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ORIGINAL ARTICLE

Evaluating the effect of cervical dilatation prior to operative hysteroscopy to the week of subsequent delivery

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KEYWORDS

Hysteroscopy;
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Abstract *Introduction:* Nowadays diagnostic and operative hysteroscopy is an integral part of infertility workup. For the operative interventions dilatation of the cervix is needed. The aim of this study was to evaluate the effect of cervical dilatation on the later obstetrical outcome.

Methods: 1975 Operative hysteroscopy procedures were studied of a 10-year period in the two departments. 66 Patients with any kind of obstetrical events after hysteroscopy were enrolled. Groups were created based on obstetrical history and type of surgery. Week of delivery was analyzed in each group. Data were statistically compared to controls without previous hysteroscopic operation.

Results: There was no significant difference between the week of delivery of the hysteroscopy and control group patients. Also no statistical difference was found between week of delivery of groups created on the base of neither obstetrical history nor type of surgery.

Conclusions: Patients who have operative hysteroscopic intervention with cervical dilatation prior to their pregnancy irrespectively of their previous obstetrical history have no increased risk for preterm delivery because of the cervical dilatation.

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1. Introduction

Hysteroscopy has become more frequent intervention in the recent years among patients with infertile symptoms. Infertility workup usually contains an evaluation of the uterine cavity. Abnormal intrauterine findings have been found 34–62% in infertile women (1). Due to the technical improvements of the last two decades this evaluation can be performed in an outpatient setting without cervical dilatation (2).

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The most frequent intrauterine pathologies are endometrial polyps, submucous fibroids, septate uterus and intrauterine adhesions. Most of them can be treated by operative hysteroscopy but this procedure requires cervical dilatation (3). Resection of these lesions may have positive effect on fertility and it is improving the obstetrical outcome significantly (4,5). After transcervical resection of submucous fibroids decreasing number of miscarriage and increasing take home baby rate can be detected (4). Endometrial polyps can affect conceiving and pregnancy loss, too. Improving these indicators, hysteroscopic polypectomy should be advised, especially prior to IVF-ET (6). Resection of uterine septa does not affect conceiving, but has severe impact on decreasing the possibility of pregnancy loss (7). Intrauterine adhesions can be detected more frequently among consecutive miscarriage patients. Adhesiolysis improves the results of these cases (8).

Traditionally the cervical dilatation, which is needed for the operation, is performed with Hegar's dilators, which is an effective and quick, but probably harmful method. The procedure requires anesthesia and operating theater. However there are no available data in connection with the cervical injury during this process. The structure of the cervix can be damaged during dilatation which can influence the outcome of subsequent pregnancy. According to our best knowledge, there is no publication dealing with the influence of the dilatation of the cervix prior to operative hysteroscopy on subsequent delivery. Some review can be found about correlation between the induced abortion and subsequent obstetrical events. However cervical dilatation during the abortion is not the only factor that effects the outcome of subsequent pregnancy. The evidence for an association between preterm delivery and induced abortion is conflicting (9). Some review states, that there is no increased risk of preterm delivery after induced abortion (10). Some systematic review suggests that patients, undergone induced abortion are at higher risk for preterm delivery (11,12).

The aim of our study was to evaluate the effect of cervical dilatation prior to resectoscopy in outcome of those pregnancies which conceived after the operative hysteroscopic procedure.

2. Materials and methods

All the operative hysteroscopy cases were collected retrospectively which were performed between 2001 and 2010 in the Departments of Obstetrics and Gynecology of University of Debrecen Medical and Health Science Center, and in Kenézy Hospital. Population which's healthcare is responsible for these two departments is approximately 450.000 people. Four types of operative interventions were focused on. Transcervical resection of myoma, resection of polyp, resection of septum and adhesiolysis belonged to the operative intervention. During the operations resectoscope (Storz, Germany) was used with a 4 mm 30 degree optic with an 11.5 mm sheath. The electrosurgical system had a 5 mm diameter 0 degree (for septotomy and adhesiolysis) and 90 degree electrode (for polypectomy and myomectomy). Monopolar technique was used with the output of 60–100 W. For the distension 1.5% Glycin was used with an inflow pressure of 80–100 mmHg. All interventions were performed under general anesthesia.

For cervical dilatation up to 11.5 mm, Hegar's dilators were used without preoperative preparation.

We enrolled those patients into the study that had any kind of obstetrical events after the hysteroscopy. No cases were ruled out because of the type of the delivery, multiple pregnancies, induction of the labor on fetal or maternal indication. Mean BMI of hysteroscopy (HSC) patients was 28.36 (SD 4.48), in the control group 27.85 (SD 4.18). There is no significant difference.

Unadjusted between-groups comparisons of continuous variables were made using Student's two-sample *t* test or Wilcoxon's rank-sum test, subject to normality assumptions being satisfied. Fisher's exact test was used for the same purpose with categorical variables. Analysis adjusted for age was based on linear regression. Separate models were fitted for each explanatory variable. The models included a quadratic term for age, and an interaction term between age and the key explanatory variable. The high negative skewness in the distribution of week of delivery was corrected by a 9th-power transformation. Between-groups effects were expressed as a function of age (at values conveniently covering the HSC subjects' observed age range) in terms of point estimates and 90% confidence intervals on the original scale; dilatation was assumed not to have a prolonging effect on pregnancy (one-sided approach). Age-specific preterm limits were calculated as the difference between 37 (i.e. the number of weeks before which delivery qualifies as preterm) and the model-fitted values of controls' week of delivery. *P* values < 0.05 were considered to indicate significance, and 90% confidence intervals entirely above the preterm limit were considered to indicate equivalence. Models were checked using the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity and Ramsey's regression specification-error test for omitted variables.

3. Results

Between 2001 and 2010 in University of Debrecen Medical and Health Science Center, Department of Obstetrics and Gynecology and in Department of Obstetrics and Gynecology, Kenézy Hospital, Debrecen, 1975 operative hysteroscopy procedures were occurred. Out of 1975 cases documentation of 69 patients with obstetrical event after the operation was available. One patient had an artificial abortion, and 2 had miscarriage at the 18th and the 22nd gestational week, resulting in exclusion of 3 cases. Control group made out of 1000 consecutive deliveries at the same institute with no exclusion criteria was used and compared with the examined group (*n* = 66). Out of the 66 patients 22 were nulliparous and nulligravid, 24 were nulliparous but not nulligravid and 20 were non-nulliparous. In 7 cases adhesiolysis, in 27 cases resection of septum, in 22 cases resection of polyp and in 10 cases enucleation of fibroid were performed. Mean age of hysteroscopy group patients was 29.4 (SD = 4.97) and of control group ones was 32.5 (SD = 3.85) years; the difference was significant (*t* test, *p* < 0.0001). Thirty-four (51.5%) deliveries in the hysteroscopy versus 364 (36.4%) in the control group were Cesarean sections (*p* = 0.018), which were performed predominantly (~70%) due to fetal indications in both groups. Premature rupture of membranes occurred in 14 (21.2%) and 240 (24%) cases in the HSC and control groups, respectively

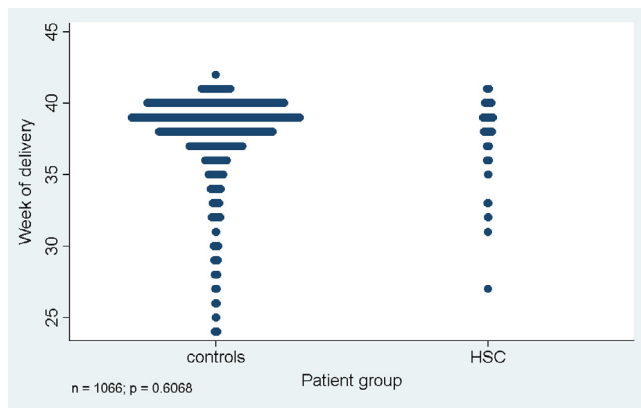


Figure 1 Distribution of week of delivery in the control and hysterectomy groups. HSC: operative hysterectomy.

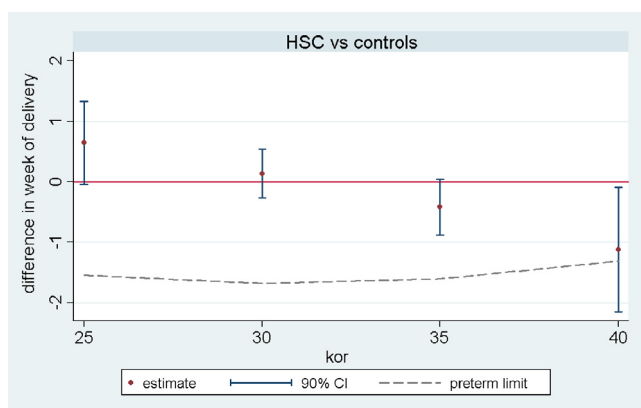


Figure 2 Comparison of the hysterectomy and control groups in terms of week of delivery, as a function of age. Preterm limit indicates where the difference reaches a size such that delivery becomes preterm (duration of pregnancy becomes < 37 weeks).

($p = 0.658$). There were four (6.1%) subjects observed with preeclampsia in the patient group, and 35 (3.5%) in the control group ($p = 0.297$). Comparing the mean week of delivery (WOD) of control group and hysterectomy group patients, the figures are 38.02 (SD = 2.78) vs. 37.91 (SD = 2.67) weeks, respectively; the unadjusted difference is not significant (Wilcoxon's rank-sum test, $p = 0.6068$; Fig. 1). Adjusted for age, weeks of gestation tended to be somewhat longer than in controls in younger and somewhat shorter in older HSC subjects (Fig. 2, Table 1). Equivalence was maintained at 25–35 but inconclusive at 40 years of age. Comparison according to the type of surgery showed no significant differences, either. In the adhesiolysis group the mean WOD was 39.14

(SD = 1.46), in the myoma enucleation group the mean WOD was 36.7 (SD = 3.13), in the resection of polyp group the mean WOD was 38.41 (SD 1.82) and in the resection of septum group the mean WOD was 37.63 (SD 3.18) (Fig. 3). Using Wilcoxon rank-sum test we compared these data to control group mean WOD. Adhesiolysis vs. control $p = 0.1363$, myoma enucleation vs. control $p = 0.1072$, resection of septum vs. control $p = 0.5283$, resection of polyp vs. control $p = 0.9714$. Adjusted modeling confirmed these findings, revealing no significant differences and supporting equivalence in most strata under 40 years of age (Fig. 4, Table 2). In another aspect we analyzed nulliparous, nulligravid, after hysterectomy (I.), nulliparous, but not nulligravid after hysterectomy (II.) and non-nulliparous after hysterectomy (III.) subgroups. Mean WOD of subgroup I. was 37.59 (SD 2.22), subgroup II. 38.08 (SD 2.84), and subgroup III. 38.05 (SD 3.02) (Fig. 5.). Compared to the control group $p(I.) = 0.0862$, $p(II.) = 0.4875$, $p(III.) = 0.9332$, the differences are not significant in this subdivision either. Consistently with these findings, HSC was not seen to be associated with shorter terms after adjustment for and in interaction with age (Fig. 6, Table 3); equivalence was strongly confirmed in multigravida subjects 35 years old or younger. Obstetrical point of view limit of the preterm delivery, according to the definition is 37 week. For none of the subgroups (I., II., III.) WOD decreased below this value (marked by dashed line), as shown in Figs. 2, 4 and 6.

All models were found to be sufficiently fitting.

4. Discussion

Uterine cavity can be deformed by submucous fibroid, endometrial polyp, uterine septum and adhesions causing sub-

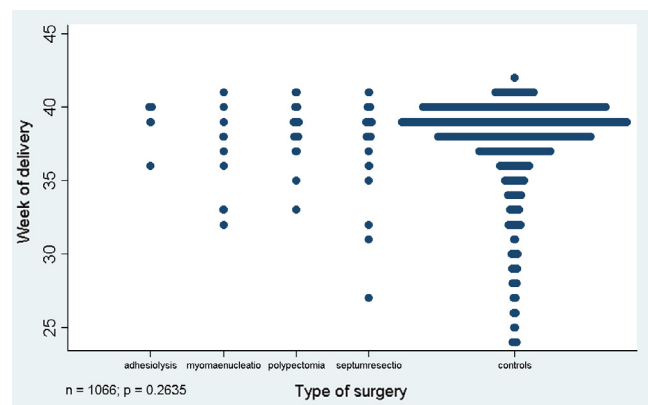


Figure 3 WOD of subjects stratified by type of surgery.

Table 1 Estimated adjusted differences in week of delivery between the hysterectomy and control groups as a function of age.

Factor	Contrast	Age	Effect	90% CI	p
Patient group	HSC vs controls	25	0.64	−0.04; 1.33	0.1212
Patient group	HSC vs controls	30	0.14	−0.27; 0.54	0.5782
Patient group	HSC vs controls	35	−0.42	−0.88; 0.04	0.1350
Patient group	HSC vs controls	40	−1.12	−2.15; −0.09	0.0727
BMI	< 25 vs controls	25	0.21	−1.73; 2.14	0.8617

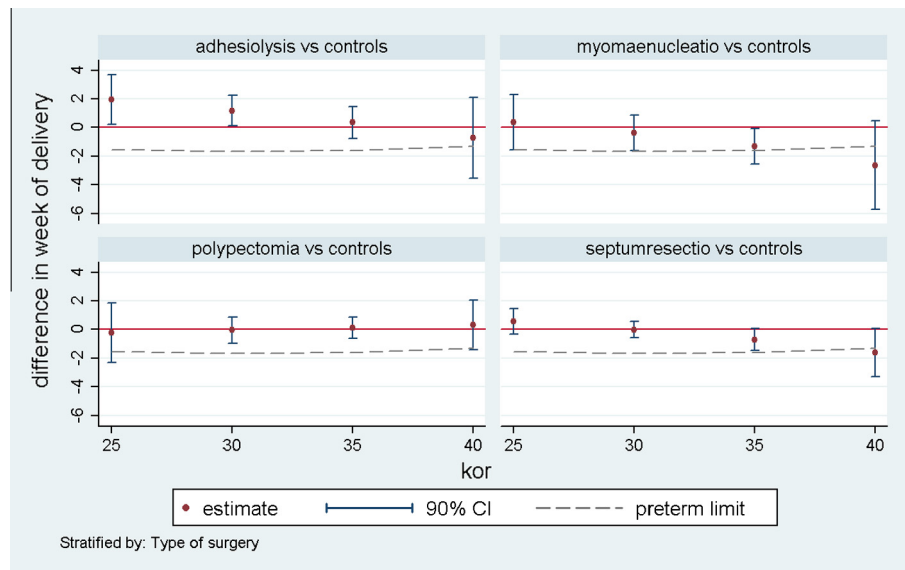


Figure 4 Comparison of the hysteroscopy and control groups in terms of week of delivery, as a function of age and stratified by type of surgery. Preterm limit indicates where the difference reaches a size such that delivery becomes preterm (duration of pregnancy becomes < 37 weeks).

Table 2 Estimated adjusted differences in week of delivery between the hysteroscopy and control groups as a function of age and stratified by type of surgery.

Factor	Contrast	Age	Effect	90% CI	<i>p</i>
Type of surgery	Adhesiolysis vs controls	25	1.94	0.20; 3.67	0.0663
Type of surgery	Adhesiolysis vs controls	30	1.18	0.12; 2.23	0.0661
Type of surgery	Adhesiolysis vs controls	35	0.34	-0.77; 1.46	0.6130
Type of surgery	Adhesiolysis vs controls	40	-0.73	-3.55; 2.08	0.6694
Type of surgery	Myoma enucleation vs controls	25	0.36	-1.56; 2.28	0.7586
Type of surgery	Myoma enucleation vs controls	30	-0.40	-1.63; 0.84	0.5976
Type of surgery	Myoma enucleation vs controls	35	-1.30	-2.54; -0.07	0.0815
Type of surgery	Myoma enucleation vs controls	40	-2.63	-5.74; 0.48	0.1638
Type of surgery	Polypectomy vs controls	25	-0.23	-2.30; 1.84	0.8533
Type of surgery	Polypectomy vs controls	30	-0.04	-0.95; 0.86	0.9356

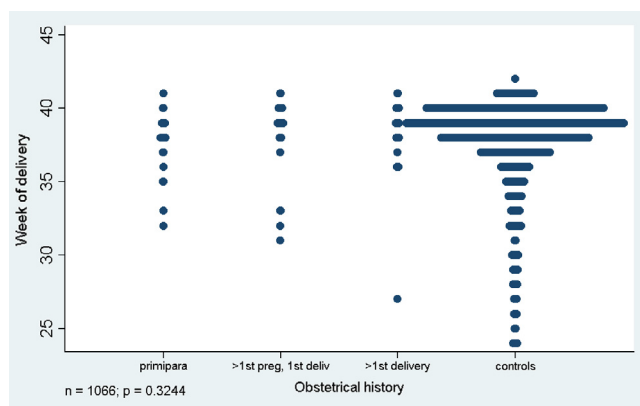


Figure 5 WOD of subjects stratified by obstetrical history.

fertile complains. Treatment of infertility caused by these intrauterine pathologies is usually solvable with resectoscope. Transcervical resection of myoma, polypectomy, resection of

septa, and adhesiolysis may improve infertility. After these operations a reduced number of miscarriage and increased take home baby rate were published (4,7,8). Cervical dilatation is needed for the resectoscopy. Mechanical dilatation without any preoperative preparation was thought to lead to increased risk for preterm delivery. Reviewing the literature, connection between cervical dilatation before induced abortion and preterm delivery was analyzed by numerous studies, however results are contradictory. Some study groups concluded that previous abortion is a risk factor for preterm delivery (13,17), while others concluded the opposite, so that induced abortion is not a significant risk factor for preterm birth (14,15). The aim of our study was to examine the effect of cervical dilatation prior to operative hysteroscopy on the subsequent deliveries, which has not been evaluated yet, although this type of surgery was performed on numerous occasions in patients with infertility complaints prior to pregnancy. However operating and treating infertility causing pathologies at the same time improves obstetrical outcomes (3,16,17). On the other hand obstetrical indicators were suspected to be ruined by the rapid dilatation of the cervix destructing its

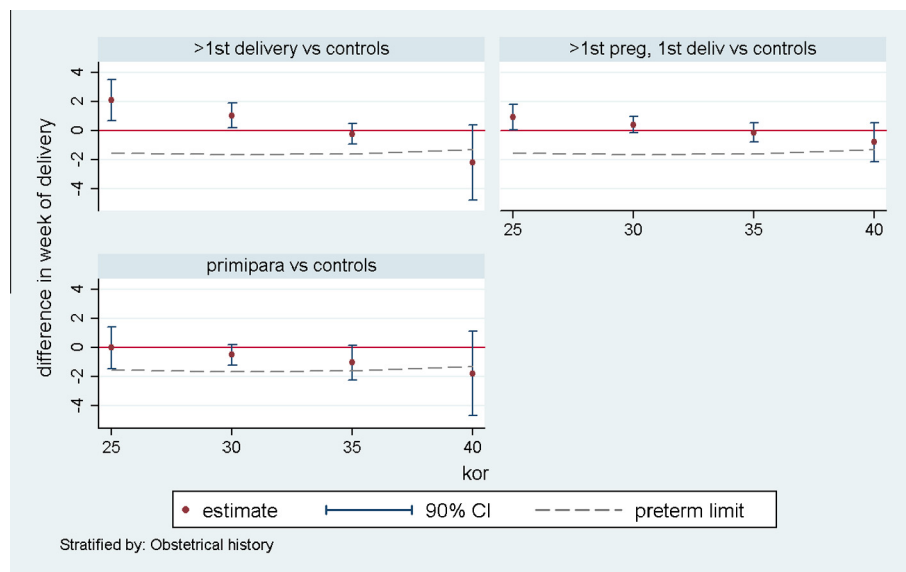


Figure 6 Comparison of the hysteroscopy and control groups in terms of week of delivery, as a function of age and stratified by obstetrical history. Preterm limit indicates where the difference reaches a size such that delivery becomes preterm (duration of pregnancy becomes < 37 weeks).

Table 3 Estimated adjusted differences in week of delivery between the hysteroscopy and control groups as a function of age and stratified by obstetrical history.

Factor	Contrast	Age	Effect	90% CI	<i>p</i>
Obstetrical history	Primigravida vs controls	25	-0.01	-1.44; 1.42	0.9881
Obstetrical history	Primigravida vs controls	30	-0.49	-1.20; 0.21	0.2519
Obstetrical history	Primigravida vs controls	35	-1.04	-2.24; 0.16	0.1525
Obstetrical history	Primigravida vs controls	40	-1.79	-4.70; 1.13	0.3131
Obstetrical history	Multigravida, primipara vs controls	25	0.91	0.02; 1.80	0.0941
Obstetrical history	Multigravida, primipara vs controls	30	0.40	-0.19; 0.98	0.2630
Obstetrical history	Multigravida, primipara vs controls	35	-0.15	-0.81; 0.52	0.7191
Obstetrical history	Multigravida, primipara vs controls	40	-0.82	-2.15; 0.52	0.3131
Obstetrical history	Multipara vs controls	25	2.09	0.68; 3.50	0.0146
Obstetrical history	Multipara vs controls	30	1.03	0.16; 1.90	0.0522
Obstetrical history	Multipara vs controls	35	-0.26	-0.97; 0.45	0.5459
Obstetrical history	Multipara vs controls	40	-2.23	-4.81; 0.35	0.1556

structure. Due to our results, comparing the week of delivery of hysteroscopy group and control group the difference was not significant. Subgroups were created in hysteroscopy group by the obstetrical history and the type of surgery and data were analyzed. No significant difference could be detected between the WOD of none subgroups compared to the WOD of control group. According to this analysis, no correlation can be found between the cervical dilatation and preterm delivery. Evaluating the data of the study it cannot be proved that dilatation of the cervix causes preterm delivery.

Weakness of the study is the quite low number of cases. Cases of a county population, with 450,000 inhabitants in a 10 years period were overviewed to have a representative study. Further examinations are needed to confirm the results of this study. Resection of a fibroid and resection of a polyp do not have the same effect on the integrity of the uterine wall. Injured uterine wall and scar tissue in the uterine wall also can cause different obstetrical outcomes. In further study data of same type of resectoscopy cases should be analyzed.

Polypectomy seems to be the procedure that may have most effect on infertility and have least effect on uterine wall's integrity.

P. Török participated in data collection, management, and manuscript writing.

R. Lampé participated in data collection and manuscript editing.

E. Farkas participated in data collection.

Gy. Bacsó participated in project development.

Conflict of interest

The authors declare that there is no conflict of interest.

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