# Use of manual strangulation technique to reduce blood loss at elective cesarean section

*Elektif sezaryen kan kaybını azaltmak için elle boğma tekniği kullanımı*

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## Abstract

**Purpose:** To evaluate the effect of manual strangulation of the uterine isthmus on the amount of blood loss during elective cesarean section.

**Materials and methods:** Participants with indication of elective cesarean section were randomly allocated to two groups. In Group 1 (71 women), manual strangulation of the uterine isthmus right after the removal of the placenta was applied, whereas no such technique was applied in Group 2 (66 women). Both groups then were compared in terms of haematocrit change on the first postoperative day.

**Results:**No demographic difference was observed between groups. The mean difference between the preoperative and postoperative 24 h haematocrit values was significantly lower in Group 1 (3.05±2.57) compared to the group 2 (4.35±2.38; p<0.01).

**Conclusion:** The manual strangulation of the uterine isthmus right after the removal of the placenta may reduce the blood loss at uncomplicated elective cesarean section.

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**Key words:** Blood loss, Cesarean section, Uterine strangulation.

## Özet

**Amaç:** Elektif sezaryen sırasında uterus isthmusunun elle boğulmasının kan kaybı üzerine etkisini araştırmaktır.

**Gereç ve yöntem:** Elektif sezaryen planlanan katılımcılar rastgele iki gruba ayrıldı. Grup 1 (71 kadın)' deki hastalara plasenta çıkarıldıktan sonra uterus isthmusuna elle boğma uygulandı. Grup 2 (66 kadın)'deki hastalara bu teknik uygulanmamıştır. Daha sonra her iki grup postoperatif ilk gün hematokrit değişim açısından karşılaştırıldı.

**Bulgular**: Gruplar arasında demografik fark gözlenmedi. Grup 2 (4.35 ± 2.38)'ye göre Grup 1 (3.05 ± 2.57; p<0.01)'de preoperatif ve postoperatif ortalama hematokrit değerleri arasındaki fark anlamlı olarak daha düşüktü.

**Sonuç:** Komplike olmayan elektif sezaryen de plasenta çıkarıldıktan sonra uterus isthmusnun elle boğulması kan kaybını azaltabilir.

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**Anahtar sözcükler:** Kan Kaybı, Sezeryan, Uterus'un boğulması.

## Introduction

Cesarean section (C/S) is the most frequent abdominal surgical procedure in the world. In many countries C/S has become the mode of delivery in over a quarter of all births. Unfortunately, delivery by C/S is characterised by a substantially more blood loss than vaginal delivery [1,2]. The immediate post-partum period (24 h after delivery) is the most critical time; almost 90% of deaths occur within 4 hours after delivery [3]. A reduction of intraoperative blood loss during C/S is beneficial to the patients in terms of decreased postoperative morbidity and a decrease in risks associated with blood transfusions. The first step in reducing morbidity is to improve methods of prevention. Systematic reviews have concluded that active management of the third stage of labour, such as use of uterotonic agents, controlled cord traction, and uterine massage after delivery of the placenta, can significantly decrease the

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incidence of postpartum haemorrhage (PPH) compared with expectant management [4–6]. Strangulation of the uterine isthmus by a rubber tourniquet is a well known technique for the prevention of blood loss during myomectomy [7]. So in this study we tried to find out whether manual strangulation of the uterine isthmus right after the removal of the placenta until the firm contraction of the uterus has any effect on the amount of blood loss in primary elective C/S.

**Methods**

A total of 137 nulliparous patients with term pregnancy scheduled for elective C/S participated in this prospective, randomized study between April 2005 and April 2006 in Suleymaniye Maternity Hospital for Research and Training in Istanbul, Turkey. Exclusion criteria were the women with any risk factors associated with an increased risk of postpartum haemorrhage like anaemia (Hb < 8 g%), multiple gestation, antepartum haemorrhage, uterine fibroids, polyhydramnios, emergency C/S, current or previous history of significant disease including heart disease, liver, renal disorders or known coagulopathy. The study was approved by the local ethics committee, and a written informed consent was obtained in all cases. A computer program was used to randomly assign participants to two groups (Random Number Generator Version 1.0, Segobit software, Issaquah, WA, USA).

All the C/S were performed under endotracheal general anesthesia using a slightly modified Misgav Ladach technique [8]. In Group I (n=71), after the delivery of the fetus and removal of the placenta, the uterus was extraabdominally taken out and by using the left hand, the isthmic portion of the uterus from the posterior site was strangulated until a firm contraction of the fundus uteri was seen (Figure 1). Strangulation was not performed in Group II, the control group (n=66). Subsequently, a holding stitch stabilized the right corner, then the whole thickness of the uterine wall (including the endometrium) was sutured with a one-layer continuous locking stitch using No.1-polyglactin suture (Ethicon Inc.,Somerville, NJ, USA). Seperate hemostatic sutures were used when deemed necessary. Complications were not encountered in applying the strangulation.

**Figure 1.** After the delivery of the fetus and removal of the placenta, surgeon took the uterus extraabdominally and using his/her left hand strangulated the isthmic portion.

The postpartum care for both groups were identical, every patient received a prophylactic dose of antibiotics (cephazoline sodium flac. 1gr. IM. [Ulagay Ilac,Istanbul, Turkey]). Postpartum infection was not seen in any of these patients. A 20 U oxytocine IV infusion (Deva, Istanbul, Turkey) was administered intraoperatively and at the early postoperative period. All of the patients started breast feeding at the earliest postoperative period with the help of a nurse who specialized in newborns care.

A complete blood count including hematocrit values in the peripheric venous blood by automated blood cell counter (Abbott Cell-Dyn 3700, Abbott Diagnostics, Illinois, USA) immediately before the operation and at approximately 24 h after the operation was taken from every patient. Various demographic, laboratory and clinical variables including mean maternal age, gestational age at delivery, body mass index, preoperative haematocrit level, preoperative haemoglobin level, preoperative platelet count, cervical dilatation at delivery, birth weight, caesarean indications of the patients and the postoperative haematocrit at 24 hours after caesarean delivery, postoperative haemoglobin level, postoperative haematocrit change, and operation time, flatus time, hospital stay were compared between the two groups. None of the patients needed blood transfusions.

The statistical analysis was done with the SPSS 10.0 software for Windows (IBM software,

New York, USA). Cathegorical variables were compared with chi-square and Fischer's test where appropriate. Quantitative values were compared with Student's t- test for independent variables with normal distribution. Mann-Whitney U test was utilised for non-parametric variables, p-value <0.05 was selected as the level of statistical significance.

## Results

There were no statistically significant differences between the two groups for the demographic variables–including mean maternal age, gestational age at delivery, body mass index, preoperative haematocrit level, preoperative haemoglobin level, preoperative platelet count, birth weight, and the caesarean indications of the patients (p>0.05) (Table 1).

Though there were no significant differences between the groups in haemoglobin and haematocrit values at 24 h post-partum period, the mean difference between the preoperative and postoperative 24 h haematocrit values was significantly lower in Group 1 (3.05±2.57) compared to group 2 (4.35±2.38; p<0.01) (Table 2). No patient in both groups needed extra surgical procedures, such as a B-Lynch suture, uterine artery ligation or post-partum hysterectomy.

**Table 1.** Clinical characteristics of the study groups

| | Group 1 | Group 2 | p value |
|---|---|---|---|
| Mean maternal age ± SD (year)* | 27.97±5.63 | 26.92±6.43 | 0.311 |
| Gestational age at delivery ± SD (weeks)* | 38.23±0.98 | 38.27±1.16 | 0.852 |
| Body mass index ± SD (kg/m$^2$)* | 28.59±2.72 | 28.83±2.65 | 0.610 |
| Preoperative haematocrit level ± SD (%)* | 36.02±3.42 | 36.13±3.35 | 0.847 |
| Preoperative haemoglobin level ± SD (g/L)* | 12.11±1.33 | 12.19±1.29 | 0.730 |
| Preoperative platelet count ± SD* | 230.52±57.69 | 240.14±73.50 | 0.394 |
| Birth weight ± SD (g)* | 3347.61±487.21 | 3265.00±473.44 | 0.317 |
| Cervical dilatation at delivery ± SD (cm)* | 1.5775±1.42 | 1.8333±1.64 | 0.396 |
| Previous caesarean. n (%) | 34 (47.9%) | 24 (36.4%) | 0.173 |
| CPD. n (%) | 3 (4.2%) | 3 (4.5%) | 1.000 |
| Elective. n (%) | 18 (25.4%) | 21 (31.8%) | 0.402 |
| Arrest (dilatation/ descent). n (%) | 7 (9.9%) | 4 (6.1%) | 0.414 |
| Breech presentation. n (%) | 7 (9.9%) | 10 (15.2%) | 0.348 |
| Transverse lie. n (%) | 2 (2.8%) | 1 (1.5%) | 1.000 |
| Foot presentation. n (%) | 0 (.0%) | 1 (1.5%) | 0.482 |
| Plasenta previa. n (%) | 0 (.0%) | 2 (3.0%) | 0.230 |

*Data are expressed as mean ± standart deviation.

**Table 2.** Comparison of surgical outcomes between groups

| | Group 1 | Group 2 | p value |
|---|---|---|---|
| Operation time ±SD (min) | 46.83±7,18 | 45.76±9.04 | 0.441 |
| Postoperative haematocrit level ± SD (%) | 32.96±3.98 | 31.78±3.92 | 0.084 |
| Postoperative haemoglobin level ± SD (g/L) | 11.19±1.54 | 10.82±1.48 | 0.157 |
| Preoperative-postoperative haematocrit difference ± SD (%) | 3.05±2.57 | 4.35±2.38 | 0.003 |
| Flatus time ± SD (hour) | 31.10±12.10 | 31.39±11.14 | 0.882 |
| Hospital stay ± SD (hour) | 49.69±8.19 | 47.94±4.06 | 0.112 |

Data are expressed as mean ± standart deviation.

## Discussion

Simple manual strangulation of the uterine isthmus results in less change in the hematocrit levels at the early postoperative period of C/S. A reduction of intraoperative blood loss during C/S is beneficial to patients in terms of decreased postoperative morbidity and decrease in risks associated with blood transfusions. In countries with a high incidence of anemia among pregnant women because of either nutritional or environmental factors, even a relatively small reduction in post-partum blood loss is significant and clinically relevant.

Therapy options for prevention of PPH compromise of, concentric uterine compression (such as massage or manual compression), compression sutures, pressure from an intrauterine tamponade with either a balloon catheter or uterine packing,and/or medication with uterotonic agents or intravenous hemostatic agents (such as tranexamic acid, an antifibrinolytic, and recombinant activated factor VIIa) [9-15]. As an alternative novel surgical technique, we evaluated the effect of manual strangulation technique in elective C/S.

The results of this study show that the manual strangulation technique in elective C/S is useful for reducing the hematocrit difference by about one third. Additionally, this technique, applied for less than a minute in most of the cases, did not extend the operation time. A similar technique was used by Ikeda et al. in cases of placenta accreta during C/S.They concluded that their compression technique not only prevented massive bleeding from the placental bed, but also allowed physicians time to consider the necessity of subsequent hysterectomy [16]. We think that our technique has no place in cases of placenta previa or accreta, simply because of the increased dimensions of the isthmic portion in these cases, but might be a very useful manoeuvre in cases of plain simple atony of the uterine fundus. Another striking feature of our technique is that in most of the cases in the strangulation group, a routine aspiration of blood from the Douglas pouche before the replacement of the uterus into the abdominal cavity was not necessary because of negligible amounts of blood collection.

Wariness in monitoring blood loss and prompt management are essential in avoiding the associated morbidity and mortality. But It does not matter how quick we are in recognising and managing obstetric hemorrhage, preventing unnecessary blood loss obviously is a much better strategy then waiting for the insult to happen in the first instance. Therefore, it is logical to recommend an oxytocin bolus and infusion to all women after the delivery of the baby [17]. Similarly,the strangulation technique might be implemented to prevent blood loss in the immediate pastpartum period. The technique is very simple and easy to perform, does not require extensive experience or special equipment. The only setback might be the need for the exteriorisation of the uterus, which is the standart technique at our institution. We were did not encounter any difficulties in applying the technique.

In conclusion, after delivery of the fetus and removal of the placenta in elective C/S, simple manual strangulation of the uterine isthmus results in less change in the hematocrit levels at the early postoperative period and thus might be helpful in reducing blood loss, need of blood transfusion and morbidity after elective C/S.

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## References

1. Meikle S, Steiner CA, Zhang J, Lawrence WL. A national estimate of the elective primary cesarean delivery rate. Obstet Gynecol 2005;105:751-756.
2. Ahmed B, Abu Nahia F, Abushama M. Routine cervical dilatation during elective cesarean section and its influence on maternal morbidity: A randomized controlled study. J Perinat Med 2005;33:510-513.
3. WHO, UNICEF, UNFPA, The World Bank. Maternal Mortality in 2005: Estimates Developed by WHO, UNICEF, UNFPA, and the World Bank. Geneva: World Health Organization, 2007.
4. Begley CM, Gyte GM, Murphy DJ, Devane D, McDonald SJ, McGuire W. Active versus expectant management for women in the third stage of labour. Cochrane Database Syst Rev. 2010;7:CD007412.
5. McDonald S, Abbott JM, Higgins SP. Prophylactic ergometrine–oxytocin versus oxytocin for the third stage of labour. Cochrane Database Syst Rev 2004; 1:CD000201.
6. Elbourne DR, Prendiville WJ, Carroli G, Wood J, McDonald S. Prophylactic use of oxytocin in the third stage of labour. Cochrane Database Syst Rev2001; 4:CD001808.

7. Ikechebelu JI, Ezeama CO, Obiechina NJ. The use of torniquet to reduce blood loss at myomectomy. Niger J Clin Pract 2010;13:154-158.
8. Holmgren G, Sjöholm L, Stark M. The Misgav Ladach method for cesareansection: method description. Acta Obstet Gynecol Scand 1999;78:615-621.
9. American College of Obstetricians and Gynecologists. Diagnosis and management of postpartum hemorrhage: ACOG technical bulletin no. 143. Int J Gynaecol Obstet 1991;36:159-163.
10. Anderson JF. Rupture of the uterus; treatment by gauze packing; recovery. Proc R Soc Med 1920;13:188-191.
11. B-Lynch C, Coker A, Lawal AH, Abu J, Cowen MJ. The B-Lynch surgical technique for the control of massive postpartum haemorrhage: an alternative to hysterectomy? Five cases reported. BJOG 1997;104:372-375.
12. Georgiou C. Balloon tamponade in the management of postpartum haemorrhage: a review. BJOG 2009;116: 748-757.
13. Su LL, Chong YS, Samuel M. Oxytocin agonists for preventing postpartum haemorrhage. Cochrane Database Syst Rev. 2007; 3:CD005457. Review. Update in: Cochrane Database Syst Rev. 2012;2:CD 005457.
14. Franchini M, Franchi M, Bergamini V, et al. The use of recombinant activated FVII in postpartum hemorrhage. Clin Obstet Gynecol 2010;53:219-227.
15. Peitsidis P, Kadir RA. Antifibrinolytic therapy with tranexamic acid in pregnancy and postpartum. Expert Opin Pharmacother 2011;12:503-516.
16. Ikeda T, Sameshima H, Kawaguchi H, Yamauchi N, Ikenoue T. Tourniquettechnique prevents profuse blood loss in placenta accreta cesarean section. J Obstet Gynaecol Res 2005;31:27-31.
17. Sheehan SR, Montgomery AA, Carey M, et al. Oxytocin bolus versus oxytocin bolus and infusion for control of blood loss at elective caesarean section:double blind, placebo controlled, randomised trial. BMJ 2011;343:d4661.