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The effect of B-Lynch uterine compression suture performed for uterine atony on future menstrual pattern and reproductive outcome

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ABSTRACT

Objectives: The effects of B-Lynch (UCS) compression sutures applied in postpartum hemorrhage cases due to uterine atony on menstrual pattern, fertility, obstetric outcomes, dysmenorrhea and dyspareunia were evaluated.

Material and methods: Between January 2012 and March 2017, 77 patients (study group 37, control group 40) diagnosed postpartum hemorrhage in our clinic were included in the study. The long-term results of the patients were evaluated comparatively.

Results: In the B-Lynch UCS group, an increase in the postoperative menstrual cycle length and the intensity of dyspareunia measured by the VAS score, and a statistically significant decrease in the duration of menstrual bleeding were observed. In the control group, a decrease

in the self-estimated time of postpartum menstrual bleeding and a statistically significant increase in dyspareunia VAS values were observed. There was a statistically significant difference between the groups in terms of menstrual cycle length only after treatment.
Conclusion: B-Lynch UCS can be used effectively and safely in PPH due to uterine atony without causing any additional pathology in menstrual pattern, fertility, dysmenorrhea and dyspareunia complaints other than the length of the menstrual cycle.
Keywords: postpartum hemorrhage; B-Lynch uterine compression suture; menstrual regularity; dysmenorrhea; dyspareunia; fertility

INTRODUCTION

Postpartum hemorrhage (PPH) is defined as a total blood loss of more than 500 mL within the first 24 hours after delivery and accepted as the most important cause of maternal mortality/morbidity [1]. In cases with PPH when the first-line treatment with uterotonics and transamine fail to control the bleeding, surgical alternatives are used. The surgical methods involve conservative methods such as vascular ligation and uterine compression sutures (UCS) that decrease the uterine and pelvic blood flow as well as more radical procedures such as hysterectomy. In a French study with large number of cases, the incidence of invasive procedures due to PPH was 0.2% and the rate of the need for hysterectomy among these cases was 1.1% [2].

Uterine compression sutures is successfully used among surgical options that enables uterine preservation in severe postpartum hemorrhage. After it was identified by B-Lynch in 1997, numerous modifications with high rates of success have been reported [3]. Although there is information about the short-term results of B-Lynch UCS the data about the long-term results are insufficient. In our study, long-term effects of B-Lynch UCS performed for treatment of uterine atony on menstrual characteristics, fertility, obstetric outcomes, and the complaints of dysmenorrhea and dyspareunia were evaluated.

MATERIAL AND METHODS

Place and time of the study

The patients who delivered by cesarean section and had postpartum haemorhage due to uterine atony at Adıyaman University, Faculty of Medicine Training and Research Hospital between January 2012 and March 2017 were evaluated in the study. The study groups constituted of patients who failed to respond to the medical treatment of uterine atony and had the bleeding controlled by B-Lynch and the control group were the patients who had uterine

atony during cesarean atony and responded to the medical treatment with uterotonics. The study was approved by the Local Ethics Committee of Adiyaman University Faculty of Medicine (Reference number: 2020/1-6).

The records of patients archived were analyzed and the patients with a history of previous cesarean section who developed uterine atony and postpartum haemorrhage during elective cesarean section were recruited to the study. The epidemiologic, obstetric characteristics, the surgery notes were extracted from the patient files that were recorded to have postpartum haemorrhage due to uterine atony. The data obtained from the hospital records and files. The patients who gave consent for the survey conducted by phone calls were asked about their preoperative and postoperative menstrual patterns, postoperative reproductive outcome and presence of postoperative dysmenorrhea and dyspareunia. The data obtained from the interviews using a standard questionnaire with the patients included prenatal and postnatal menstrual cycle, postnatal obstetric outcome, and the presence of dysmenorrhea and dyspareunia. Dysmenorrhea and dyspareunia were assessed using the Visual Analogue Scale (VAS). According to VAS, score “0” was determined as none and score “10” as unbearably severe and the patients were asked to state a score between 0 and 10 for their complaints.

The inclusion criteria

The study was as follows: aged between 18-40 and having undergone CS operation in elective conditions due to previous ≤ 3 cesarean sections that resulted with live birth without any fetal anomaly, having uterine atony during CS and not using any contraceptive method after the CS.

The exclusion criterion

There were having previous ≥ 4 CSs, presence of placental adherence anomalies, medical disease (hypertension, diabetes mellitus, goiter, etc., having myomectomy or other tubal or ovarian surgery during CS, using a contraceptive method after the CS. The patients with missing records or having a body mass index (BMI) > 35, cigarette use, grand multiparity, and uterine myoma; having a preoperative and postoperative complication (such as wound site infection or ileus); having undergone different uterine compression procedures; or having undergone hysterectomy were also excluded from the study.

The control group consisted of the patients who met the same criteria who had the heamorrhage related to uterine atony during elective cesarean section that was controlled with

medical treatment protocol using uterotonics mainly oxytocin (40 IU oxytocin — Synpitan Forte 5IU/mL ampul, Deva holding A.Ş. in 1000 mL saline solution) with additional metilergonovin maleat (Metiler amp 0.2 mg/mL im, Adeka İlac Sanayi) and Misoprostol (Cytotec 200 mg tab ×5/rectal, Pfizer) when required. B-Lynch UCS performed as described by B-Lynch et al in-patient group [4].

Statistical analysis

SPSS 23.0 (IBM Corp., Armonk, NY, USA) software program was used for statistical analyses. The Independent sample T test was used for the assessment when the continuous variables were normally distributed, and Mann-Whitney U test was used when they were not normally distributed. The preoperative and postoperative parameters of the same patients were assessed with the Paired Samples T test. The variables were expressed as mean ± standard deviation (SD) or median (min-max). The Chi-square test was used for the comparison of categorical variables. The statistical significance level was accepted as 0.05 and the confidence interval as 95%.

RESULTS

Among a total of 38 428 births that occurred at our clinic during the study period, the number of patients who underwent B-Lynch UCS within this duration was 232. According to these records, the rate of patients who underwent an additional surgery due to the failure to respond to medical treatment of PPH caused by atony was about 0.60%. Out of 61 patients who met the stated inclusion criteria, 37 (60.65%) were reached and all the patients who had undergone B-Lynch UCS during the surgery volunteered to take part in the study. The control group consisted of 40 consecutive patients who met the stated inclusion criteria.

Demographic data of all the patients included in the study were assessed and no statistically significant difference was found between the groups in terms of age, obstetric characteristics (gravida, parity, abortion, live birth), gestational age at delivery, and BMI ($p > 0.05$) (Tab. 1). The length of hospitalization was significantly higher in the study group when compared with the control group (4.1 ± 1.1 vs 2.1 ± 0.3 days; $p<0.001$). Although no statistically significant difference was found between the mean preoperative hemoglobin levels of the two groups mean postoperative hemoglobin levels were higher in the control group (9.56 ± 1.75 g/dl vs 10.43 ± 1.09 gr/dL; $p = 0.012$). When the antepartum and postpartum transfusion needs of the patients were assessed the transfusion need was found higher in the study group as expected [median (0-7) vs median (0-1) units; $p < 0.001$] (Tab.

1). There was no statistically significant difference between the durations of follow-up from surgery to the time of telephone interview (33.2 ± 7.1 vs 30.7 ± 5.3 months; p = 0.08).

When the reproductive performances were assessed no statistically significant difference was found between the groups in terms of postpartum infertility, abortion and parity (p = 0.391, p = 0.345 and p = 0.487 respectively). Five patients in the B-Lynch UCS group and three patients in the control group stated that they failed to get pregnant although they did not use any postpartum contraceptive methods; however, none of the patients received treatment for this complaint. Therefore, the causes of fertility problems in the patients could not be determined. A total of four abortions were detected in the B-Lynch group and two abortions in the control group. One patient in the B-Lynch UCS group had a medical abortion due to a category x drug use during early pregnancy.

The preoperative and postoperative menstrual parameters of each group is compared. The length of the menstrual cycle increased (29.0 ± 3.1 vs 30.4 ± 2.3 days; p = 0.01) and the duration of menstrual bleeding decreased (4.9 ± 0.9 vs 4.5 ± 0.9 days; p = 0.01) in the B-Lynch UCS group. No significant change was detected in the mean amount of pads used during the menstrual cycle (p = 0.66). The duration of postpartum menstrual bleeding was lower in the control group (4.8 ± 1.1 vs 4.2 ± 1.0; p < 0.01) (Tab. 2).

The menstrual characteristics of the B-Lynch Group was compared with the study group and no statistically significant difference was found between the groups in terms of the preoperative length of menstrual cycle, duration of menstrual bleeding and amount of menstruation (p > 0.05). When the postoperative values of the study and the control group were compared, there was no statistically significant difference between the groups in terms of the duration of menstrual bleeding and estimated amount of menstrual blood loss (p = 0.23 and p = 0.96 respectively). The length of menstrual cycle was higher in the B-Lynch UCS group (30.4 ± 2.3 days vs 28.4 ± 2.8 days; p < 0.01) (Tab. 2).

In the assessment of the groups in terms of dysmenorrhea, no significant change was found either within the groups or between the groups. Postoperative VAS scores for dyspareunia were higher from the preoperative values in the B-Lynch UCS group (2.7 ± 1.1 vs 3.1 ± 0.7; p = 0.03). Similarly, postoperative VAS score for dyspareunia was high in the control group after the CS (2.2 ± 0.8 vs 2.8 ± 0.7; p < 0.01). In the intergroup comparison, no significant difference was found between the two groups in terms of preoperative and postoperative VAS score for dyspareunia (p = 0.052 and p = 0.12 respectively) (Tab. 2).

DISCUSSION

B-Lynch UCS is a life-saving fertility sparing surgical intervention in the treatment of uterine atony caused by postpartum hemorrhage that enables preservation of the uterus. However, uterine necrosis, pyometra and uterine synechia have been defined as serious but rare complications of B-Lynch UCS [5]. Although there are studies on the success and short-term complications of this treatment in literature studies on the long-term outcome is insufficient. Our study mainly aims to assess the effect of B-Lynch UCS on the reproductive outcome after the procedure and its effect on gynecological symptoms such as menstrual cycle, dysmenorrhea, dyspareunia and future fertility. The study was performed at a single-center on a population with the same sociodemographic characteristics, which decreased the risk of socioeconomic and ethnic differences that might have affected the results of the study. Future fertility and obstetric outcome after B-Lynch UCS is an important area of interest. Some case series reported no fertility problem and the long-term pregnancy rates of the cases were given as 11–75% [6, 7]. The most common indications of repeated CS after previous B-Lynch UCS application were patient request and the surgeon's choice to perform cesarean section after previous cesarean delivery [8]. In our study, there was no patient who had infertility problem and the rate of pregnancy in the B-Lynch UCS group was 16.2%.

The decreasing oocyte pool with the increasing age of the woman is the most common cause of the changes in menstrual cycle. Abenhaim et al. [9] reported an increased risk of menorrhagia with increasing number of live births in advanced phases of the reproductive period, while dysmenorrhea is found to be decreased and these changes were more prominent in cases with previous cesarean section. The changes were speculated to be related to the hormonal dysfunction that arise during the late reproductive years, endometrial changes, scarring of the uterus and possibly the regression of the endometriotic implants during pregnancy that would have caused dysmenorrhea. The risk of PPH increases with the increasing number of CS with CS scar site defects and is also accepted as a cause of menstrual irregularity [9]. The studies assessing the effects of UCS on menstrual cycle are limited. A systemic review investigated the resumption of normal menstruation within six months and achievement of pregnancy after uterus sparing surgical procedure such as uterine artery ligation, or uterine compression sutures performed for surgical treatment of postpartum haemorrhage [10]. Overall normal menstruation occurred in 91.2% of the women within postpartum six months while 77.8% of the women who desired to get pregnant achieved pregnancy. In patients who had B-Lynch UCS Intrauterine synechia might be observed postoperatively and this might lead to menstrual changes besides causing infertility related to the extent of the synechia [11]. In our study, while a decrease was detected in the duration of

menstrual bleeding in the B-Lynch UCS group during the post-operative period while there was no increase in the length of menstrual cycle. There was a decrease only in the duration of menstrual bleeding in the control group. In the preoperative and postoperative comparison of the groups, there was a difference only in terms of the length of menstrual cycle. Due to the duration of follow-up changes in the ovarian functions are expected to lead changes in the menstrual cycle. B-Lynch UCS can additionally cause synechia as a result of the fibrosis that effects the endometrium, especially the basal layer. Although there was no statistically significant difference between the two groups in terms of age, the average age of the B-Lynch UCS group was higher, thus might have caused the difference in the length of menstrual cycle.

Dysmenorrhea is associated with the high number of CS, the width of CS incision site, adhesions, and uterine scar defects [12, 13]. The preoperative symptoms such as dysmenorrhea, dyspareunia, abdominal pain etc. of the women who were scheduled for a repeat cesarean section were recorded prior to the operation and these were compared with the intraoperative findings by Stark et al and no correlation was found [14]. In our study, neither CS nor the B-Lynch UCS performed during CS influenced dysmenorrhea complaint as measured by intergroup and intragroup assessments.

There is no significant difference between vaginal delivery and CS in terms of post-delivery dyspareunia [15]. There was a statistically significant increase in VAS values for dyspareunia in both control and B-Lynch UCS groups when compared with the VAS values reported for the preoperative period. However, there was no difference between the groups. This result reveals that CS is a risk factor for dyspareunia, but B-Lynch UCS does not pose a risk in addition to CS in terms of the intensity of the dyspareunia.

No negative effect of B-Lynch UCS on fertility have been observed even if the studies have been performed as case series or case reports [16, 18]. In our study, there was no significant negative effect of B-Lynch UCS on fertility, which is consistent with the findings of other published studies. However, the number of cases recruited is low and the duration of follow-up is limited. The most important limitation of our study was its retrospective design. However, we consider that our study investigating the long-term outcomes of UCS and having one of the largest number of case series will contribute to literature.

CONCLUSIONS

B-Lynch UCS is successfully used alone or in combination with other uterine-sparing surgical interventions in cases with PPH related to uterine atony. In our study, we could not

find a significant effect of B-Lynch UCS on future fertility and menstrual cycle characteristics within an average of 30-months follow-up. Further prospective studies with larger number of cases and longer duration of patient follow-up are needed for more precise information.

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Table 1. Comparison of the demographic, surgical features and subsequent reproductive outcome of the B-Lynch group and the control group

	B-Lynch group	**Control group**	**p**
	n = 37	**n = 40**	
Age [years]	31.6 ± 6.9	30.1 ± 5.9	0.307
BMI [kg/m^2]	29.9 ± 2.5	30.4 ± 1.7	0.261
Gravida	2.6 ± 1.3	2.8 ± 0.8	0.149
Parity	1.9 ± 0.9	2.2 ± 0.7	0.112
Abortion	0.6 ± 0.6	0.7 ± 0.6	0.707
Live	1.9 ± 0.9	2.1 ± 0.7	0.191
Gestational age [weeks]	37.9 ± 1.2	37.6 ± 1.4	0.252
Before Hgb [gr/dL]	11.48 ± 1.64	11.27 ± 1.44	0.557
After Hgb [gr/dL]	9.56+1.75	10.43 ± 1.09	0.012
Transfusion	0.92+1.57	0.03 ± 0.16	< 0.001
Operation time [min]	62.2 ± 32.3	31.6 ± 5.4	< 0.001
Hospitalization time [day]	4.1 ± 1.1	2.1 ± 0.3	< 0.001
Gravida (postoperative)	6 (16.2)	9 (22.5)	0.487

Abortion (postoperative)	4 (10.8)	2 (5.0)	0.345
Infertility (postoperative)	5 (13.5)	3 (7.5)	0.391
Follow-up time [month]	33.2 ± 7.1	30.7 ± 5.3	0.08

BMI — body mass index; Hgb — hemoglobin

Table 2. Comparison of the menstrual pattern of B-Lynch group with the control group

	B-Lynch group		**Control group**		
	Before	**After**	**Before**	**After**	**p values**
The length of the menstrual cycle [day]	29.0 ± 3.1	30.4 ± 2.3	28.5 ± 2.8	28.4 ± 2.8	[a]**0.01** [b]0.88 [c]0.43 [d]**< 0.01**
Amount of menstrual blood loss per period [pad/day]	4.3 ± 0.9	4.2 ± 1.2	4.4 ± 0.9	4.2 ± 1.1	[a]0.66 [b]0.67 [c]0.48 [d]0.96
The length of the menstrual flow period [day]	4.9 ± 0.9	4.5 ± 0.9	4.8 ± 1.1	4.2+1.0	[a]**0.01** [b]**< 0.01** [c]0.48 [d]0.23
Dysmenorrhea	2.6 ± 1.1	2.4 ± 0.7	2.9 ± 0.8	2.6 ± 1.1	[a]0.29 [b]0.12 [c]0.11 [d]0.23
Dysparenuia	2.7 ± 1.1	3.1 ± 0.7	2.2 ± 0.8	2.8 ± 0.7	[a]**0.03** [b]**< 0.01** [c]**0.052** [d]0.12

[a]Comparison of patients before and after surgery for patient group; [b]Comparison of patients before and after surgery for control group; [c]Comparison of preoperative values between groups; [d]Comparison of postoperative values between groups