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Cervical Dilatation and Curettage in Elective Caesarean Section. A Retrospective Analysis

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Abstract. *Background/Aim: To analyze the influence of intraoperative cervical dilatation and curettage during elective Caesarean section (CS) on maternal morbidity. Patients and Methods: A total of 1,003 elective CS were retrospectively evaluated. Primary outcome measure was the influence of cervical dilatation and curettage on postpartum haemorrhage (PPH). Several subgroup analyses were performed and a multiple logistic regression model was used in order to identify risk factors affecting PPH. Results: Multiple pregnancy (p=0.0025) and body mass index (p=0.0251) were identified as risk factors for PPH. Curettage, cervical dilatation, prior CS, age, and duration of pregnancy were statistically not significant at a level of α=0.10. There was a significantly higher proportion of women suffering from uterine sub-involution when the cervix was dilated (p=0.0482). The operating time was significantly longer when curettage and/or dilatation were performed (p<0.0001). Conclusion: Routine cervical dilatation and/or curettage in elective Caesarean section are not beneficial. Accomplishment of either or both of these measures led to a prolonged operating time, without improving the postoperative outcome.*

The Caesarean section (CS) is one of the most frequent surgeries in women and is the commonest major operative procedure in obstetrics (1). At present, CS is considered a safe procedure due to a continuous improvement of, for example, prophylactic antibiotics, as well as surgical and anaesthesiological techniques (2, 3). The increased CS rate has to be seen critically as it is known that CS leads to higher maternal morbidity and mortality compared to vaginal delivery (4, 5). In order to minimise postoperative complications after CS, various investigations analysed surgical steps, such as methods of placental delivery, changing of gloves and altering the uterine position during suture of the uterine incision (6). Sufficient evidence exists for the following surgical steps and perioperative procedures: A Cochrane analysis revealed that prophylactic extended-spectrum antibiotics at skin incision are effective in reducing maternal infection after CS (7). Joel-Cohen methods, which include blunt extension of subcutaneous tissues, fascia, and separation of the rectus muscles, have been associated with less operating time, less blood loss, and lower analgesia requirement when compared to sharp dissection methods (3, 6, 8). Manual placenta removal compared to cord traction and uterine massage was associated with greater incidence of endometritis, greater blood loss, a lower haematocrit level after delivery, as well as a longer duration of hospital stay (9). Concerning uterine closure, a systematic literature review revealed that a single-layer, continuous closure is associated with a better short-term outcome due to a statistically significant reduction in mean blood loss, reduced duration of suturing and less postoperative pain compared to double-layer closure (6). However, robust data on long-term outcomes (*e.g.* pain, fertility, morbidly adherent placenta and rupture of the uterus) after the different techniques (including two suture layers compared with single-layer uterine closure) are still needed (6, 8, 10-12). Many important aspects concerning the best procedural management in CS remain unclear and investigations are scarce. Curettage of the uterine cavity during CS is a technique frequently used but, to our knowledge, has not yet been investigated in any clinical trial. According to various authors, the uterine cavity should be cleaned with a towel or swab to remove any placental remnants and membranes, but these techniques have also not been analysed sufficiently (13-15). Only a few studies addressed cervical dilatation during CS (16, 17). Some

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Key Words: Caesarean section, cervical dilatation, curettage, postpartum haemorrhage, infection, postpartum outcome.

Table I. *Demographic characteristics of 1003 parturients undergoing Caesarean section. Quantitative data are presented by mean values±SD or by median and range, as appropriate. For qualitative parameters, absolute and relative frequencies are given.*

Characteristics	Total	Dilation (n=341)	No dilatation (n=662)	*p*-Value	Curettage (n=568)	No curettage (n=435)	*p*-Value	Dilation or curettage (n=648)	No dilatation/ curettage (n=345)	*p*-Value	Dilation and curettage (n=261)	*p*-Value*	Test used
Age (years)	31.1±5.7	32.0±5.7	30.7±5.7	0.0005	31.7±5.5	30.4±5.9	0.0007	31.6±5.5	30.2±5.8	0.0002	32.2±5.5	<0.0001	*t*-Test
Gravidity	2 (1-13)	2 (1-13)	2 (1-9)	0.6884	2 (1-13)	2 (1-9)	0.2959	2 (1-13)	2 (1-9)	0.9218	2 (1-13)	0.6380	Mann–Whitney
Parity Whitney	2 (1-7)	2 (1-7)	2 (1-7)	0.7696	2 (1-7)	2 (1-7)	0.2217	2 (1-7)	2 (1-6)	0.9755	2 (1-7)	0.2697	Mann–
Gestational age (days)	267 (174-300)	267 (174-300)	267 (177-298)	0.9645	267 (174-298)	267 (187-300)	0.6190	267 (174-300)	267 (187-291)	0.9734	267 (174-294)	0.6614	Mann–Whitney
Birth weight (g)	2951.9± 704.9 (425-5140)	2942.4 ±723.9	2956.7 ±695.4	0.7530	2925.4 ±753.5	2987.2 ±633.2	0.1443	2925.1 ±743.6	3001.8 ±624.4	0.0727	2948.5 ±740.1	0.3173	*t*-Test
Body mass index (kg/m^2)	24.0 (16.3-55.6)	24.1 (17.2-46.1)	23.9 (16.3-55.6)	0.5634	24.0 (16.7-50.8)	24.0 (16.3-55.6)	0.9888	24.0 (16.7-50.8)	24.0 (16.3-55.6)	0.7777	24.1 (17.5-45.7)	0.7148	Mann–Whitney
Nicotine abuse	187 (18.6%)	60 (17.6%)	127 (19.2%)	0.5405	99 (17.4%)	88 20.2%)	0.2591	114 (17.6%)	73 (20.6%)	0.2480	45 (17.2%)	0.3005	Chi squared
Gestational diabetes, diabetes mellitus	120 (12.0%)	40 (11.7%)	80 (12.1%)	0.8699	72 (12.7%)	48 (11.0%)	0.4273	81 (12.5%)	39 (11.0%)	0.4799	31 (11.9%)	0.7305	Chi squared
Previous Caesarean section	418 (41.7%)	152 (44.6%)	266 (40.2%)	0.1813	245 (43.1%)	173 (39.8%)	0.2842	276 (42.6%)	142 (40.0%)	0.4258	121 (46.4%)	0.1148	Chi squared
Multiple pregnancy	76 (7.6%)	25 (7.3%)	51 (7.7%)	0.8327	49 (8.6%)	27 (6.2%)	0.1512	54 (8.3%)	22 (6.2%)	0.2215	20 (7.7%)	0.4758	Chi squared

*Comparison to "no dilatation/curettage" group.

authors argue that a closed cervix might lead to an intra-uterine collection of lochia and debris, hence facilitating infectious morbidity (16). Cervical dilatation might also reduce the incidence of PPH by reducing potential uterine atony, and due to reducing the risk of lochiometra, pain symptoms might be lessened (17). Others, however, underlined that mechanical cervical dilatation using sponge, forceps or a finger during CS may result in contamination by vaginal micro-organisms during dilatation and increase the risk of infection or cervical trauma (16). In a Cochrane analysis, there was insufficient evidence for mechanical dilatation of the cervix at non-labour CS reducing postoperative morbidity (16). According to the small amount of literature available, the authors of this analysis state that further studies are needed in order to generate evidence-based recommendations. The aim of this study was, therefore, to analyze the influence of cervical dilatation and curettage of the uterine cavity on postpartum morbidity in patients undergoing CS.

Patients and Methods

This investigation was performed at a University Hospital in Germany. The study period was from July 2008 to December 2011, in which elective CS were evaluated. Only patients with elective CS were included, and pre-term pregnancy, emergent CS, as well as cases of ruptured membranes and fever on admission, were excluded. Every delivery is documented in a computerized database (GeDoWin QS-Software, Worms, Germany) as well as in a delivery book. Other than delivery data, patients and labour characteristics are documented in the computerized database. Data were generated

using this database, as well as by reviewing operative reports and labour, delivery and postpartal records. The primary outcome measure was the influence of cervical dilatation and curettage on PPH (blood loss greater than 1000 ml). Further outcome parameters were secondary PPH within the first six weeks after delivery, perioperative blood loss (difference of preoperative from first day postoperative haemoglobin concentration), necessity for blood transfusion, postoperative fever, endometritis, wound infection, urinary tract infection, uterine sub-involution, lochiometra, and operating time. When curettage of the uterine cavity was performed, a large blunt curette was used. Cervical dilatation was accomplished with a 15-mm Hegar dilator. Gloves were not changed after dilatation. A prophylactic single-shot antibiosis with 2 g cefazoline was routinely implemented.

Statistical analysis. All statistical calculations were performed using SAS software, release 9.2 (SAS Institute Inc., Cary, NC, USA). Quantitative approximately normally-distributed parameters are presented by mean values and standard deviations; for skewed data, median and range are given. Qualitative data are described by their absolute and relative frequencies. In order to compare two groups regarding qualitative parameters, a Chi-square test or Fisher's exact test was used, where appropriate. The mean values of two subgroups were compared by two-sample *t*-tests (in the case of normally distributed data) or the Mann-Whitney *U*-test. Each test result with a value of $p<0.05$ was considered statistically significant. Furthermore, logistic regression was used as a multiple statistical method to identify risk factors which causally affect PPH. For this technique, several factors were included in the model [dilatation, curettage, patient's age and body mass index (BMI), gestation age, previous CS and multiple pregnancy]; the most important factors were selected by backward elimination using the SAS procedure PROC LOGISTIC.

Results

Over the given period, 5,140 women delivered and 1,097 (21.3%) women met the inclusion criteria. Ninety-four cases had to be excluded because of incomplete data. Thus, data of 1,003 women were finally analyzed. Demographic characteristics of the investigated parturients undergoing CS are given in Table I. Except for age, the listed parameters showed no statistically significant differences comparing the different subgroups. Women undergoing dilatation ($p=0.0005$) and women undergoing curettage ($p=0.0007$) were statistically significantly older compared to the subgroup of women without dilatation or curettage, respectively. Indications for CS are given in Table II. For almost half of the parturients investigated (46%), prior CS, myomectomy, or maternal request were the reasons for this mode of delivery. Results concerning primary and secondary outcome parameters are shown in Table III. There was a significantly higher proportion of women suffering from uterine sub-involution when the cervix was dilated ($p=0.0482$). The operating time was significantly longer when curettage and/or dilatation were performed ($p<0.0001$). In a multiple analysis using a logistic regression model, multiple pregnancy ($p=0.0025$) and higher BMI ($p=0.0251$) were identified as being most important risk factors for PPH with odds ratios of 5.479 and 1.082, respectively. Curettage, cervical dilatation, prior CS, age, and duration of pregnancy were not statistically significant (each $p>0.15$).

Table II. *Indications for Caesarean sections in 1,003 women.*

Indication	n (%)
Previous Caesarean section or myomectomy	297 (29.6)
Maternal request	164 (16.4)
Breech presentation	132 (13.2)
Foetal malformation	98 (9.8)
Pathological cardiotocogram or Doppler sonography findings	76 (7.6)
Maternal disease	60 (6.0)
Multiple pregnancy	59 (5.9)
Pre-eclampsia, HELLP syndrome	39 (3.9)
Suspected foetal macrosomia	29 (2.9)
Placenta praevia	14 (1.4)
Transverse lie	10 (1.0)
Imminent rupture of the uterus	7 (0.7)
Suspected placental insufficiency	4 (0.4)
Abruptio placentae	4 (0.4)
Other	10 (1.0)

Discussion

Evidence concerning cervical dilatation or curettage of the uterine cavity in CS is limited, and reviews do not show any advantage for cervical dilatation (16). To the best of our knowledge, this is the first investigation evaluating the effect of cervical dilatation and/or curettage in CS. We demonstrated that there was no clinical benefit of these procedures but an increased time of surgery. This finding supports the recommendation of an actual review (18). We chose PPH as the primary outcome measure. The reason for this was an adaption to the pre-defined primary and secondary outcome parameters of the recent Cochrane review by Liabsuetrakul *et al*., so that results could best possibly compared (16). None of the few analyzed studies of the mentioned Cochrane analysis considered all these outcome parameters. In particular, PPH as a primary outcome parameter was not assessed in any of the included investigations. Therefore, we aimed to evaluate all of these measures retrospectively in a greater collective. Severe PPH is the main cause for maternal death worldwide (19). Known risk factors for excessive PPH after CS are leiomyoma, previous PPH, pre-eclampsia, *placenta praevia*, birth weight >4000g, and multiple pregnancies (20, 21). Multivariate analysis revealed multiple pregnancy ($p=0.0025$) and high maternal BMI ($p=0.0251$) as risk factors for PPH. There is no information about the influence of cervical dilatation during CS on PPH. Its influence on haematocrit,

Table III. *Outcome data of 1,003 Caesarean sections. Quantitative data are presented by mean values±SD or by median and range, as appropriate. For qualitative parameters, absolute and relative frequencies are given.*

Outcome measures	Total	Dilation (n=341)	No dilation (n=662)	*p*-Value	Curettage (n=568)	No curettage (n=435)	*p*-Value	Dilation or curettage (n=648)	No dilatation/ curettage (n=355)	*p*-Value	Dilation and curettage (261)	*p*-Value*	Test used
Postpartum haemorrhage	18 (1.8%)	6 (1.8%)	12 (1.8%)	0.9521	10 (1.8%)	8 (1.8%)	0.9260	12 (1.9%)	6 (1.7%)	0.8536	4 (1.5%)	1.0000 Fisher	Chi squared
Blood transfusion	19 (1.9%)	6 (1.8%)	13 (2.0%)	0.8222	11 (1.9%)	8 (1.8%)	0.9106	13 (2.0%)	6 (1.7%)	0.7255	4 (1.5%)	1.0000 Fisher	Chi squared
Secondary postpartum haemorrhage	1 (0.1)	1 (0.3)	0 (0.0)	0.3400	1 (0.2%)	0	1.0000	1 (0.2%)	0	1.0000	1 (0.4%)	0.4237	Fisher
Difference of haemoglobin level before and after Caesarean section (mg/dl)	1.1 (-3.1–7.2)	1.1 (-3.1–5.6)	1.0 (-1.5–7.2)	0.6237	1.1 (-3.1–5.6)	1.0 (-1.4–7.2)	0.0684	1.1 (-3.1–5.6)	1.0 (-1.4–7.2)	0.1342	1.1 (-3.1–5.6)	0.1589	Mann–Whitney
Uterine subinvolution	5 (0.5%)	4 (1.2%)	1 (0.2%)	0.0482	4 (0.7%)	1 (0.2%)	0.3956	5 (0.8%)	0	0.1677	3 (1.2%)	0.0756	Fisher
Retained products of conception	5 (0.5%)	2 (0.6%)	3 (0.5%)	1.0000	4 (0.7%)	1 (0.2%)	0.3956	4 (0.6%)	1 (0.3%)	0.6613	2 (0.8%)	0.5770	Fisher
Puerperal fever	7 (0.7%)	4 (1.2%)	3 (0.5%)	0.2369	5 (0.9%)	2 (0.5%)	0.7053	7 (1.1%)	0	0.0558	2 (0.8%)	0.1791	Fisher
Endometritis	4 (0.4%)	1 (0.3%)	3 (0.5%)	1.0000	4 (0.7%)	0	0.1375	4 (0.6%)	0	0.3035	1 (0.4%)	0.4237	Fisher
Wound infection	11 (1.1%)	3 (0.9%)	8 (1.2%)	0.7581	7 (1.2%)	4 (0.9%)	0.7649	7 (1.1%)	4 (1.1%)	1.0000	3 (1.2%)	1.0000	Fisher
Urinary tract infection	4 (0.4%)	2 (0.6%)	2 (0.3%)	0.6084	1 (0.2%)	3 (0.7%)	0.3221	2 (0.3%)	2 (0.6%)	0.6177	1 (0.4%)	1.0000	Fisher
Operating time	45 (16-133)	45 (18-120)	45 (16-133)	0.1469	48 (16-120)	40 (18-133)	<0.0001	46 (16-120)	40 (19-133)	<0.0001	48 (22-120)	<0.0001	Mann–Whitney

*Comparison to "no dilatation/curettage" group.

haemoglobin level changes and postoperative anaemia, however, was not significant (16, 22). One randomized study found a statistically non-significant mean decrease in blood loss of 50 ml with cervical dilatation compared to non-dilatation (23). In our investigation, we did not find a significant influence of dilatation or curettage, nor of their combination on PPH, necessity for blood transfusion, secondary PPH or changes in haemoglobin level. In this context, infections are a matter of ongoing scientific debate. Sherman *et al*. showed that a positive culture at the lower uterine segment predicted postpartum endometritis in patients after elective CS (24). It may be obvious that placental remnants favour infection in the puerperal period. The question if cleaning the uterine cavity with a towel or swab is sufficient or if curettage should preferably be accomplished remains unanswered. Contrary to this, Liabsuetrakul *et al*. found no statistically significant differences concerning postoperative endometritis, urinary tract infection, febrile morbidity, wound infection nor uterine subinvolution comparing non-dilatation *versus* dilatation of the cervix in CS (16). In this study, cervical dilatation and curettage also did not influence the occurrence of postoperative fever,

endometritis, wound infection, and urinary tract infection. Retained products of conception with uterine subinvolution in elective CS without cervical dilatation due to repeated CS were described in two case reports by Bollapragada and Edozien (25). However, these results were not confirmed by clinical trials (16). In contrast to this, the present results demonstrated a higher incidence of uterine subinvolution when cervical dilatation was performed (p=0.0482). Several researchers investigated the influence of cervical dilatation on operating time. Only Güngördük *et al*. found a statistically significantly prolonged operating time in patients undergoing cervical dilatation compared to non-dilatation of the cervix (mean difference 1.84 minutes, 95% confidence interval 1.47 to 2.21 minutes), of arguable clinical significance (23). Consistently, we found the duration of surgery to be longer in the dilatation as well as the curettage cohort (p<0.0001). A limitation of this investigation is its retrospective design. Existing randomized controlled trials (RCT) are not sufficient for evidence-based recommendations, so that further RCTs are needed. There is an ongoing RCT evaluating the procedure of dilatation of the cervix in CS (ACTRN12612000228886). This investigation may help to answer several actual questions.

Conclusion

At present there is no evidence for the utility of routine cervical dilatation and/or curettage in elective CS. Accomplishment of either or both of these methods led to prolonged duration of surgery, without improving the postoperative outcome.

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