Lower Uterine Segment Compression for Management of Early Postpartum Hemorrhage After Vaginal Delivery at Charoenkrung Pracharak Hospital

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Objective: *1. To evaluate the efficacy of lower uterine compression method in treatment of postpartum hemorrhage (PPH). 2. To compare the amount of blood loss in PPH between the lower uterine compression method and the conventional treatment.*
Study design: *Randomized control trial.*
Material and Method: *This Randomized control trial was done at the Department of Obstetrics and Gynecology, Charoenkrung Pracharak Hospital, Bangkok, between January and August 2008. During the study period, 66 cases of PPH were identified. Two patients were excluded from the present study due to cervical tear and extensive birth canal tear. Sixty-four patients met all inclusion criteria and were included in the present study. Thirty-two patients were randomly assigned to the conventional protocol and the other 32 were managed by the conventional protocol with the addition of lower uterine compression. The lower uterine compression treatment was started promptly together with other modalities of PPH treatment. This technique can be performed by using one hand to compress tightly at the lower segment of uterus for 10 minutes.*
Main outcome measurement: *The amount of blood loss in both control and experiment groups were collected after treatment of PPH for 2 hours postpartum.*
Results: *In all 64 cases, the blood loss after treatment in the conventional group is statistically significantly higher than the blood loss in the group that received lower uterine compression (225 $\pm$ 401 ml vs. 120 $\pm$ 211 ml; p = 0.026). The addition of lower uterine compression resulted in 105 ml or 47% reduction of blood loss.*
Conclusion*: The lower uterine compression method is a very effective procedure for treating PPH. It is simple to use, safe and no cost. This technique is an innovative scheme in the obstetrics field. The more efficient treatment of PPH would have a positive impact on the outcome of many patients who have postpartum hemorrhage, leading to the reduction in morbidity or even save the lives of patients.*

Keywords: *Postpartum hemorrhage, Suture techniques, Therapy, Uterine hemorrhage*

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Postpartum hemorrhage (PPH) is defined as blood loss $\geq$ 500 ml after delivery. It remains one of the most common causes of maternal morbidity and mortality in both developed and developing countries, particularly in under-resourced areas[1]. It occurs 2-5% globally and contributes to 25% of all maternal deaths[2]. Prompt intervention and treatment is essential in this situation. Uterine atony is the leading cause of PPH[3]. PPH still occurs despite the prophylactic treatment by the active management of the third stage of labor, which involves the administration of oxytocic agents at delivery of the anterior shoulder, early clamping of the cord, and delivery of the placenta by controlled cord traction[4-6]. Delay in the treatment may place patients at increased risk of adverse outcomes.

Recent treatments of PPH include medical and surgical aspects. Uterotonic agents, such as oxytocin, ergometrine (Methergin®), and prostaglandins are

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administered in cases of uterine atony[7]. When medical therapy is unsuccessful, surgical intervention such as bimanual compression or uterine packing by using roll gauze, Senstaken-Blackemore tube, warm saline inflated condom packed in the uterine cavity as a tamponade for 24 hours, is used to treat PPH. Although these methods are effective[8-10], several drawbacks, such as pain and uterine infection, can be found. The use of antibiotics may increase the expenses. Other surgical techniques such as B-lynch suture, ligation of uterine artery, or internal iliac artery embolization, may be used. If all mentioned techniques failed, hysterectomy is required.

This research used lower uterine compression as a treatment method of PPH. This technique can be performed by pressing one hand tightly at the lower segment of uterus, as much as the patient still feels no pain for ten minutes. The reason is described by having good contraction at the body or fundus of the uterus; meanwhile it has less contraction at the lower uterine segment because of less uterine muscle. In case of the low insertion of placenta, although patients have gotten uterotonics, hemorrhage still occurs because of the poor contraction of the lower uterine segment. The lower uterine compression method is helpful in this situation. In addition, this method is easy to do and does not require surgeons to place their hand into the vagina; therefore, patients feel no pain and anesthesia is unnecessary. It has no risk of genital tract infections. Finally, it has no costs. Until recently, no research has presented this technique.

Objective

The objectives of this research are to study the efficacy of lower uterine compression method in the treatment of immediate postpartum hemorrhage and to evaluate the amount of blood loss in PPH between the lower uterine compression method and conventional treatment.

Material and Method

The present study was conducted in pregnant women who had 28-42 weeks gestational age, delivered vaginally and had PPH; blood loss $\geq$ 500 ml after delivery; during January and August 2008.The sample size was calculated by the formula, $n = \frac{2((Z\alpha + Z\beta)\sigma)^2}{(\mu c - \mu t)^2}$ the (μc - μt) number was estimated at 100 based on a previous study by Nordstrom L, Fogelstam K, Fridman G. et al[11]. They studied the treatment of PPH that could reduce blood loss more than 100 ml. The subjects were collected by unrestricted randomization. All sixty-six postpartum hemorrhage patients were identified. Two patients were excluded from the present study due to cervical tear and extensive birth canal tear. Sixty-four patients met all inclusion criteria and were included in the present study. All 64 patients were equally divided into two groups and the treatment method was randomly assigned to each patients. Both groups received similar treatment scheme including uterine massage, oxytocin (10-20 units in 1,000 ml of intravenous solution, 200 ml/min), intravenous ergometrine (Methergin®, 0.2 mg), placed cold pack on the uterus, and urinary catheterization. The experiment group received the additional lower uterine compression method for 10 minutes (Fig. 1, 2) which started promptly together with other modalities. Bleeding was observed for 2 hours after the delivery. All soaking drapes and blood in bucket were weighed. The measurement was divided into two parts, bleeding before and after treatments. The well-trained registered nurses were assigned to record the result in the Record Form.

The lower uterine compression method can be done in two techniques. The first technique is to compress at the lower segment only, which is suitable in tense abdominal wall like primiparous or obese patients (Fig. 1). The second technique is to compress lower uterine segment with counteracting pressure from fundus (Fig. 2), which looks like the transabdominal wall bimanual compression. This second technique is appropriate for patients with relaxed abdominal wall.

Statistical analysis

The collected data were analyzed by parametric statistics using SPSS statistical software version 11.5 (SPSS, Chicago, IL). The descriptive statistical parameters were summarized as mean with standard deviation (SD) for unpaired t-test, median with interquatile range or median with range for Mann Whitney U-test and percentage. The difference in quantitative and qualitative measurements between the experiment and control group was tested by Student's t-test or Mann Whitney U-test and Chi-square or Fisher exact test, respectively as appropriate. Factor differences with $p < 0.05$ were considered statistically significant.

Results

During the study period, 64 cases of PPH were identified; 32 were managed by conventional treatment and the other 32 were managed by adding the lower uterine compression method as shown in Table 1, which revealed characteristic features of both control and study groups. The characteristics comprised of age,

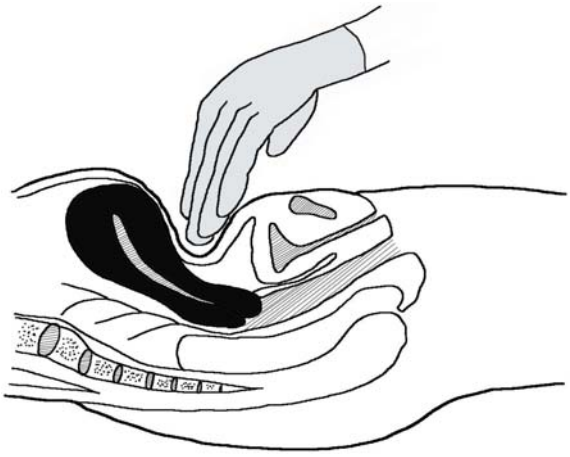

Fig. 1 Lower uterine compression method in treatment of acute postpartum hemorrhage by compressing at the lower uterine segment only

Fig. 2 Lower uterine compression method in treatment of acute postpartum hemorrhage by compressing at the lower uterine segment with counteracting pressure from fundus

parity, body weight, gestational age, and previous PPH status. There were no significant differences between the two groups in terms of maternal demographics.

In Table 2, those displayed variables of antepartum and intrapartum. The results demonstrated no differences in terms of induction of labor, polyhydramnios, duration of membrane ruptured before birth, magnesium sulfate treatment, and multiple pregnancy. Similarly Table 3, the results exhibited no difference between duration of labor, assisted vaginal delivery by forceps or vacuum, birth weight, type of episiotomy, and type of perineal tear. In the experiment group, the authors had one patient delivered by vacuum extraction but no statistical significance was found. In addition, Table 4 looked at the data. The results showed that the lower uterine compression treatment group and conventional treatment group were treated with the same standard protocol. There were two patients in the study group without catheterization after delivery because they had been done shortly before birth. There was no difference of blood loss before treatment in both groups but the blood loss after treatment is markedly less in the lower uterine compression group. The 47% reduction of blood loss is statistically significant (p =.026). There were few patients in both control and studied groups received prostaglandin and blood transfusion. Five patients received prostaglandin due to uncontrollable bleeding condition after using oxytocin and Methergin®. Ten received blood transfusion because of underlying anemia (Hct less than 33%).

Discussion

The present result showed that the lower uterine compression method could significantly reduce the blood loss from PPH compared to the conventional protocol by about 105 ml. The difference of blood loss

Table 1. Clinical characteristic features of patients between conventional treatment group and lower uterine compression group

Characteristics	Conventional treatment group (n = 32)	Lower uterine compression group (n = 32)	p-value
Age (years) (mean ± SD)	26.2 ± 5.9	27.2 ± 6.0	0.51*
Parity (median, range)	0.5 (0-3)	1.0 (0-3)	0.57**
Body weight (kgs) (median, range)	64 (47-115)	66 (47-98)	0.72**
Gestational age (weeks) (median, range)	39 (36-42)	39 (31-41)	0.71**
Previous PPH (%) (n = 6)	2 (33.3)	4 (66.7)	0.67****

* p-value by unpaired t-test
** p-value by Mann Whitney U-test
**** p-value by Fisher exact test

Table 2. Antepartum and intrapartum variables between conventional treatment group and lower uterine compression group

Variables	Conventional treatment group (n = 32)	Lower uterine compression group (n = 32)	p-value
Induction of labor (%)	23 (71.8)	28 (87.5)	0.12***
Polyhydramnios	0	0	1.00****
Duration of ruptured membranes before birth (mins) (median, range)	180 (6-1440)	180 (9-600)	0.26**
Magnesium sulfate treatment	0	0	1.00****
Multiple pregnancy	0	0	1.00****

* p-value by unpaired t-test
** p-value by Mann Whitney U-test
*** p-value by Chi-square test
**** p-value by Fisher exact test

Table 3. Intrapartum and postpartum variables between conventional treatment group and lower uterine compression group

Variables	Conventional treatment group (n = 32)	Lower uterine compression group (n = 32)	p-value
Duration of labor (mins) (mean $\pm$ SD)			
1st stage of labor (mean $\pm$ SD)	471.5 $\pm$ 277.3	504.2 $\pm$ 291.4	0.65*
2nd stage of labor (median, range)	19.5 (5-90)	23.5 (5-110)	0.37**
3rd stage of labor (mean $\pm$ SD)	11.4 $\pm$ 9.0	10.0 $\pm$ 6.3	0.48*
Delivery by forceps or vacuum (%)	0	1 (3.1)	1.00****
Birth weight (gram) (mean $\pm$ SD)	3299.7 $\pm$ 460.5	3220.8 $\pm$ 440.3	0.49*
Episiotomy (%)			
No	5 (15.6)	6 (18.8)	0.74***
Median	5 (15.6)	11 (34.4)	0.08***
Mediolateral	22 (68.8)	15 (46.9)	0.08***
Perineam tear (%)			
No	28 (87.5)	28 (87.5)	1.00****
1st degree	1 (3.1)	2 (6.3)	1.00****
2nd degree	3 (9.4)	2 (6.3)	1.00****
3rd degree	0	0	1.00****

* p-value by unpaired t-test
** p-value by Mann Whitney U-test
*** p-value by Chi-square test
**** p-value by Fisher exact test

can be described by less contraction of lower uterine segment, especially in patients who have placental bed at the lower part of uterus. The rich blood supply at placental bed cause more hemorrhage. For this reason, it can be explained why this technique works well.

The mechanism of blood coagulation depends on vascular factors, coagulation factors, and platelets, which act together and in consequence. In birth process, after the expulsion of placenta, raw surface has occurred in the placental bed. The capillary will contract, platelet is aggregated to form platelet plugs, and then coagulation factors are activated to form clots. The process proceeds consequently to form fibrin-platelet plugs, which are strong enough to plug the vessels and stop bleeding. This whole mechanism takes about 5-15 minutes[12], so the 10-minute period of lower uterine compression method is the proper time to help cease bleeding.

Many advantages of lower uterine compression method are as follows. At first, it is easy to

Table 4. The amount of blood loss, treatments and medications in postpartum period between conventional treatment group and lower uterine compression group

Variables	Conventional treatment group (n = 32)	Lower uterine compression group (n = 32)	p-value
Amount of blood loss (ml)			
Before treatment (mean ± SD)	845.3 ± 243.0	955.3 ± 344.1	0.15*
After treatment (median ± interquatile range)	225.0 ± 401.0	120.0 ± 211.0	0.026**
Fundal cold pack (%)	32 (100)	32 (100)	1.00***
Uterine massage (%)	32 (100)	32 (100)	1.00***
Urinary catheterization (%)	32 (100)	30 (94)	0.0492****
Received intravenous			
Oxytocin (%)			
Oxytoxin 10 units	9 (28.1)	10 (31.3)	0.79***
Oxytoxin 20 units	23 (71.9)	22 (68.8)	0.79***
Methergin® 0.2 mg (%)	29 (91)	30 (94)	1.00****
Prostaglandin (Nalador®) (%) (n = 5)	3 (60)	2 (40)	1.00****
Blood transfusion (%) (n = 10)	3 (30)	7 (70)	0.17***

* p-value by unpaired t-test
** p-value by Mann Whitney U-test
*** p-value by Chi-square test
**** p-value by Fisher exact test

perform thus skilled personnel are not necessary. Patients can receive other treatments at the same time. General anesthesia is not needed. Unlike bimanual compression, there is no risk of birth canal tear or genital tract infection.

The outcome of this method occurs immediately because placental bed at the lower uterine segment is pressed together in the way of uterine temponade. During ten minutes of compression, the surgeons will have sufficient time to check birth canal tear. In the meantime, it is easy to check bleeding because of the slowing rate of blood filling into the vaginal pool especially if the lower uterine segment was compressed and pushed upward simultaneously. By this action, the upper vagina is tenting and creates a roomy space for inspection. In addition, it allows surgeons to have time for other treatment modalities.

Another advantage of this method is that it can be performed immediately within the seconds of PPH starting. This impact is the most significant because a massive hemorrhage can be prevented by this procedure. As notoriously known, a massive hemorrhage will cause uterine hypoxia and finally lead to the uterine atony. At last, the worst outcome is the irreversible uterine atony, resulting in an unavoidable hysterectomy. It can be said that this method acts like a safety guard for massive PPH. As the authors know, the massive PPH causes everything to become worst and can threaten patient lifes.

Conclusion

The lower uterine compression method in treatment of PPH is an innovative scheme in the obstetric field. The application of this technique can lead to a positive impact on outcomes of many PPH women over the world in either developed or developing countries. The authors believe that this method has many benefits over the conventional protocol. It is easy to do, the procedure is not invasive, there is no complication, it costs nothing and, the known efficacy over the conventional treatment of PPH is undoubtedly shown in the present results.

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References

1. Berg CJ, Atrash HK, Koonin LM, Tucker M. Pregnancy-related mortality in the United States, 1987-1990. Obstet Gynecol 1996; 88: 161-7.
2. Dildy GA III. Postpartum hemorrhage: new management options. Clin Obstet Gynecol 2002;

45: 330-44.
3. Combs CA, Murphy EL, Laros RK Jr. Factors associated with postpartum hemorrhage with vaginal birth. Obstet Gynecol 1991; 77: 69-76.
4. Prendiville WJ, Harding JE, Elbourne DR, Stirrat GM. The Bristol third stage trial: active versus physiological management of third stage of labour. BMJ 1988; 297: 1295-300.
5. Rogers J, Wood J, McCandlish R, Ayers S, Truesdale A, Elbourne D. Active versus expectant management of third stage of labour: the Hinchingbrooke randomised controlled trial. Lancet 1998; 351: 693-9.
6. Elbourne DR, Prendiville WJ, Carroli G, Wood J, McDonald S. Prophylactic use of oxytocin in the third stage of labour. Cochrane Database Syst Rev 2001; (4): CD001808.
7. Kupferminc MJ, Gull I, Bar-Am A, Daniel Y, Jaffa A, Shenhav M, et al. Intrauterine irrigation with prostaglandin F2-alpha for management of severe postpartum hemorrhage. Acta Obstet Gynecol Scand 1998; 77: 548-50.
8. Maier RC. Control of postpartum hemorrhage with uterine packing. Am J Obstet Gynecol 1993; 169: 317-21.
9. Condous GS, Arulkumaran S, Symonds I, Chapman R, Sinha A, Razvi K. The "tamponade test" in the management of massive postpartum hemorrhage. Obstet Gynecol 2003; 101: 767-72.
10. Akhter S, Begum MR, Kabir J. Condom hydrostatic tamponade for massive postpartum hemorrhage. Int J Gynaecol Obstet 2005; 90: 134-5.
11. Nordstrom L, Fogelstam K, Fridman G, Larsson A, Rydhstroem H. Routine oxytocin in the third stage of labour: a placebo controlled randomised trial. Br J Obstet Gynaecol 1997; 104: 781-6.
12. Hoffman M, Monroe DM III, Roberts HR. Activated factor VII activates factors IX and X on the surface of activated platelets: thoughts on the mechanism of action of high-dose activated factor VII. Blood Coagul Fibrinolysis 1998; 9 (Suppl 1): S61-5.

การกดมดลูกส่วนล่างเพื่อรักษามารดาที่มีภาวะตกเลือดหลังคลอดในโรงพยาบาลเจริญกรุงประชารักษ์

วันชัย จันทราพิทักษ์, กมล ศรีจันทึก, สุภลาภ พวงสอาด

วัตถุประสงค์*: 1. เพื่อศึกษาประสิทธิผลของการกดมดลูกส่วนล่างในการรักษาผู้ป่วยตกเลือดหลังคลอด 2. เพื่อเปรียบเทียบปริมาณเลือดที่สูญเสียภายหลังการใช้วิธีกดมดลูกส่วนล่างกับวิธีรักษาแบบดั้งเดิม*

วัสดุและวิธีการ*: เป็นการศึกษาแบบการทดลอง ณ กลุ่มงานสูตินรีเวชกรรมโรงพยาบาลเจริญกรุงประชารักษ์ สำนักการแพทย์กรุงเทพมหานคร ระหว่างเดือน มกราคม ถึง สิงหาคม พ.ศ. 2551 ผู้ป่วยที่มีภาวะตกเลือดหลังคลอด จำนวน 66 ราย ถูกเลือกนำมาศึกษาผู้ป่วย 2 รายถูกคัดออกเนื่องจากมีภาวะของการฉีกขาดของปากมดลูกและช่องทางคลอด ผู้ป่วยที่มีภาวะตกเลือดหลังคลอด จำนวน 64 ราย แบ่งออกเป็น 2 กลุ่ม โดยการสุ่ม กลุ่มควบคุมได้รับการรักษาโดยวิธีดั้งเดิม จำนวน 32 ราย และผู้ป่วยกลุ่มศึกษาจำนวน 32 ราย ได้รับการรักษาโดยวิธีดั้งเดิมร่วมกับการกดมดลูกส่วนล่างเป็นเวลานาน 10 นาที ปริมาณเลือดที่สูญเสียหลังคลอด 2 ชั่วโมง ทั้งสองกลุ่มตัวอย่างได้รับการบันทึกและศึกษา*

ผลการศึกษา*: ผู้ป่วยตกเลือดหลังคลอดทั้งหมด 64 ราย ในกลุ่มควบคุมมีปริมาณเลือดที่สูญเสียหลังคลอดมากกว่ากลุ่มศึกษา ซึ่งได้รับการกดมดลูกส่วนล่างอย่างมีนัยสำคัญทางสถิติ (225 $\pm$ 401 ลูกบาศก์เซนติเมตร vs. 120 $\pm$ 211 ลูกบาศก์เซนติเมตร, $p = 0.026$) การเพิ่มวิธีกดมดลูกส่วนล่างสามารถลด การเสียเลือดได้ 105 ลูกบาศก์เซนติเมตร หรือ 47 เปอร์เซ็นต์*

สรุป*: การกดมดลูกส่วนล่างในผู้ป่วยที่มีภาวะตกเลือดหลังคลอดเป็นวิธีที่มีประสิทธิภาพ กระทำได้ง่ายปลอดภัย ไม่ต้องให้ยาสลบ และไม่มีค่าใช้จ่ายนับเป็นนวัตกรรมด้านการรักษาภาวะตกเลือดหลังคลอด ที่มีผลกระทบเชิงบวกต่อการรักษาผู้ป่วยตกเลือดหลังคลอด สามารถลดอันตราย และอัตราการเสียชีวิต ในผู้ป่วยตกเลือดหลังคลอด*