

Obstetric complications after laparoscopic excision of posterior deep infiltrating endometriosis: a case–control study

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Objective: To study obstetric outcomes and complications in women with previously excised posterior deep infiltrating endometriosis (DIE) in comparison with women without endometriosis.

Design: Matched case–control study.

Setting: Tertiary-level academic center.

Patient(s): All surgeries for endometriosis performed in the Department of Gynecology and Gynecological Oncology, University of Bern between March 2004 and July 2015, were assessed. Inclusion criteria included complete laparoscopic excision of posterior DIE. Exclusion criteria included concomitant hysterectomies, refusal to participate, and patients lost to follow-up. Each subsequent pregnancy was matched to three controls by maternal age, parity, history of cesarean, and mode of conception.

Intervention(s): None.

Main Outcome Measure(s): Obstetric complications.

Result(s): Among 841 patients with surgically diagnosed endometriosis, 125 satisfied the inclusion and exclusion criteria. Of these, 73 pregnancies resulted, although a further 11 patients were excluded owing to early miscarriages or extrauterine pregnancies. The final study cohort included 62 singleton pregnancies matched to 186 controls. The analysis identified an increased risk of placenta previa, gestational hypertension, and intrauterine growth restriction for the case group. The possibility of successful vaginal delivery was similar between groups. Moreover, no significant increase in risk of maternal and neonatal delivery complications, except for a slightly higher postpartum blood loss in the case group, was observed.

Conclusion(s): Despite previous surgical excision, women with history of DIE present a higher risk of placenta previa, gestational hypertension, and intrauterine growth restriction during pregnancy. Previous surgery for DIE does not seem to predispose to failed vaginal delivery. (Fertil Steril® 2018;110:459–66. ©2018 by American Society for Reproductive Medicine.)

El resumen está disponible en Español al final del artículo.

Key Words: Delivery, labor, pregnancy, rectovaginal endometriosis

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Endometriosis is an extremely heterogeneous disease broadly separated into three distinct categories: superficial peritoneal, ovarian, and deep infiltrating endometriosis

(DIE). Deep infiltrating endometriosis lesions are characterized by penetration in excess of 5 mm under the peritoneal surface (1). They are found in many locations, most commonly in the rectou-

terine pouch (2), and can involve uterosacral ligaments, the posterior vaginal wall, the anterior rectal wall, and in most severe cases, extend laterally with ureteral involvement (3). Symptoms may include dyschezia, bowel dysfunction, dyspareunia, and lower abdominal pain. Surgical excision is a common treatment option for symptomatic cases because it reduces pain and improves quality of life (4).

Over the past few years it has emerged that endometriosis may impact pregnancy outcomes. A series

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of controlled observational studies have shown a negative association with endometriosis (5–14) that was confirmed in systematic meta-analysis (15, 16). However, most of these studies do not focus on DIE; nor do they provide surgical treatment information. This is crucial because pregnancy complications may differ according to the endometriotic lesion (17) or mode of surgery. Moreover, these studies have mainly examined pregnancy but not critical delivery outcomes, such as the rate of failed vaginal delivery or severe birth trauma. As a result, the proper delivery management of these patients remains unclear. One recent study found increased risk of obstetric complications in women with untreated posterior DIE (18). It has not yet been examined whether a similar risk persists after complete excision of DIE (19).

Complete surgical removal of symptomatic posterior DIE with or without vaginal and bowel involvement is regularly performed in specialized centers, with many women achieving pregnancy after surgery (20). It is of major importance therefore to identify potential pregnancy and delivery complications and establish evidence-based management policies in this specific group of patients. In the present study we examined the effect of a complete laparoscopic excision of posterior DIE on subsequent pregnancy and delivery outcomes.

MATERIALS AND METHODS

The study was prepared according to the “Strengthening the reporting of observational studies in epidemiology” guidelines (21) and was institution review board approved (no. 2016-00402).

In this matched case–control study, the case group was derived from all patients with laparoscopically treated posterior DIE in the Department of Gynecology and Gynecological Oncology, University of Bern, between March 2004 and July 2015. Only women with complete excision of posterior DIE, histologically verified, were included in the study. The following outcomes potentially related to pregnancy and delivery risks, were collected: [1] type of bowel surgery (shaving, segmental, or disc bowel resection), [2] revised American Society for Reproductive Medicine (rASRM) stage, [3] affected structures, [4] level of bowel anastomosis and length of resected bowel, if performed, [5] partial resection of posterior vaginal fornix, [6] concomitant bladder wall resection, and [7] protective stoma. All women were contacted via post, and a written informed consent form, as well as a completed questionnaire on pregnancies and delivery outcomes, was obtained. Multiple pregnancies and pregnancies before the surgery were excluded. The detailed outcomes (parity, time between endometriosis surgery and conception, mode of conception, duration of pregnancy, pregnancy and delivery complications, mode of delivery, newborn birth weight, Apgar score, and umbilical blood gases) were obtained from the obstetric clinics where medical care was provided.

The control group was obtained from all women with early pregnancy (12–15 weeks of pregnancy) presenting to the Ultrasound Department of Obstetrics and Gynecology, University of Bern from March 2014 to November 2016. Their pregnancy and delivery outcomes are stored and recorded in a

newborn registration database of the Ultrasound Department. Women with documented endometriosis or adenomyosis were excluded. The case and control groups were matched for age, parity, previous cesarean section, and mode of conception. Three control pregnancies were matched to each case pregnancy.

Surgical Technique

The standardized laparoscopic surgical technique performed in our clinic has been described previously (22). Briefly, the rectovaginal septum is dissected and the nodule mobilized. Vaginal infiltration is treated by partial resection of the posterior vaginal fornix. All lesions are initially treated by shaving alone. When necessary, deeply infiltrative rectal lesions are treated by either segmental or disc resection, depending on the circumference and length of rectal involvement. In cases with extensive involvement and when disc resection is deemed inadequate for macroscopic clearance, segmental resection is performed. Defunctioning ileostomies are performed selectively. The removal of all endometriotic implants is pursued.

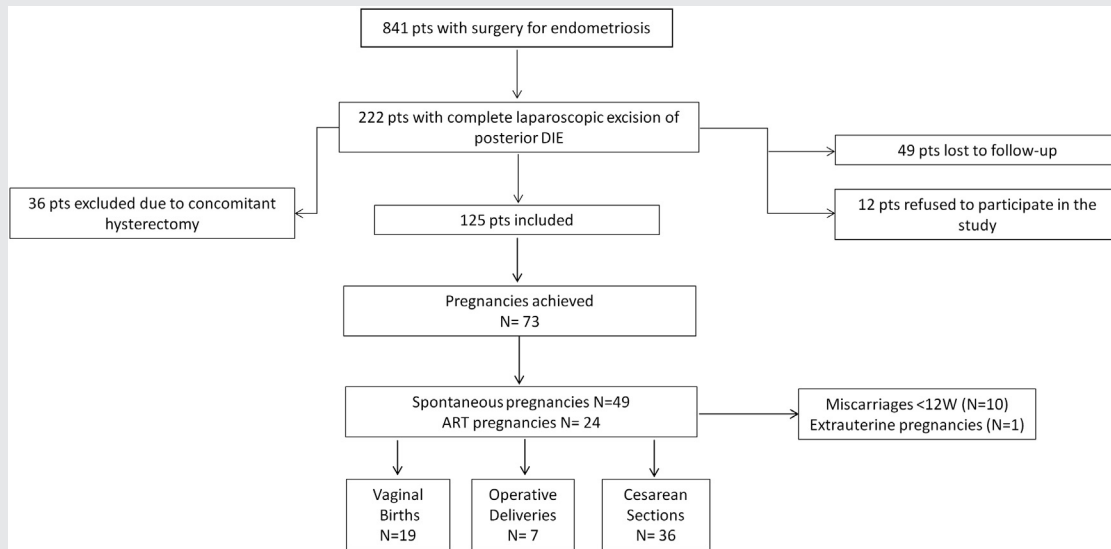
Definitions

Gestational complications were defined as follows: preterm birth was delivery before 37 completed weeks of gestation; gestational hypertension was blood pressure persistently over 140/90 mm Hg developed after 20 weeks of gestation in a previously normotensive woman; pre-eclampsia was gestational hypertension and proteinuria (>300 mg/24 hours); gestational diabetes was a carbohydrate intolerance with onset in pregnancy with a positive oral glucose tolerance test; small for gestational age (SGA) was an infant weighing less than the 10th percentile according to the fetal growth curve; intrauterine growth restriction (IUGR) indicated an infant weighing less than the 3rd percentile or less than the 10th with pathologic Doppler cerebro-placental ratio, umbilical artery or uterine arteries flows; placental abruption was separation of the placenta from its site of implantation before delivery; and placenta previa was complete or partially covering of the internal cervical os during the third trimester. Postpartum hemorrhage (PPH) was defined as the loss of more than 500 mL or 1000 mL blood within the first 24 hours after childbirth after vaginal or cesarean delivery, respectively.

Statistical Analysis

Descriptive statistical and binary logistic regression analyses were performed. A Student *t* test and Mann–Whitney *U* test were used to compare continuous parametric and nonparametric variables, respectively. Fisher’s exact test was used to compare binary variables. Univariate and multivariate analysis were performed to analyze factors predicting unfavorable pregnancy or delivery outcomes. The variables included in the model showed a Wald test’s parameter different from 0. If the Wald test showed that the parameter for a variable was zero, the variable was removed from the model. Multivariate models were performed for variables with a *P* value of $\leq .3$ in the univariate analysis. *P* values of $\leq .05$ were considered

FIGURE 1



Flow diagram of the case group. ART = assisted reproductive technology; pts = patients.

Nirgianakis. Obstetric outcomes after DIE excision. *Fertil Steril* 2018.

statistically significant. Statistical analysis was carried out with GraphPad Prism version 6.0 (GraphPad Software) and IBM-Microsoft SPSS version 22.0.

RESULTS

During the study period, among 841 patients with laparoscopically diagnosed endometriosis, 222 patients underwent a complete excision of posterior DIE. Forty-nine were lost to follow-up, 12 refused to participate in the study, and 36 were excluded owing to concomitant hysterectomy. From the remaining 125 women in the study, 73 pregnancies were documented. Ten pregnancies (13.7%) resulted in miscarriages in the first trimester of pregnancy, and one (1.4%) in an extrauterine pregnancy. Because the control group included only pregnancies after first trimester ultrasound screening, neither early miscarriages nor extrauterine pregnancies were expected. Consequently, the 10 miscarriages and one extrauterine pregnancy were excluded from the final case group, resulting in a final study cohort of 62 singleton pregnancies (Fig. 1). The control group consisted of 186 pregnancies.

The baseline characteristics of the groups, including, time from surgery to conception, endometriosis rASRM stage, and surgical outcomes, are presented in Table 1. In one woman a protective ileostomy was performed owing to ultralow bowel anastomosis (4 cm ab ano). Cases and controls had no statistically significant differences in terms of age, body mass index, parity, previous uterine surgery, and type of conception (Table 1).

Pregnancies after surgery for posterior DIE showed a higher risk of placenta previa ($P=.004$), gestational hypertension ($P=.036$), and IUGR ($P=.0496$). The incidence of vaginal delivery was lower in the DIE group; however, this was

marginal and not statistically significant ($P=.056$). Indeed, 26 of the 42 women who attempted vaginal delivery in the DIE group (61.9%) were successful. One delivery (2.4%) was complicated by a fourth-degree tear after vacuum delivery and another (2.4%) by a third-degree tear after spontaneous birth, similar to the control group. Ten deliveries (16.1%) were accompanied by PPH in the DIE group; five after cesarean section and five after vaginal delivery, with blood transfusion necessary in five (8.1%). The risk of PPH was, however, not statistically significant different between groups ($P=.099$). Blood loss was, conversely, significantly higher in the DIE group ($P=.006$). Finally, no difference was observed in fetal acidosis or asphyxia between groups (Table 2).

Out of 26 women with successful vaginal delivery, 14 (53.8%) had previous partial vaginal fornix resection, 14 (53.8%) previous bowel segment resection, 4 (15.4%) bowel disc resection, and 8 (30.8%) bowel shaving. Five of these deliveries (19.2%) were complicated with PPH; however, all of them were due to placenta retention or atonia and not due to birth trauma. No case of severe laceration of the upper vagina was reported in any patient in both groups.

The indications for either primary or secondary cesarean section in the endometriosis group are presented in Table 3. One of these indications was directly correlated with DIE (intra-abdominal bleeding with hemoperitoneum due to endometriosis lesion). In one woman with previous cesarean section and uterine contractions at 38 weeks a repeat cesarean section was performed, revealing a uterine perforation. In another with placenta previa a cesarean section with concomitant supracervical hysterectomy was performed because of associated placenta accreta.

The univariate and multivariate analysis of possible risk factors for cesarean delivery showed that bowel anastomosis

TABLE 1

Baseline characteristics of the two groups.

Characteristic	Endometriosis (n = 62)	Controls (n = 186)	P value
Age at delivery (y)	33.7 ± 3.74	33.8 ± 4.38	ns
BMI (kg/m ²)	23.5 ± 3.77	22.9 ± 3.57	ns
Previous deliveries			ns
None	40 (64.5)	125 (67.2)	
1	20 (32.3)	55 (29.6)	
2	2 (3.2)	6 (3.2)	
Previous cesarean section	9 (14.5)	26 (14)	ns
Mode of conception			ns
Spontaneous	40 (64.5)	123 (66.1)	
Insemination or/and hormonal stimulation	7 (11.3)	12 (6.5)	
IVF/ICSI	15 (24.2)	51 (27.4)	
Time from surgery to conception (mo)	25 (1–110)	–	–
rASRM stage			
I	–	–	–
II	–	–	–
III	–	–	–
IV	–	–	–
Segmental bowel resection	29 (46.5)	–	–
Disc resection	4 (6.5)	–	–
Bowel shaving	25 (40.3)	–	–
Length of removed bowel (cm)	7 (3.5–13)	–	–
Distance of bowel anastomosis ab ano (cm)	8 (4–30)	–	–
Partial resection of posterior vaginal fornix	37 (60)	–	–
Concomitant bladder wall resection	3 (4.8)	–	–
Protective stoma	1 (1.6)	–	–

Note: Data presented as mean ± standard deviation or median (range) for continuous variables and number (percentage) for the qualitative variables. Comparison between groups using the Student *t* test and Fisher's exact test as appropriate. ICSI = intracytoplasmic sperm injection; ns = nonsignificant.

Nirgianakis. Obstetric outcomes after DIE excision. *Fertil Steril* 2018.

during DIE surgery was positively associated with cesarean delivery ($P=.04$) (Supplemental Table 1). None of the examined factors was associated with PPH (Supplemental Table 2).

DISCUSSION

In the present study we demonstrate that women with excised posterior DIE, similarly to women with endometriosis in general, have a statistically significant increased risk of placenta previa, gestational hypertension, and IUGR compared with women without endometriosis. An important finding of the study was that the possibility of successful vaginal birth, if attempted, was high and similar to that in the control group. Except for a higher postpartal blood loss in the endometriosis group, all other delivery and neonatal risks were similar between groups. History of bowel anastomosis during DIE surgery was positively associated with delivery via cesarean section.

To the best of our knowledge this is the first controlled study to assess the pregnancy and delivery outcomes in patients who have previously undergone complete laparoscopic excision of posterior DIE. Recently an increased risk of preterm birth, placenta previa, gestational hypertension, and cesarean section in women with posterior nontreated DIE has been identified (17). However, because of the unmatched design of this study, significant differences in terms of age, previous uterine surgery, parity, and mode of conception between groups may have biased the results. More specifically, almost half of pregnancies were achieved after assisted repro-

ductive technology in the endometriosis group, compared with none in the control group. Because assisted reproductive technology is associated per se with a higher risk of cesarean section and other pregnancy complications (23), this may have biased the results significantly. Nevertheless, our results partially support those of the earlier study, which associate DIE with pregnancy complications, and extend them to show that surgical removal of DIE at least does not seem to increase obstetric risks.

Previous studies report different influences of endometriosis on pregnancy (5–14,24–30). A recent meta-analysis concluded there was a higher risk of preterm birth, placenta previa, SGA, and cesarean delivery (15), similar to what we have observed. However, the classification of endometriosis and the surgery performed was poorly documented in most of these studies, and the case groups consisted of any type of endometriosis, mainly peritoneal and ovarian, thus significantly differing from our study population.

Our study suggests that complete excision of posterior DIE does not prevent the risk of placenta previa often reported in women with endometriosis. Patients should thus be informed that this type of surgery will not reduce the probability of this pregnancy complication and the risks associated with it. There are several theories linking endometriosis and placenta previa, including dysperistalsis and abnormal uterine contractions in women with endometriosis leading to anomalous blastocyst implantation (31). Pelvic adhesions secondary to endometriosis and causing a fixed uterus may also contribute, as could an aberrant, inflammatory

TABLE 2

Pregnancy and delivery outcomes between groups.

Pregnancy and delivery outcomes	Endometriosis (n = 62)	Controls (n = 186)	P value	RR (95% CI)
Premature delivery <37 wk	8 (12.9)	13 (7)	ns	1.817 (0.79–4.18)
Premature delivery <32 wk	1 (1.6)	2 (1.1)	ns	1.5 (0.138–16.27)
Placenta previa	4 (6.5)	0	.004	n/a
Placental abruption	1 (1.6)	0	ns	n/a
Gestational diabetes	7 (11.3)	14 (7.5)	ns	1.5 (0.634–3.547)
Pre-eclampsia	3 (4.8)	5 (2.7)	ns	1.8 (0.443–7.318)
Gestational hypertension	4 (6.5)	2 (1.1)	.036	6 (1.126–31.98)
SGA	7 (11.3)	13 (7)	ns	1.615 (0.675–3.867)
IUGR	7 (11.3)	7 (3.8)	.0496	3 (1.095–8.218)
Spontaneous vaginal delivery	19 (30.7)	66 (35.5)	ns	0.864 (0.566–1.32)
Instrumental vaginal delivery	7 (11.3)	39 (21)	ns	0.538 (0.254–1.14)
Primary cesarean section	20 (32.3)	39 (21)	.085	1.538 (0.975–2.428)
Secondary cesarean section	16 (25.8)	42 (22.6)	ns	1.111 (0.583–2.117)
Normal vaginal delivery (spontaneous and instrumental)	26 (41.9)	105 (56.5)	.0564	0.743 (0.54–1.022)
Failed vaginal delivery	16 (38.1 ^a)	42 (28.6 ^b)	ns	1.33 (0.839–2.12)
Second-degree perineal tear or episiotomy	11 (26.2 ^a)	68 (36.6 ^b)	ns	0.716 (0.417–1.23)
Third- or fourth-degree perineal or button hole tear	2 (4.8 ^a)	5 (3.4 ^b)	ns	1.4 (0.2815–6.962)
Vaginal laceration	3 (7.1 ^a)	14 (9.5 ^b)	ns	0.75 (0.226–2.49)
PPH	10 (16.1)	16 (8.6)	.0995	1.875 (0.898–3.915)
Blood loss (mL)	500 (200–2000)	400 (200–1500)	.0063	
phA < 7.10	1 (1.6)	6 (3.2)	ns	0.505 (0.062–4.12)
phA	7.28 (7.05–7.38)	7.26 (6.92–7.42)	ns	
phV	7.35 (7.15–7.47)	7.35 (7.02–7.49)	ns	
5-minute Apgar score	9 (1–10)	9 (1–10)	ns	

Note: Data presented as mean ± standard deviation or median (range) for continuous variables and number (percentage) for the qualitative variables. Comparison between groups using the Student *t* test, Mann–Whitney *U* test, and Fisher's exact test as appropriate. CI = confidence interval; RR = relative risk.

^a Percentage of patients attempting a vaginal delivery (n = 42) in the case group.

^b Percentage of patients attempting a vaginal delivery (n = 147) in the control group.

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intrauterine environment. The association with gestational hypertension and IUGR could be related to the thickening of the junctional zone reported in endometriosis (32–34), because trophoblastic invasion into this layer is critical for pregnancy (35). Abnormal spiral artery remodeling, inflammation, oxidative stress, and an imbalance in the angiogenic milieu of the endometrium may also be reasons

for abnormal placentation (36). Consequently, previous surgery for DIE is highly unlikely to represent the cure for these abnormalities because these represent mainly a pre-existing predisposition rather than a consequence of DIE lesion presence.

In contrast to the study of Exacoustos et al. (18), which identified a very high incidence of preterm birth in women with nontreated posterior DIE (31.7%), no similar risk was observed in women with surgically treated posterior DIE in our study. Whether this was solely due to the surgical excision of endometriosis cannot be answered with certainty but represents an intriguing possibility.

It is reasonable to assume that the higher risk of placenta previa, gestational hypertension, and IUGR associated with DIE would lead to a higher incidence of cesarean delivery. In contrast to previous studies, though, we found a higher, but nonsignificant ($P = .0564$) increase in the incidence of cesarean delivery in the case group. This may be due to the specific subgroup of women analyzed in this study or a positive influence of surgical removal of DIE on subsequent vaginal deliveries. However, given the borderline nature of the results, this may be simply statistical variation. Nevertheless, when a woman in the DIE group without contraindication attempted a vaginal delivery, the success rate was similar to that in the control group (61.9% vs. 71.4%), meaning previous surgery for posterior DIE does not predispose to vaginal delivery failure.

A previous study reported a significant influence of vaginal involvement and bowel resection on the method of

TABLE 3

Indication for cesarean section in the endometriosis group

Indication for cesarean section	No. of cesarean sections (n = 36)
Primary cesarean sections	20
Breech presentation	6
Previous cesarean section	6
Placenta previa	4
Previous traumatic vaginal birth	1
Intra-abdominal bleeding due to endometriosis	1
Perianal thrombosis in the 31st week of pregnancy	1
Pre-eclampsia	1
Secondary cesarean sections	16
Labor dystocia	6
Pathological cardiotocography	6
Amniotic infection syndrome	2
Extensive vaginal bleeding during labor	1
Nondefined	1

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delivery (37). Our findings also associate bowel anastomosis but not partial resection of the posterior vaginal fornix due to DIE with an increased incidence of cesarean delivery in subsequent pregnancies. It is likely that this association originates from a biased choice toward cesarean deliveries by clinicians due to concerns about possible obstetric complications after such surgeries. Nevertheless, because of the wide confidence interval in the multivariate analysis, this finding should be interpreted with caution.

Previous partial resection of the posterior vaginal fornix and the resulting scar could lead to severe lacerations of the upper vagina during labor, which represents a potentially major complication, in terms of blood loss and difficulties at suturing. However, no such complication has been reported in any patient in our study. Similarly, in the study by Allerstorfer et al. (37) no vaginal laceration was documented after previous excision of vaginal endometriosis. Given such a low incidence of this complication, our study is underpowered to detect a between-group risk difference. Because of its potential severity, large multicenter studies are needed to better elucidate its incidence and clinical significance. In the meantime it should be carefully considered by all obstetricians caring for pregnant women with previous surgery for posterior DIE.

The higher postpartum blood loss but not higher rate of PPH observed in the endometriosis group could be explained by the increased incidence of cesarean delivery in this group, known to have higher blood loss (58.1% vs. 43.6%). Consequently, it cannot be concluded that previous surgery for posterior DIE is responsible per se for higher postpartum blood loss.

One limitation of our study is that low sample numbers limit the incidences of some rarer events. For example, despite the high number of pregnancies in the control group, none presented with placenta previa or placenta abruption. For the same reason the validity of the univariate and multivariate analysis for potential risk factors related to cesarean section and PPH is limited. Moreover, as stated above, many patients who underwent complete excision of posterior DIE were not included, because they were lost to follow-up or refused participation. Considering these patients are often at increased risk of unfavorable outcome, this constitutes a drawback of the study. The strengths of the study, however, include the clear inclusion criteria of patients only with completely excised severe posterior DIE, with high incidence of bowel surgery and partial resection of posterior vaginal fornix, as well as the comparison with a controlled group matched for the most important confounding outcomes, thus increasing the quality and enhancing the interpretation of the results.

In conclusion, whether a complete surgical treatment of DIE endometriosis has a beneficial influence on pregnancy and delivery cannot be directly answered from the present study. It does, however, suggest that no additional adverse effects not already related to the presence of endometriosis itself are created. The clinician should be aware of the potential risk of placenta previa, gestational hypertension, and IUGR associated with previous posterior DIE; however, a change in prenatal care cannot be suggested, because the standard prenatal

care in developed countries should be adequate to diagnose these complications early enough in the pregnancy. Last, concerns that the surgery of the rectovaginal septum with or without bowel or vaginal involvement may predispose to failed vaginal delivery are refuted by this study. Women trying to deliver vaginally succeed with a similar rate as endometriosis-free women, although further studies with increased numbers of patients delivering vaginally are required to conclusively determine the safety of vaginal delivery in this specific group of patients.

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Complicaciones obstétricas en mujeres con endometriosis profunda infiltrante en compartimento posterior sometidas a excisión laparoscópica: estudio de casos y controles

Objetivo: Evaluar el resultado y las complicaciones obstétricas en mujeres con cirugía previa con excisión de endometriosis profunda infiltrante (DIE) del compartimento posterior comparándose con mujeres sin endometriosis.

Diseño: Estudio comparativo casos-controles.

Lugar: Centro académico de tercer nivel.

Pacientes: Revisión de todas las cirugías de pacientes con endometriosis realizadas en el Departamento de Ginecología y Ginecología Oncológica, Universidad de Berna entre marzo de 2004 y julio de 2015. Los criterios de inclusión incluían laparoscopias con excisión completa de DIE posterior. Fueron criterios de exclusión las histerectomías concomitantes, la negativa a participar en el estudio y las pacientes pérdidas para seguimiento/ el abandono de las pacientes del estudio. Cada embarazo subsiguiente fue comparado con tres controles según edad materna, paridad, historia de cesáreas previas y modo de concepción.

Intervenciones: Ninguna.

Resultados principales: Complicaciones obstétricas.

Resultados: Entre las 841 pacientes diagnosticadas con endometriosis quirúrgicamente, 125 cumplían los criterios de inclusión y exclusión. De ellas, 73 lograron el embarazo, aunque posteriormente 11 pacientes fueron excluidas por sufrir abortos precoces o gestaciones extrauterinas. La cohorte final del estudio incluyó a 62 embarazos únicos comparados con 186 controles. El análisis identificó un aumento del riesgo de placenta previa, hipertensión gestacional y crecimiento intrauterino retardado en estos casos de estudio. La probabilidad de parto vaginal fue similar entre los dos grupos. Además, no se observó aumento significativo de riesgo para complicaciones maternas ni neonatales en el parto, excepto un ligero incremento del sangrado postparto en el grupo de casos de estudio.

Conclusiones: A pesar de la excisión quirúrgica previa, las mujeres con antecedentes de DIE presentan un mayor riesgo de placenta previa, hipertonía gestacional y crecimiento intrauterino retardado durante el embarazo. La cirugía previa por DIE no parece predisponer al fracaso del parto vaginal.