External validation of the Endometriosis Fertility Index in a French population

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Objective: To show an external validation of the Endometriosis Fertility Index (EFI) and to observe cumulated pregnancy rates after infertility management combining surgery and assisted reproductive technologies (ART).
Design: Observational study from January 2004 to December 2012.
Setting: Tertiary-care university hospital and ART center.
Patient(s): Four hundred twelve infertile and endometriotic patients after laparoscopic surgery.
Intervention(s): Surgical diagnosis and treatment followed by spontaneous fertility or ART management.
Main Outcome Measure(s): Spontaneous pregnancy rates and cumulative (spontaneous and ART) pregnancy rates according to the EFI.
Result(s): A significant relationship between EFI and spontaneous pregnancy rates was observed at 12 months ($P=.001$). The least function score and complete removal of endometriotic lesions and pelvic adhesions were significantly associated with spontaneous pregnancy ($P=.006$). Cumulative pregnancy rate at 18 months was 78.8%. ART benefits for pregnancy rates were higher for patients with poor EFI.
Conclusion(s): External validation of the EFI in a French population was demonstrated. Combining surgery for endometriosis and ART led to a 78.8% pregnancy rate at 18 months after surgery. (Fertil Steril® 2015;104:119–23. ©2015 by American Society for Reproductive Medicine.)
Key Words: Endometriosis, fertility, index, laparoscopy, pregnancy, ART

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Endometriosis remains an enigmatic and diverse disease, regarding both treatment and pathogenesis. The management of an infertile patient suffering from endometriosis is determined not only by the severity and the stage of the disease, but also by the physician's specialty (1). Classifications commonly used do not actually allow predicting fertility prognosis after surgery. The frequent use of assisted reproductive technology (ART) after failure to conceive addresses the issue of the most appropriate individual therapeutic strategy particularly for couples whose fertility prognosis is radically different. Laparoscopic surgery is the key to an individualized approach, through exploration, diagnosis, and treatment of endometriosis, with possible referral to an ART program after surgery.

The lack of results with a high level of proof led Adamson in 2010 to create and validate a predictive model of spontaneous pregnancy after surgery: the Endometriosis Fertility Index (EFI). This score included for the first time historical factors (age, length of infertility, previous pregnancy) and surgical factors (American Fertility Society [AFS] total score, AFS endometriosis lesions, and the least function score as the anatomic and functional result of the surgery on the reproductive adnexal organ). This index was internally validated with normo-ovulating women whose partners had satisfactory semen parameters according to the

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World Health Organization (WHO) criteria (2). The EFI gave a prognostic relevance to laparoscopic surgery in endometriotic infertile patients.

A Chinese study published as a national review including 350 patients externally confirmed the association between EFI and spontaneous pregnancy rate after laparoscopic surgery for endometriosis (3).

More recently in 2012, Tomassetti et al. (4) published an external validation of the EFI in a Belgian population of 233 patients and recommended to use this index to advise couples on their chances of spontaneous pregnancy after surgery.

The aim of the present analysis was to perform an external validation of the EFI in a French population, to identify predictive factors for pregnancy after surgery and to observe the overall cumulative pregnancy rate with an approach combining surgery and ART.

PATIENTS AND METHODS

Study Design

This retrospective study was conducted in the Obstetrics, Gynecology, and ART Department of a tertiary-care university hospital. This center is a tertiary referral unit for reproductive endocrinology, reproductive surgery, and endometriosis-related infertility. The study was approved by the Institutional Review Board of Bondy University Hospital. Informed consent (data collection, telephone follow-up) was obtained from each of the subjects before beginning the surgery.

From September 2004 to December 2012, data on history of infertility, surgery, postoperative follow-up, and subsequent fertility were collected prospectively for all endometriotic and infertile patients. Normo-ovulating patients, with at least one patent tube according to hysterosalpingography, with infertility over an 18-month period and a diagnosis of endometriosis according to laparoscopy with histologic confirmation were included in the study. Semen analyses of partners were normal according to the WHO criteria (5).

Surgical Procedure

All laparoscopies were performed by the same surgeon (P.C.). Complete surgical treatment of all recognizable endometriotic lesions was performed whenever possible. Asymptomatic peritoneal endometriotic lesions were not removed. Surgical treatment of superficial peritoneal endometriotic lesions was performed by means of ablation with electrocoagulation, plasma ablation, or excision. Complete pelvic adhesiolysis was performed. Transient abdominal ovariopexy was performed using a nonreadsorbable suture for patients having undergone complete adhesiolysis and endometriotic lesion removal with an American Society for Reproductive Medicine (ASRM) score of >8 per adnexa (6). Prevention of adhesion recurrence was performed for patients with ASRM score >6 or in cases with large peritoneal excision by means of hydroflotation with the use of a wide-range antiadhesive liquid (Adept [4% icodextrin]; Baxter) into the peritoneal cavity.

Digestive lesions resections were performed when patients were clinically symptomatic. Endometriomas were removed either by means of cystectomy or plasma ablation, when they were >3 cm and symptomatic (dysmenorrhea or dyspareunia) or 6 cm whether symptomatic or not. We systematically evaluated ovarian function after surgery with lengths of cycle, ultrasound performed at the 12th day of cycle (spontaneous cycle to check folliculogenesis and ovulation), antral follicle count (AFC) and antimüllerian hormone. No ovarian failure was observed after surgery. No laparoconversion was performed.

Postoperative Management and EFI Calculation

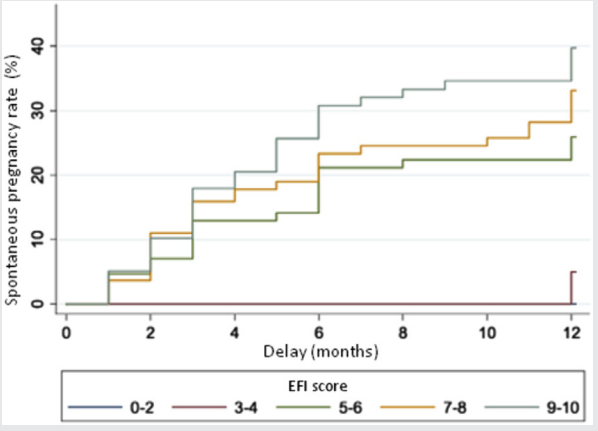
Postoperative care was decided during a multidisciplinary meeting. Patient distribution is detailed in Figure 1. Patients were directly referred to ART after surgery according to age (>40 years) and ovarian reserve as assessed by ovarian AFC with the use of pelvic ultrasound (AFC 6–8). Spontaneous conception (with or without ovarian stimulation) was proposed to other patients for 12 months.

A spontaneous pregnancy was defined by a β-hCG level >25 UI/L. Patients who did not begin a pregnancy after 12 months were referred to ART. Ongoing pregnancy was defined as pregnancy reaching $\geq$20 weeks.

The EFI was calculated retrospectively for all patients. The EFI was calculated externally in the non-ART patients. Evaluation of the least function score (i.e., the anatomic and functional result of the surgery on the female reproductive organ) was retrospectively performed with a double-blind calculation performed by the operative surgeon (P.C.) and another surgeon specialized in endometriosis with the use of the operative report. Discrepancy between the two surgeons was <1% (data not shown).

The primary end point was the cumulative postoperative spontaneous pregnancy rate according to EFI. The secondary end point was the overall cumulative pregnancy rate after surgery and ART, as well as overall cumulative pregnancy for each subclass of the EFI.

FIGURE 1



Kaplan-Meier curves. Significant correlation between Endometriosis Fertility Index (EFI) score and probability of non–assisted reproductive technology pregnancy (P=.001).

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