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Ultrasound-guided surgical suction evacuation (US-SSE) for missed miscarriage

Amr F. Abdulkareem[1,2], Ibrahim A. Abdelazim[1,2], Mohannad Abu-Faza[1], Khaled M. Abdelrazek[1,2], Mohamed M. Farghali[2,3]

[1]Department of Obstetrics, and Gynecology, Ahmadi Hospital, Kuwait Oil Company (KOC), Kuwait
[2]Department of Obstetrics, and Gynecology, Ain Shams University, Cairo, Egypt
[3]Department of Obstetrics, and Gynecology, Sabah Maternity, Hospital, Kuwait

Abstract

Introduction: Surgical evacuation of the uterine contents in first trimester missed miscarriage is a blind procedure, carrying a risk of complications. This study was designed to evaluate the outcome of the implemented protocol of ultrasound-guided surgical suction evacuation (US-SSE) for first trimester missed miscarriage.

Material and methods: Two hundred and twenty women diagnosed with missed miscarriage in the first trimester of pregnancy were included in this study and classified in two groups: 124 women in the US-SSE group, and 94 women in the blind surgical suction evacuation (B-SSE) group. Outcome measures: operative time, hemoglobin loss, hospital stay, cervical trauma, uterine perforation, retained products of conception (RPOC) requiring repeat evacuation, and post-operative infection.

Results: The hemoglobin loss was significantly lower in the US-SSE group compared to B-SSE (0.9 ±1.1 vs. 1.2 ±0.8 gms% ; respectively, $p = 0.0006$), and the hospital stay was significantly shorter in the US-SSE group compared to B-SSE (1.1 ±1.3 vs. 1.5 ±0.9 days; respectively, $p = 0.0001$). Cervical trauma was significantly less frequent in the US-SSE group compared to B-SSE (0 (0%) vs. 2 (2.08%); respectively, $p = 0.05$), and uterine perforation was significantly less frequent in the US-SSE group compared to B-SSE (0 (0%) vs. 2 (2.08%); respectively, $p = 0.05$). Post-operative endometritis was significantly less frequent in the US-SSE group compared to B-SSE (0 (0%) vs. 3 (3.13%); respectively, $p = 0.02$), and RPOC requiring repeat evacuation was significantly less frequent in the US-SSE group compared to B-SSE (0 (0%) vs. 4 (4.16%); respectively, $p = 0.007$).

Conclusions: US-SSE for first trimester missed miscarriage is safer than the B-SSE method, and is associated with significant reduction of intra-operative and post-operative complications.

Key words: ultrasound, suction surgical evacuation (SSE), missed miscarriage.

Corresponding author: Prof. Ibrahim A. Abdelazim, Ain Shams University, Cairo, Egypt, and Ahmadi Kuwait Oil (KOC) Company Hospital, P.O. Box: 9758, 61008 Ahmadi, Kuwait, phone: +965 66551300, e-mail: dr.ibrahimanwar@gmail.com

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Introduction

The incidence of missed miscarriage in the first trimester is about 10–20% [1, 2]. Surgical evacuation of the uterine content for missed miscarriage in the first trimester is the only treatment option in Kuwait, because the medications used for termination for pregnancy in such cases are not licensed, and are not available in Kuwait. Surgical evacuation of the uterine content for first trimester missed miscarriage is a relatively safe procedure, carrying a 6–10% risk of complications including cervical trauma, incomplete evacuation and/or uterine perforation [3, 4].

Suction surgical evacuation (SSE) of the uterine content for missed miscarriage in the first trimester is a safest method used for evacuation [5], because of using a less traumatic non-metal instrument during the evacuation procedure. However, the step of cervical dilatation using Hegar's dilators before the SSE has remained unchanged since 1874 [6]. Ultrasound used during surgical suction evacuation (US-SSE) of the uterine content helps to identify the uterine axis, as well as the size and position of the gestational sac, monitor the insertion of the suction evacuation cannula into the uterine cavity, ensure complete evacuation, and minimize the risk of complications [3, 4, 7]. This prospective comparative study was designed to evaluate the outcome of the implemented protocol of US-SSE for first trimester missed miscarriage.

Material and methods

Two hundred and twenty pregnant (220) women diagnosed with missed miscarriage in the first trimester of pregnancy were included in this prospective comparative study from January 2016 to August 2017 after approval of the study by the institute ethical committee of the Obstetrics and Gynecology Department. The studied women were classified in two groups: 124 women in the US-SSE group, and 94 women in the conventional blind surgical suction evacuation (B-SSE) group (Figure 1).

Women diagnosed with missed miscarriage < 13 weeks of gestation, calculated from the last menstrual period, with no fetal bones detected during the ultrasound scan, were included in this study, after informed consent. Women diagnosed with missed miscarriage > 13 weeks, calculated from the last menstrual period and/or fetal bony part detected during the ultrasound scan or suspicion of ectopic pregnancy were excluded from this study.

The diagnosis of missed miscarriage was based on the trans-vaginal ultrasound (TVS) criteria, which include a mean gestation sac diameter ≥ 25 mm with no obvious yolk sac or a fetal pole with a crown rump length of ≥ 7 mm without evidence of fetal cardiac activity [8].

Trans-vaginal ultrasound scan for the diagnosis of missed miscarriage was done according to the departmental protocol by the consultant of Obstetrics and Gynecology on duty and confirmed by an expert sonographer, using Philips HD9 with 2D convex probe 4–9 MHz (Philips international; Amsterdam; Netherlands).

The US-SSE was done for the first group in the operative theatre in a conventional way with the guidance of ultrasound scanning during the whole procedure; the cervical dilation and the insertion of the suction evacuation cannula inside the uterine cavity were done under real time ultrasound. The studied women were asked to evacuate the bladder and to keep a moderate comfortable amount of urine to facilitate the visualization of the uterus and uterine cervix during the procedure before anesthesia. After general anesthesia and positioning the studied women in the lithotomy position, bimanual pelvic examination was performed under anesthesia to assess the uterine size and axis. A Sim's speculum was inserted in the vagina for visualization of the uterine cervix, followed by grasping of the uterine cervix using Vulsellum forceps. The ultrasound transducer was held on the abdomen of the studied women by the assistant to obtain a longitudinal image of the uterus, the uterine cervical canal, gestational sac position, passage of the dilators through the cervical canal, and the passage of the suction cannula through the dilated cervical canal to the uterine cavity. The cervical canal was gradually dilated with Hegar dilators under ultrasound guidance to accommodate the suction cannula easily. The uterine cavity was evacuated using a plastic non-metal suction cannula attached to an electric suction apparatus using 75 mm Hg negative pressure. The suction evacuation procedure ended when the complete evacuation of the uterine content was confirmed by the ultrasound, and the endometrial line appeared as a clear, smooth line.

The studied women in the second group were asked to completely evacuate the bladder, then the B-SSE was carried out for them following the same steps described above for the US-SSE without the use of ultrasound guidance. In both studied groups, the product of conception aspirated was examined at the end of the procedure and sent for histopathological examination. At the end of the procedure 5 IU of Oxytocin® (Minapharm Pharmaceuticals, Heliopolis, Cairo, Egypt) was given to the studied women on intravenous Ringer's lactate solution at a rate of 1–2 ml/min, to maintain uterus contraction, and to minimize the blood loss after the evacuation procedure. The studied women were discharged from the hospital on the same day of the procedure or next day morning, for post-operative follow-up in the outpatient department. Trans-vaginal ultrasound was done for the studied women during the follow-up visits to confirm complete evacuation of the uterine content, and during the follow-up visit a blood sample was taken from the studied women for post-operative hemoglobin check. Outcome measures: operative time, hemoglobin loss (postoperative hemoglobin-preoperative hemoglobin), hospital stay, cervical trauma, uterine perforation, and retained products of conception (RPOC) requiring repeat evacuation, and post-operative infection. Post-operative infection was diagnosed by fever of 38°C on at least two occasions and/or endometritis (abnormal vaginal discharge, and pelvic tenderness) after the procedure.

Sample size

The required sample size was calculated using G* Power software, version 3.17 for sample size calculation (*Heinrich

Table 1. Variables of the two studied groups, and the outcome of US-SSE versus B-SSE

Variables	US-SSE group (n = 124)	B-SSE group (n = 96)	P-value (95% CI)
Age [years]	27.2 ±2.2	26.9 ±3.1	(95% CI; –0.4, 0.3, 1.03)
Gestational age [weeks]	10.1 ±1.1	10 ±1.5	(95% CI; –0.3, 0.1, 0.45)
Parity	3.0 ±2.6	2.5 ±2.4	(95% CI; –0.2, 0.5, 1.16)
Women with previous cesarean section	21 (16.9%)	13 (13.5%)	0.5
Operative time [min]	15.2 ±5.3	18.3 ±4.7	(95% CI; 4.4, 3.1, –1.8)
Hemoglobin loss [gms %]	0.9 ±1.1	1.2 ±0.8	(95% CI; –0.5, –0.3, –0.05)
Hospital stay [days]	1.1 ±1.3	1.5 ±0.9	(95% CI; –0.7, –0.4, –0.11)
Cervical trauma	0 (0%)	2 (2.08%)	0.05*
Uterine perforation	0 (0%)	2 (2.08%)	0.05*
Post-abortive endometritis	0 (0%)	3 (3.13%)	0.02*
RPOC requiring repeat evacuation	0 (0%)	4 (4.16%)	0.007*

*Significant difference. B-SSE – blind surgical suction evacuation, CI – confidence interval. Data presented as mean ± SD (standard deviation), and number and percentage (%). RPOC – Retained product of conception. Statistical analysis was done using Student's t test for data presented as mean ± SD, and chi-square test (χ^2) for data presented as number and %. US-SSE – ultrasound-guided surgical suction evacuation.

Heine Universität; Düsseldorf; Germany). The effective sample size needed to produce a statistically accepted figure was 220 women.

Statistical analysis

Collected data were statistically analyzed using SPSS (Statistical Package for the Social Sciences); version 20 (Chicago, IL, USA). Mean ± SD (standard deviation) was used to represent numerical variables, while number and percentage (%) were used to represent categorical variables. Statistical analysis done using Student's t-test for numeric parametric variables and the chi-square (χ^2) test for categorical variables. A p-value < 0.05 was considered significant.

Results

Two hundred and twenty pregnant (220) women diagnosed with missed miscarriage in the first trimester of pregnancy were included in this prospective comparative study. The studied women were classified in two groups: 124 women in the US-SSE group, and 94 women in the conventional B-SSE group. There was no significant difference between the two studied groups regarding the mean age, mean gestational age, mean parity, or the number of women with previous cesarean delivery included in each group. In addition there was no significant difference between the two studied groups regarding the operative time (15.2 ±5.3 min for the US-SSE vs. 18.3 ±4.7 min for the B-SSE; p = 0.1).

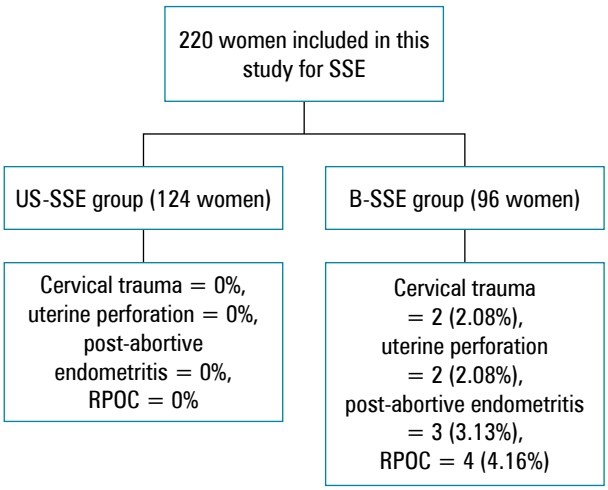
The hemoglobin loss was significantly lower in the US-SSE group compared to B-SSE (0.9 ±1.1 vs. 1.2 ±0.8 gms%; respectively, p = 0.0006), and the hospital stay was significantly shorter in the US-SSE group compared to B-SSE (1.1 ±1.3 vs. 1.5 ±0.9 days; respectively, p = 0.0001) (Table 1).

The intra-operative complication cervical trauma was significantly less frequent in the US-SSE group compared to B-SSE (0 (0%) vs. 2 (2.08%); respectively, p = 0.05), and uterine perforation was significantly less frequent in the US-SSE group compared to B-SSE (0 (0%) vs. 2 (2.08%); respectively, p = 0.05) (Table 1 and Figure 1).

The post-operative complication post-abortive endometritis was significantly less frequent in the US-SSE group compared to B-SSE (0 (0%) vs. 3 (3.13%); respectively, p = 0.02), and RPOC requiring repeat evacuation was significantly less frequent in the US-SSE group compared to B-SSE (0 (0%) vs. 4 (4.16%); respectively, p = 0.007) (Table 1 and Figure 1).

Discussion

Surgical evacuation of the uterine content in first trimester missed miscarriage is the only treatment option in Kuwait, because the medications used for medical termina-



B-SSE – blind surgical suction evacuation, RPOC – retained product of conception, SSE – surgical suction evacuation, US-SSE – ultrasound-guided surgical suction evacuation.

Figure 1. Study design and outcome of US-SSE versus B-SSE

tion for pregnancy in such cases are not licensed and not available in Kuwait. Surgical evacuation of the uterine content for first trimester missed miscarriage is a relatively safe procedure, carrying a 6–10% risk of complications [3, 4].

Suction surgical evacuation of the uterine content in first trimester missed miscarriage is the safest method used for evacuation of the uterine content [5], and US-SSE of the uterine content helps to ensure complete uterine evacuation and minimize the risk of complications [9, 10].

This prospective comparative study was designed to evaluate the outcome of the implemented protocol of US-SSE for first trimester missed miscarriage.

The hemoglobin loss in this study was significantly lower in the US-SSE group compared to the B-SSE group (p = 0.0006), and the hospital stay was significantly shorter in the US-SSE group compared to the B-SSE group (p = 0.0001). This is explained by the complete evacuation of the uterine content as an advantage of using the real-time scan during the evacuation procedure, which in turn resulted in a short convalescence time, early discharge from the hospital, short post-operative bleeding duration, and decreased hemoglobin loss in the US-SSE group.

Elsayed [11] concluded that the blood loss in the US-SSE group was significantly lower compared to the conventional B-SSE group, and explained this by the reduction in the operative time in the US-SSE group.

In this study, there was significantly less cervical trauma in the US-SSE group compared to B-SSE (p = 0.05), and uterine perforation was significantly less frequent in the US-SSE group compared to the B-SSE group (p = 0.05).

In addition, Elsayed [11] concluded that there were significantly fewer intra-operative complications in the US-SSE compared to the B-SSE group.

Ultrasound guidance during SSE eliminates the complications related to the blind procedure during B-SSE, such as false passage during cervical dilatation, especially when the axis of the cervix is not in the same line with the axis of the uterus as in an acute anteverted (AV) or acute retroverted (RV) uterus, and this explains why there was significantly less cervical trauma in this study in the US-SSE group compared to the B-SSE group [12].

Uterine perforation during suction curettage is a potentially dangerous complication, and can be unrecognized [13–15]. Usually the clinicians confirm the complete evacuation of the uterus using sharp uterine curettage at the end of the evacuation procedure, and the use of sharp uterine curettage is associated with increased incidence of uterine perforation [16]. In contrast, in US-SSE complete evacuation of the uterine content is confirmed when a clear, smooth endometrial line is seen by ultrasound, and no sharp curettage is used [17]. This explains why the incidence of uterine perforation in this study was significantly lower in the US-SSE group compared to the B-SSE group. In addition, the use of ultrasound during SEE to confirm complete evacuation of the uterine content explains why in this study the RPOC required repeat evacuation, and post-abortive endometritis was significantly less common in the US-SSE group compared to the B-SSE group.

Similar to this study, Elsayed [11] found that the incidence of post-operative complications was significantly lower in the US-SSE group compared to the conventional B-SSE group.

Capsi *et al.* [18] used US-SSE in 20 women, and US examination before and after the evacuation in another 80 women during termination of pregnancy, and concluded that US-SSE is safer than conventional B-SSE.

Conclusions

The US-SSE for first trimester missed miscarriage is safer than the B-SSE method, and is associated with significant reduction of intra-operative and post-operative complications.

Conflict of interest

The authors declare no conflict of interest.

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