Group A*: 300 cases—score 8–10
- *Group B*: 220 cases—score 5–7
- *Group C*: 80 cases—below 5

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