

# 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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**E**ndometriosis 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

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