

RESEARCH ARTICLE

Use of Innovative Low Cost Drape for Assessment of Blood Loss during Delivery: A Case Report

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ABSTRACT

Aim: Routine quantification of blood loss (QBL) during childbirth by CG drape.

Background: Postpartum hemorrhage (PPH) remains the leading cause of maternal mortality in South East Asia and needs early diagnosis and prompt intervention. A calibrated drape is the fundamental requirement for routine QBL. The commercially available drape is not cost-effective, and therefore authors have prepared an innovative low cost calibrated drape named CG drape.

Technique: CG drape was prepared on the spot from a disposable clear plastic apron. The lower edges of which were sealed together using a plastic sealing device converting it into a conical pouch. One plastic scale has already been standardized and marked denoting different volumes (350,500 and 1000 mL) at various levels (10.5, 12 and 15 cm, respectively) was used to make markings along the sealed margin. The drape was spread on the birthing surface before delivery with conical pouch kept folded under buttocks which was unfolded following delivery of the baby and cutting the cord and blood loss was assessed in real time. QBL was done by the combined method as the sum of blood in calibrated CG drape added to gravimetric assessment by weighing the pads. The drape was disposed off, as medical waste. The CG drape was used successfully in 32 low-risk gravid women delivering vaginally. PPH was diagnosed in one woman and was managed promptly.

Conclusion: CG drape is an ideal device for the direct measurement of blood loss during delivery. It does not require manufacturing and distribution. It is practical and easy to use.

Clinical significance: CG drape by virtue of its very low cost (approximately ₹ 20 each) allows routine QBL during childbirth and results into increased vigilance, early diagnosis and prompt

intervention of PPH and may be lifesaving for the already anemic women of South East Asia.

Keywords: Blood collection drape, Low resource settings, Post partum hemorrhage.

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Sustainable development goal of reducing global maternal mortality to 70 by 2030 must consider reducing deaths due to PPH, the major killer in low-income countries. These settings account for 99% of all maternal deaths globally. Most of these deaths are preventable.^{1,2} An important measure to improve outcome in PPH is early diagnosis which includes identification of the severity of hemorrhage by estimation of blood loss along with clinical signs and symptoms so that prompt measures can be instituted. By the time, the vital signs change, the already anemic woman in low resource settings may be in a very precarious condition. Early recognition of excessive blood loss, therefore, becomes a critical measure. Routine measurement of blood loss allows early recognition in an actual case of PPH. Commonly employed method of postpartum blood loss estimation is by visual estimation but has an inherent risk of gross underestimation (33–50%) whereas calibrated vaginal delivery drapes improve blood loss estimation and correlate well with photospectrometry values.³ Replacing estimation with QBL at birth has been proposed as one of seven safety objectives of the National Maternal Health Initiative.⁴ QBL by weighing all soaked swabs and drapes after delivery and subtracting the dry weight is an excellent method but is time consuming and adds to the workload of already scarce workforce of low resource setting. A more practical approach of QBL is a sum of direct measurement in the calibrated drape in real time and gravimetric methods (for the blood which was not collected in calibrated drape). This way only the minimum number of objects soaked with blood are needed to be weighed as the major component of blood

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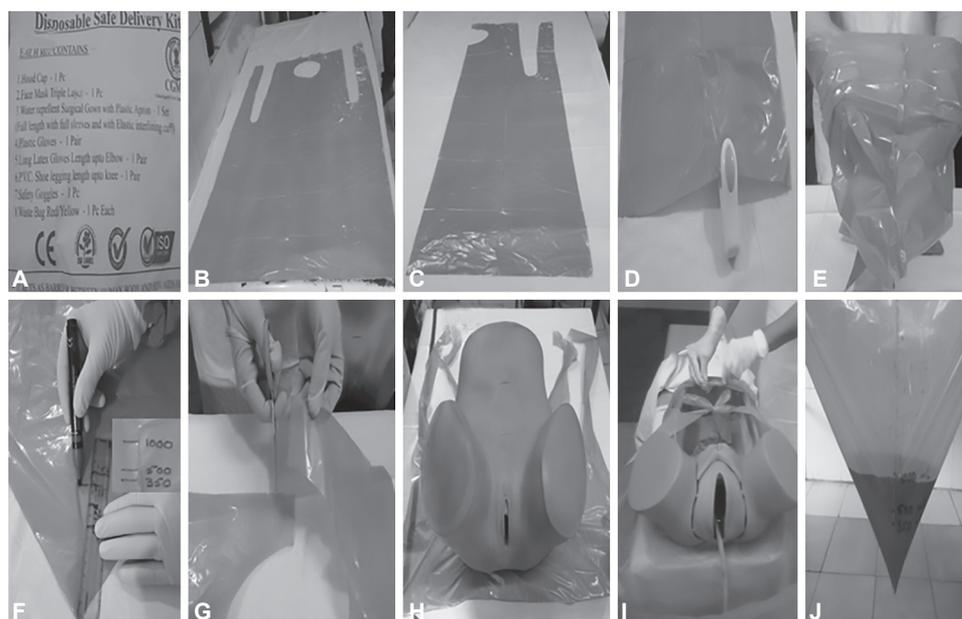
is already measured in the calibrated drape. If the predetermined size of gauze or sponge is used each time, a near perfect estimation of blood loss is possible with practice. This combined (direct added to gravimetric estimation) method also eliminates the inconvenience caused by removing and weighing the large linen which is spread on the birthing surface for the assessment of blood loss. This linen is usually dripping with blood when weighed and soils most of the things.

For practical implementation of the QBL in routine use, a calibrated drape is the fundamental requirement. The commercially available drape costs around ₹ 500 each and is not cost effective for low resource facilities with higher delivery rates. An ideal device should not require manufacturing and distribution because the logistics are difficult to sustain so it should best be prepared at the point of care. It should provide an accurate estimation of threshold volumes in real time, permit early diagnosis of PPH (must quantify at least 500–1,000 mL of blood loss), be practical and easy to use, be low cost, and require minimal equipment.⁵ To achieve these objectives, the authors have innovated a novel drape named “CG drape”. CG denotes our state of Chhattisgarh.

Technique

The steps of preparation and use are shown in Figure 1. This single-use drape is prepared on the spot from a clear

plastic apron supplied inside the delivery kit provided by the government (Figs 1 A and B.). This plastic apron may also be easily procured commercially for ₹ 15–20 each. The plastic apron is generally folded to half of its width longitudinally, otherwise the same may be done manually (Fig. 1C). The lower edges of this folded plastic apron are sealed together using a plastic sealing device (Fig. 1D). Both the hands are now inserted in the lower part of the plastic apron, and the sealed edges are brought to the midline of the front portion of the conical pouch formed thereby (Fig. 1E). One plastic scale is taken which has already been standardised and marked denoting different volumes in mL at various measurements in it i.e. 350 mL at 10.5 cm, 500 mL at 12 cm and 1000 mL at the 15 cm. This scale is kept alongside the sealed margin and designated measurements denoting these volumes are marked along the sealed margin in midline with the help of a marker pen (Fig. 1F). The neck piece loop of the plastic apron is now cut vertically and thereby converted to the stretchable upper strings (Fig. 1G, Movie clip 1). The original belt of plastic apron functions as the lower string. The drape is spread on the birthing surface before delivery, and the conical pouch of the drape is folded and kept under buttocks of delivering woman (Fig. 1H). After delivery of the baby and cutting the cord, the unfolding of the collecting pouch is done very easily by asking the woman to lift her buttocks a little. Both the plastic strings



Figs 1A to J: (A) Safe delivery kit provided by the government of CG containing plastic apron (highlighted); (B) Plastic apron unfolded; (C) Plastic apron is packaged lengthwise folded; (D) Sealing together the lower edges of the lengthwise folded plastic apron; (E) The lower part of the plastic apron converted into a conical pouch after sealing; (F) Marking of the conical pouch for volume (in mL) with the help of a standardized measuring scale; (G) Cutting the neck loop of the plastic apron converting it into stretchable tying strings (upper one); (H) Laying down of CG drape with conical pouch folded below the buttocks of woman before delivery; (I) After delivery of the baby, the original belt and vertically cut neck loop of plastic apron are tied over mother's abdomen as lower and upper strings. The conical pouch is unfolded now before delivery of placenta; (J) Blood loss assessed in real time in the conical pouch

Movie clip 1: Shows taking out of packaged lengthwise folded plastic apron out of safe delivery kit and sealing together the lower edges converting lower part of apron into a conical pouch which is marked with the help of a standardized measuring scale for volumes of 350, 500 and 1000 mL. The neck loop of the plastic apron is cut

of the drape are tied around the mother’s abdomen to ensure siphoning off all the blood into the conical pouch (Fig. 1E). Blood loss is measured in real time (Fig. 1J and Movie clip 2). The drape is removed only after the bleeding is controlled. It is decontaminated after use and is disposed off, as medical waste or may be incinerated.

OUR EXPERIENCE

We have used CG drape for QBL after childbirth in 32 low-risk gravid women at term having a vaginal delivery. The details are given in Table 1. The mean age was 23.48 years, and the majority were primipara (75%), mean birth weight was 2.68 kg, one woman was diabetic. Direct measurement of blood loss was done in real time and added to this was a gravimetric estimate (done by weighing the pads used to mop blood from vagina or vulva and subtracting the dry weight from it). Care was taken to prepare the standard sized pads each time. Each pad weighed 20 g and 80 g when dry and fully soaked, respectively. Routinely one or two pads were needed (AMTSL is a routine in our hospital).

Table 1: Clinical details of women undergone QBL with the use of CG Drape (n = 32)

Variables	Number	Percentage (%)
Age (years)		
<18	00	00
18–35	31	96.87
>35	01	3.12
Parity		
–Primipara	24	75
–Multipara	08	25
Para >4	00	00
Antenatal Complications		
Twins	00	00
Severe anaemia	00	00
Preeclampsia	00	00
Gestational Diabetes	01	3.12
–IUGR	00	00
–Oligoamnios	01	3.12
Jaundice	00	00
PROM	00	00
Gestational age at labour (wks)		
<37	00	00
37–42	32	100
>42	00	00
Birth weight (mean in kg)	2.68	
Mean Hb before delivery (gm/dL)	9.2	
Hb range on 1st postpartum day (gm/dL)	8.8–9.6	
Change in Hb	± 0.38	

If the direct estimation of blood loss in CG drape reached 350 mL mark, soaked pads weighed, and if this QBL exceeded 500 mL or if there was more than 500 mL blood in CG drape itself, PPH was diagnosed, and immediate intervention started. We estimated hemoglobin on the first postpartum day and compared it to the predelivery level.

In all 32 but one women, the blood loss in CG drape remained well below 350 mL mark and not more than two pads were soaked on an average. The only case of atonic PPH occurred on 02.02.2018 in a low-risk primipara and was diagnosed immediately because the loss was brisk and crossed 500 mL mark in the drape within few minutes of delivery of the placenta. The women responded to the prompt treatment including massage, therapeutic oxytocics, and intravenous fluids. The total loss did not exceed 1000 mL mark in CG drape, and total two pads were soaked fully with blood. The Hb% decreased by 2 g% in this particular woman (from 9 g% to 7 g%) and she was given two units of blood transfusion. The overall mean Hb% before delivery was 9.26 and mean change after delivery was ± 0.38 g%.

DISCUSSION

The CG drape was prepared on spot and used by nurses and other healthcare providers in the labor room of our hospital located in the tribal-dominated geographical area of our state of Chhattisgarh (Fig. 2). It was found to be very simple but practical because of very short training required to prepare and use it. The markings on the drape were the bare minimum and could be standardized easily (Movie clip 3). The aim was to keep



Fig. 2: Labor room nursing staff with CG drape and GMC Hospital, Ambikapur, Chhattisgarh, India

Movie clip 2: CG drape is laid with conical pouch folded below the buttocks of woman before delivery and unfolded after delivery of the baby, the original belt and vertically cut neck loop of plastic apron are tied over mother’s abdomen as lower and upper strings. Placenta is removed and blood loss is assessed in real time in the conical pouch till the bleeding stops or necessary measures are instituted

it simplest and just enough to detect PPH at the earliest so that further assistance can be warranted immediately. The advantages of CG drape over commercially available drapes are depicted in Table 2. By virtue of having been made of very soft plastic, the blood collection pouch could be easily folded under the buttocks of the birthing woman and was simply unfolded after cutting the cord following the delivery of the baby. This step avoids amniotic fluid to mix with blood, but at the same time it provides a clean impermeable surface for birth and thereby reduces infection. The simple act of unfolding the (already placed on the birthing surface with collection bag folded under the buttocks) CG Drape also eliminated the discomfort associated with laying down the blood collection drape after delivery of baby which is usually done when commercially available drapes are used as these drapes are not made of very soft plastic and cause discomfort to the woman

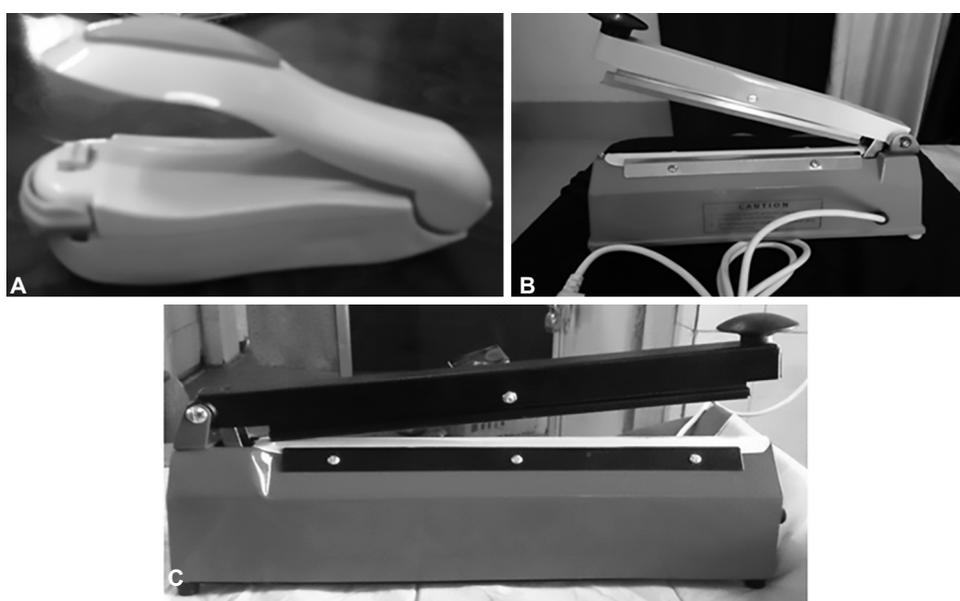
if placed in folded manner. CG drape was easily disposed off as medical waste because this plastic apron was meant to be disposed along with other contents of delivery kit as per norms of medical waste disposal. All these advantages were availed at lowest possible cost (₹ 20). The plastic sealing device is a one-time investment with many variants available in the market (cost range ₹ 179–1500) (Fig. 3 and Movie clip 4).

CONCLUSION

CG Drape is a user-friendly, very low cost (approximately ₹ 20 each) calibrated drape, prepared on spot from a disposable clear plastic apron. It helped QBL by the combined method which is the sum of real-time direct assessment in calibrated CG drape (the major component of blood loss) added to gravimetric assessment by weighing the pads (now a minor component) and gives a near accurate estimate of postpartum blood loss.

Table 2: Comparison between commercially available drape and CG drape

Feature	Commercial drape	CG drape
1 Availability	Has to be manufactured and supplied to/procured by the facility	Prepared on spot
2 Material	Thick plastic	Clear transparent soft plastic apron
3 Use	Single (one time) To be placed under buttocks after delivery of the baby	Single (one time) Being soft material, can be placed on the birthing surface throughout labour with blood collection pouch folded under buttocks before delivery of the baby and unfolded after that
4 Cost per piece	\$ 7.5 (₹ 500 approximately)	₹ 15–20



Figs 3A to C: Varieties of plastic sealing devices: (A) Handheld battery operated plastic sealing device costing; (B) Portable electricity operated 12 inches plastic sealing device; (C) Portable electricity operated 8 inches plastic sealing device

Movie clip 3: Shows the accuracy of correlation of volume measurement in conical pouch with calibrations

Movie clip 4: Shows sealing of lower edges of plastic apron with the help of handheld small battery operated sealing device

CLINICAL SIGNIFICANCE

This very low cost calibrated blood collection drape can be easily prepared at the point of care by any healthcare provider. It is a boon for routine quantification of blood loss at low resource settings where commercial calibrated drapes are neither available nor feasible owing to higher cost. The routine quantification of blood loss results into increased vigilance, early diagnosis and prompt intervention in the event of postpartum hemorrhage and thereby has a definite potential to reduce maternal morbidity in the already anemic women of the developing world particularly South East Asia.

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