

*Laparoscopic surgery in different stages
of endometriosis and relations to Ivf
SUCCESS*

Dr Roya padmehr

Fellowship in advanced laparoscopic surgeries and endometriosis

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- **Around 25–50% of women with infertility may be affected by endometriosis, and 30–50% of women with endometriosis have infertility .**

Multiple hypotheses have been suggested to explain the low fecundity observed with endometriosis

- **Altered folliculogenesis** resulting in reduced quality oocytes .
- **Mechanical interference with oocyte pickup** and transportation .
- **Exposure to a hostile environment of macrophages cytokines** and vasoactive substances in the peritoneal fluid.
- **Anatomical dysfunction** of the fallopian tube and ovary .

ENDOFOUND ENDOMETRIOSIS CLASSIFICATION

- **Category I:** Peritoneal endometriosis
- **Category II:** Ovarian Endometriomas (Chocolate Cysts)
- **Category III:** Deep Infiltrating Endometriosis I (DIE I)
- **Category IV:** Deep Infiltrating Endometriosis II (DIE II)



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Laparoscopic surgery for endometriosis (Review)

- *Endometriosis can be suspected based on a careful history and physical examination performed by an experienced gynaecologist*

- *Pain is recognised as the primary complaint of women with endometriosis. Endometriosis is a variable condition exemplified by the nature and severity of pain symptoms experienced (Giudice2004).*

- *Endometriosis lesions contain **high numbers of sensory and autonomic nerve fibres** which provide a route for painful stimuli.*
- *Endometriosis has features of an inflammatory process that stimulates a wide range of **immune and inflammatory cells**. These immune cells secrete **immune modulators**, which can stimulate the sensation of pain.*

The role of minimal to moderate endometriosis in infertility remains controversial

With no intervention, 50% of women with mild endometriosis will conceive, only 25% with moderate endometriosis will conceive and only a few with severe disease will conceive (Practice Committee ASRM 2012).



Endometriosis

Guideline of European Society of Human
Reproduction and Embryology

Diagnosis of endometriosis

- Laparoscopy is no longer the diagnostic gold standard
- It is now only recommended in patients with negative imaging results and/or where empirical treatment was unsuccessful or inappropriate

Treatment of endometriosis-associated pain

- *Danazol and anti-progestogens, laparoscopic uterosacral nerve ablation (LUNA), presacral neurectomy (PSN) and anti-adhesion agents are no longer included in recommendations, but still covered in the text*

Treatment of endometriosis-associated infertility

39	In infertile women with endometriosis, clinicians should not prescribe ovarian suppression treatment to improve fertility.	⊕⊕○○	Strong recommendation
40	Women seeking pregnancy should not be prescribed postoperative hormone suppression with the sole purpose to enhance future pregnancy rates.	⊕⊕○○	Strong recommendation
41	Those women who cannot attempt to or decide not to conceive immediately after surgery may be offered hormone therapy as it does not negatively impact their fertility and improves the immediate outcome of surgery for pain.	⊕⊕○○	Weak recommendation
42	In infertile women with endometriosis, clinicians should not prescribe pentoxifylline, other anti-inflammatory drugs or letrozole outside ovulation-induction to improve natural pregnancy rates.	⊕○○○	Strong recommendation
43	Operative laparoscopy could be offered as a treatment option for endometriosis-associated infertility in rASRM stage I/II endometriosis as it improves the rate of ongoing pregnancy.	⊕⊕○○	Weak recommendation
44	Clinicians may consider operative laparoscopy for the treatment of endometrioma-associated infertility as it may increase their chance of natural pregnancy, although no data from comparative studies exist.	⊕○○○	Weak recommendation

45 Although no compelling evidence exists that operative laparoscopy for deep endometriosis improves fertility, operative laparoscopy may represent a treatment option in symptomatic patients wishing to conceive. ⊕○○○ Weak recommendation

46 The GDG recommends that the decision to perform surgery should be guided by the presence or absence of pain symptoms, patient age and preferences, history of previous surgery, presence of other infertility factors, ovarian reserve, and estimated Endometriosis Fertility Index (EFI). GPP

Women should be counselled of their chances of becoming pregnant after surgery. To identify patients that may benefit from ART after surgery, the Endometriosis Fertility Index (EFI) should be used as it is validated, reproducible and cost-effective. The results of other fertility investigations such as their partner's sperm analysis should be taken into account. GDG STATEMENT

53	The extended administration of GnRH agonist prior to ART treatment to improve live birth rate in infertile women with endometriosis is not recommended, as the benefit is uncertain.	⊕○○○	Strong recommendation
54	There is insufficient evidence to recommend prolonged administration of the COC/progestogens as a pre-treatment to ART to increase live birth rates.	⊕○○○	Weak recommendation
55	Clinicians are not recommended to routinely perform surgery prior to ART to improve live birth rates in women with rASRM stage I/II endometriosis, as the potential benefits are unclear.	⊕⊕○○	Strong recommendation
56	Clinicians are not recommended to routinely perform surgery for ovarian endometrioma prior to ART to improve live birth rates, as the current evidence shows no benefit and surgery is likely to have a negative impact on ovarian reserve.	⊕⊕○○	Strong recommendation
57	Surgery for endometrioma prior to ART can be considered to improve endometriosis-associated pain or accessibility of follicles.		GPP
58	The decision to offer surgical excision of deep endometriosis lesions prior to ART should be guided mainly by pain symptoms and patient preference as its effectiveness on reproductive outcome is uncertain due to lack of randomised studies.	⊕○○○	Strong recommendation

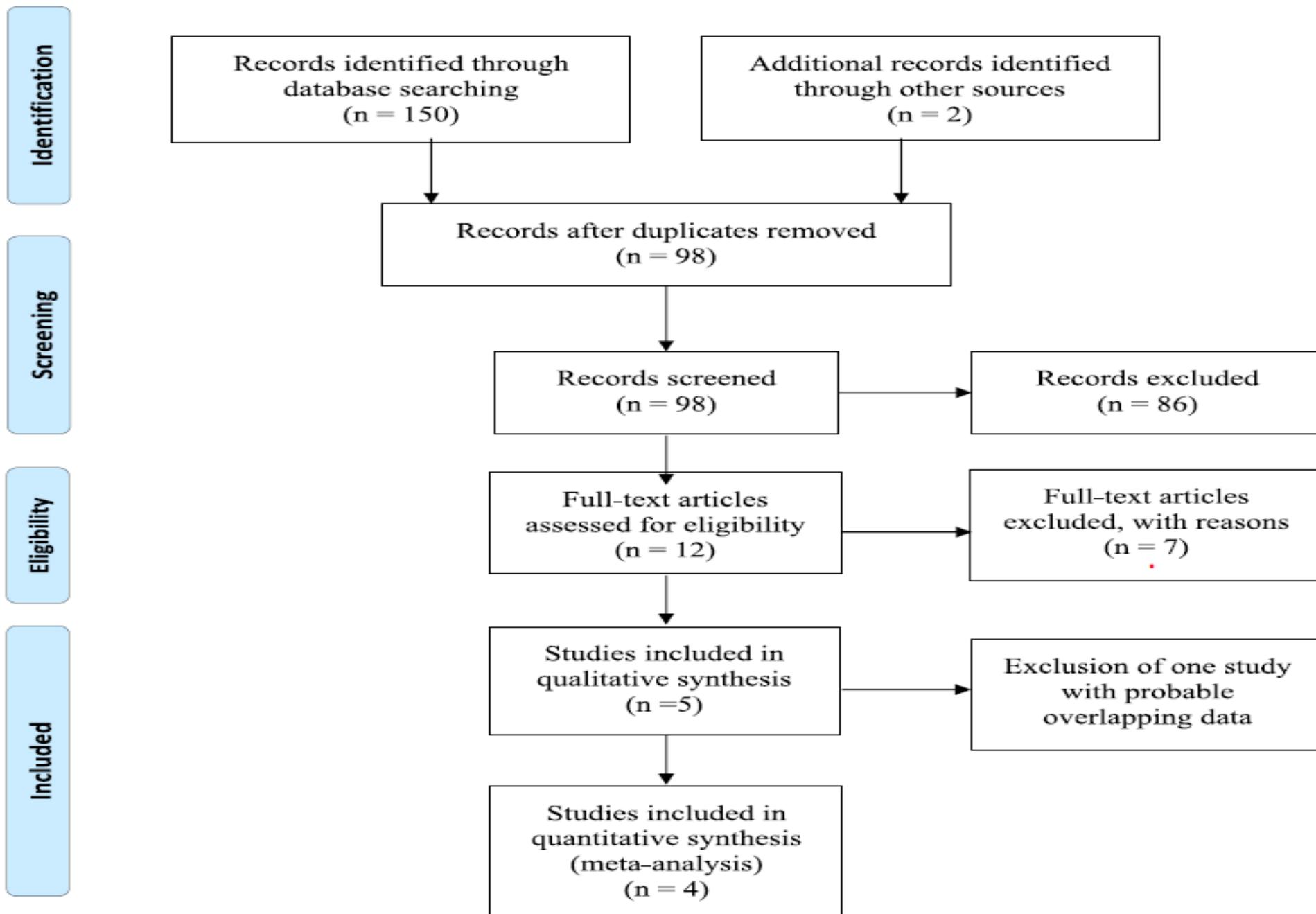
Review Article

Impact of Surgery for Deep Infiltrative Endometriosis before In Vitro Fertilization: A Systematic Review and Meta-analysis

Gemma Casals, MD, PhD, María Carrera, MD, José Antonio Domínguez, MD, PhD, Mauricio Simões Abrão, MD, PhD, and Francisco Carmona, MD, PhD

From the Department of Gynecology, Hospital Clínic de Barcelona, Institut d'Investigacions Biomèdiques August Pi i Sunyer, Faculty of Medicine, University of Barcelona (Drs. Casals and Carmona), Barcelona, Assisted Reproduction Unit, Hospital Universitario Doce de Octubre (Dr. Carrera), Madrid, Instituto Extremeño de Reproducción Asistida (IERA Badajoz-Lisboa), Centro de Cirugía de Mínima Invasión Jesús Uson (Dr. Domínguez), Cáceres, Spain, and Gynecologic Division, BP–A Beneficencia Portuguesa de São Paulo, Department of Obstetrics and Gynecology, Faculdade de Medicina, Universidade de São Paulo (Dr. Abrão), São Paulo, Brazil

- Examined **the primary and secondary** outcomes in patients **undergone surgery** for DIE before IVF and Patients who received IVF **without a previous surgery for DIE.**
- Analyzed data according to different types of surgery (**complete or incomplete**) **subgroups of patients (DIE with or without bowel involvement)**



- *Complete surgery was performed in all selected studies.*
- *An additional analysis including both complete and incomplete surgery within the surgery group was also conducted.*
- *The patients' ages and the percentage of patients affected by OMA, adenomyosis, or hydrosalpinx among the study groups for the included studies because these parameters could also influence the results.*

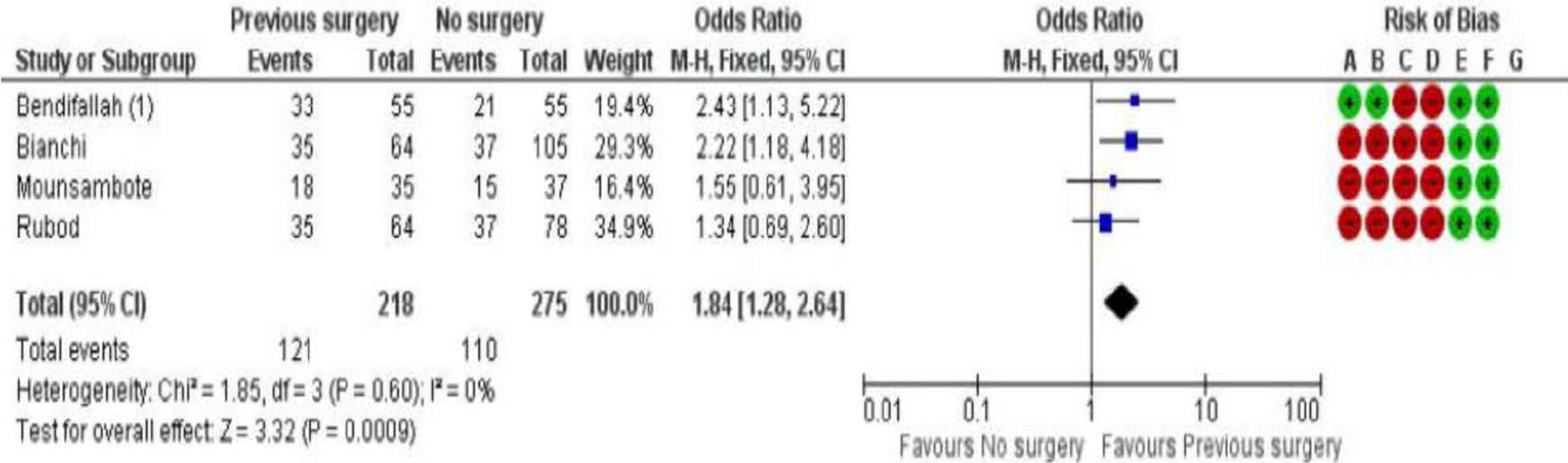
Table 1

Summary description of the included studies

Study (year)	Population	N (first-line surgery/first-line IVF) used in analysis of outcome	Study design	Study period	Age of patients, yrs	Allocation criteria	Surgery procedures	Main conclusion
Bendifallah et al [19] (2017)	Women with infertility with DIE (in situ colorectal endometriosis)	110 (55/55)	Retrospective matched cohort study using propensity scores	2005–2014	NS: 32 (24–39)* S: 31.3 (26–38)* (median, range) [†]	Patients' preferences	Shaving, disc excision, or segmental resection	First-line surgery is correlated with higher PR, LBR, and cLBR
Bianchi et al [20] (2009)	Women with infertility with clinical and TVS diagnosis of DIE (with or without colorectal endometriosis) and <38 yrs old	169 (64/105)	Prospective cohort study	2005–2008	NS: 32 ± 3 S: 32 ± 3 (mean ± SD) [†]	Patients' preferences	Extensive laparoscopic excision of all DIE lesions and endometriomas	First-line surgery significantly improved PR
Mounsambote et al [23] (2017)	Women with infertility with DIE and without digestive involvement	72 (35/37)	Retrospective cohort study	2007–2014	NS: 33.1 (22–41) S: 32.1 (24–40) (median, range) [†]	Patients' preferences	Complete resection of endometriosis	No differences
Rubod et al [22] (2019)	Women with infertility with posterior deep endometriosis	142 (78/64) An additional group of 88 patients with incomplete surgery was analyzed separately	Retrospective cohort study	2007–2013	All patients: 31.1 ± 3.6 (mean ± SD)	Complete surgery: patients who were symptomatic. Incomplete surgery: asymptomatic patients only to facilitate IVF conditions. No surgery: asymptomatic patients with no affectation of IVF conditions	Complete surgery of all DIE lesions and endometriomas after failure of medical treatment	No differences

cLBR = cumulative live birth rate; DIE = deep infiltrative endometriosis; IVF = in vitro fertilization; LBR = live birth rate; NS = no surgery; PR = pregnancy rate; S = surgery; SD = standard deviation; TVS = transvaginal

Pregnancy rate per patient in the IVF with previous surgery for DIE lesions group compared with that in the IVF without previous surgery group.
 CI = confidence interval; DIE = deep infiltrative endometriosis; IVF = in vitro fertilization; PSM = propensity score matching analysis.



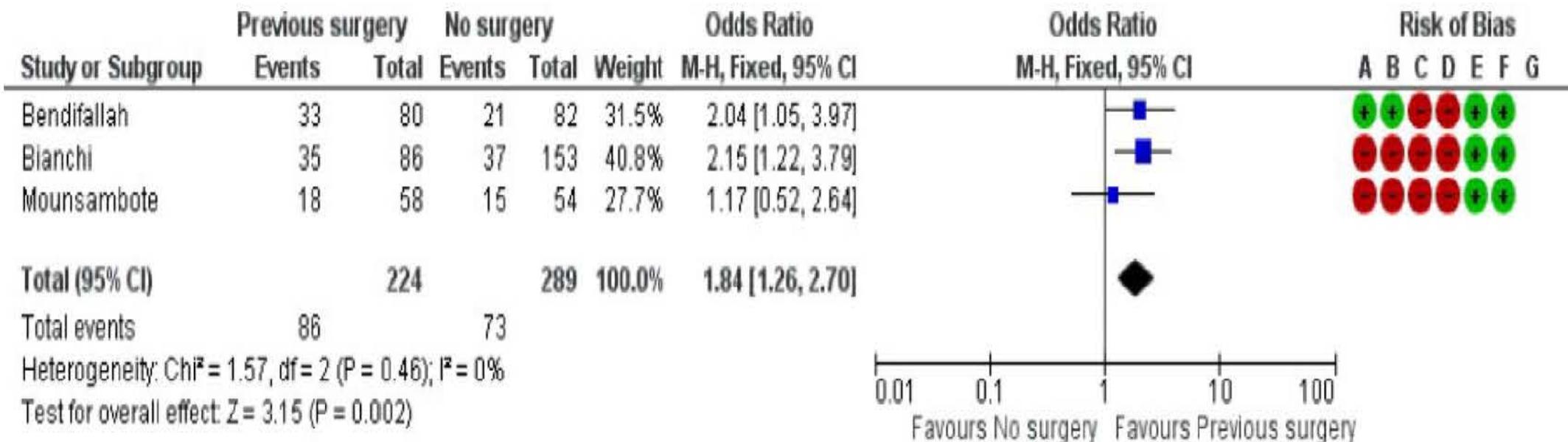
Footnotes

(1) after PSM

Risk of bias legend

- (A) Random sequence generation (selection bias)
- (B) Allocation concealment (selection bias)
- (C) Blinding of participants and personnel (performance bias)
- (D) Blinding of outcome assessment (detection bias)
- (E) Incomplete outcome data (attrition bias)
- (F) Selective reporting (reporting bias)
- (G) Other bias

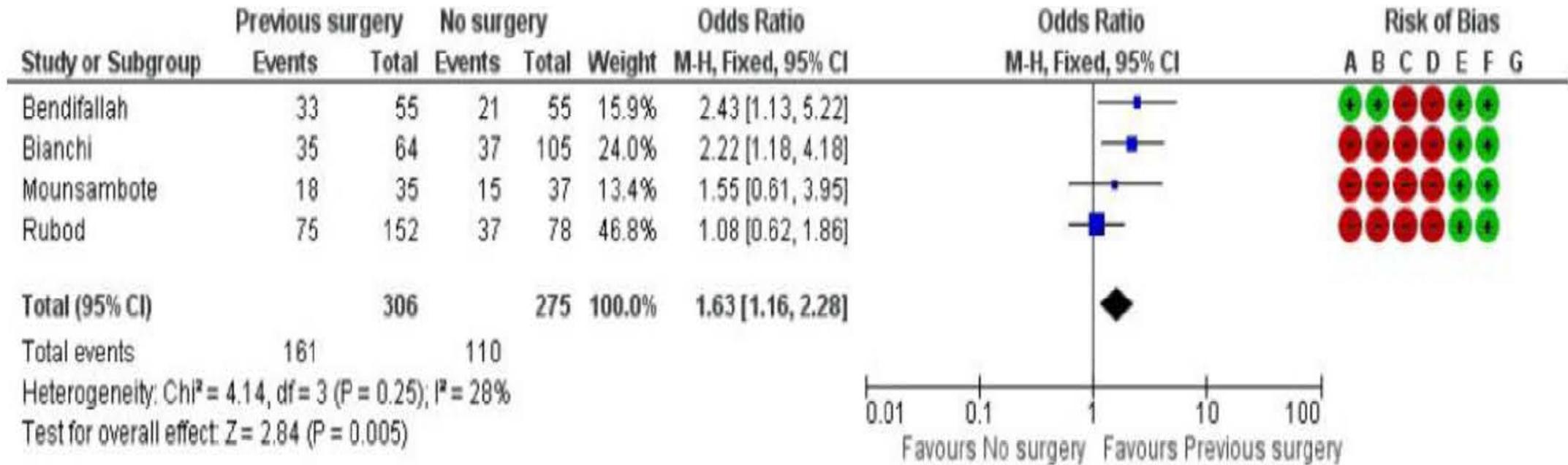
Pregnancy rate per cycle in the IVF with previous surgery for DIE lesions group compared with that in the IVF with no previous surgery group. CI = confidence interval; DIE = deep infiltrative endometriosis; IVF = in vitro fertilization.



Risk of bias legend

- (A) Random sequence generation (selection bias)
- (B) Allocation concealment (selection bias)
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- (G) Other bias

Pregnancy rate per patient in the IVF with previous surgery (complete and incomplete) for DIE lesions group compared with that in the IVF without previous surgery group. DIE = deep infiltrative endometriosis; IVF = in vitro fertilization.



Risk of bias legend

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- (F) Selective reporting (reporting bias)
- (G) Other bias

Colorectal endometriosis-associated infertility: should surgery precede ART?

Sofiane Bendifallah, M.D., Ph.D.,^{a,b} Horace Roman, M.D., Ph.D.,^c Emmanuelle Mathieu d'Argent, M.D.,^a Salma Touleimat, M.D.,^c Jonathan Cohen, M.D., Ph.D.,^a Emile Darai, M.D., Ph.D.,^{a,d,e} and Marcos Ballester, M.D., Ph.D.^{a,d,e}

^a Department of Gynaecology and Obstetrics, Tenon University Hospital, Assistance Publique des Hôpitaux de Paris, University Pierre and Marie Curie, Institut Universitaire de Cancérologie, Paris; ^b INSERM UMRS 707, Epidemiology, Information Systems, Modeling, University Pierre and Marie Curie, Paris; ^c Expert Center in the Diagnosis and Multidisciplinary Management of Endometriosis, Department of Gynecology and Obstetrics, Rouen University Hospital, Rouen; ^d UMRS 938 Université Pierre et Marie Curie, Paris; and ^e Groupe de Recherche Clinique GRC6-UPMC, Centre Expert En Endométriase, Paris, France

Objective: To compare the impact of first-line assisted reproductive technology (ART; intracytoplasmic sperm injection [ICSI]-IVF) and first-line colorectal surgery followed by ART on fertility outcomes in women with colorectal endometriosis-associated infertility.

Design: Retrospective matched cohort study using propensity score (PS) matching (PSM) analysis.

Setting: University referral centers.

Patient(s): A total of 110 women were analyzed from January 2005 to June 2014. A PSM was generated using a logistic regression model based on the age, antimüllerian hormone (AMH) serum level, and presence of adenomyosis to compare the treatment strategy.

Intervention(s): First-line surgery group followed by ART versus exclusive ART with in situ colorectal endometriosis.

Main Outcome Measure(s): After PSM, pregnancy rates (PRs), live-birth rates (LBRs), and cumulative rates (CRs) were estimated.

Result(s): After PSM, in the whole population, the total LBR and PR were 35.4% (39/110) and 49% (54/110), respectively. The specific cumulative LBR at the first ICSI-IVF cycle in the first-line surgery group compared with the first-line ART was, respectively, 32.7% versus 13.0%; at the second cycle, 58.9% versus 24.8%; and at the third cycle, 70.6% versus 54.9%. The cumulative LBRs were significantly higher for women who underwent first-line surgery followed by ART compared with first-line ART in the subset of women with good prognosis (age \leq 35 years and AMH \geq 2 ng/mL and no adenomyosis) and women with AMH serum level $<$ 2 ng/mL.

Conclusion(s): First-line surgery may be a good option for women with colorectal endometriosis-associated infertility. (Fertil Steril® 2017; ■ : ■ – ■. ©2017 by American Society for Reproductive Medicine.)

Key Words: Colorectal endometriosis, infertility, propensity score (PS) matching (PSM), ART, surgery

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Article original

La résection de l'endométriose profonde sans atteinte digestive améliore-t-elle les résultats de la fécondation in vitro ? Une étude retrospective



Deep infiltrative endometriosis without digestive involvement, what is the impact of surgery on in vitro fertilization outcomes? A retrospective study

L. Mounsambote^a, J. Cohen^{a,b,*}, S. Bendifallah^a, E. Mathieu d'Argent^a, L. Selleret^a,
N. Chabbert-Bufferet^{a,b}, M. Ballester^{a,b}, J.M. Antoine^a, E. Daraï^{a,b}

- **Results:**

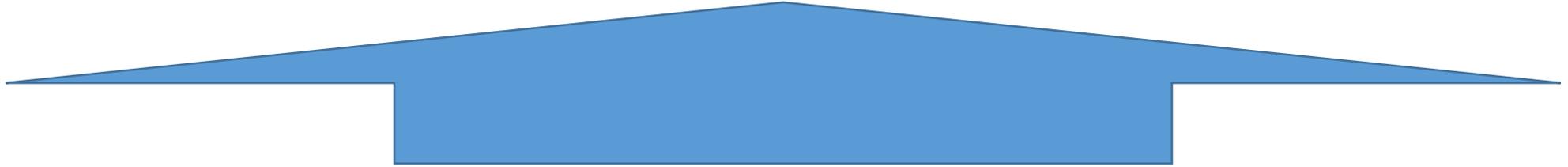
Included 72 patients: 35 in the "surgery" group and 37 in the "without surgery" group.

Women in the two groups were comparable in terms of baseline characteristics (age, body mass index, anti-Müllerian hormone, antral follicular count), endometriosis localizations and in vitro fertilization parameters.

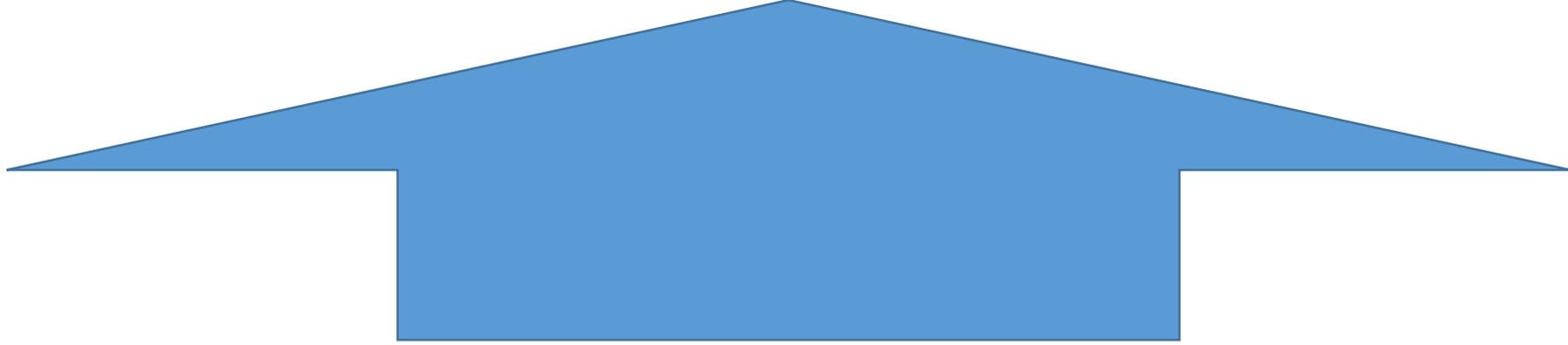
Cumulative pregnancy rates per patient were similar in both groups (40 % in the "surgery" group and 41 % in the "without surgery" group; $P=1$).

Clinical pregnancy rate per cycle were also comparable groups (24 % in the "surgery" group and 28 % in the "without surgery" group; $P=0.67$).

Age was lower in women that became pregnant ($P=0.01$) and there were more pregnancy obtained in women under 35 years.



*Study **did not provide** data on **surgical complications** but **mentioned IVF complications**, including **infection and hemorrhage** (no cases in the complete surgery group and 7.7% in the IVF with no previous surgery group).*



These Two studies did not provide any information regarding complications

Original Article

Extensive Excision of Deep Infiltrative Endometriosis before In Vitro Fertilization Significantly Improves Pregnancy Rates

Paulo H. M. Bianchi, MD*, Ricardo M. A. Pereira, MD, Alysson Zanatta, MD, Jose Roberto Alegretti, BSc, Eduardo L. A. Motta, PhD, and Paulo C. Serafini, PhD

From the Huntington Medicina Reprodutiva, São Paulo, Brazil (all authors).

ABSTRACT **Study Objective:** We sought to compare the outcomes of in vitro fertilization (IVF) treatments in women with infertility-associated deep infiltrative endometriosis (DIE) who underwent extensive laparoscopic excision of endometriosis before IVF with those who underwent IVF only.

Design: Prospective cohort study.

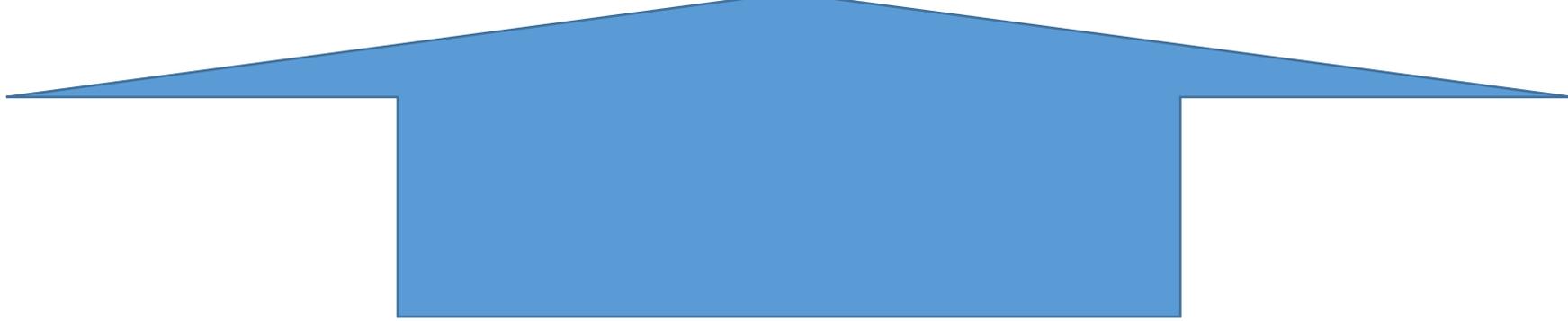
Setting: Infertility clinic and private hospital in São Paulo, Brazil.

Patients: A total of 179 infertile patients younger than 38 years had symptoms and/or signs of endometriosis and sonographic images suggestive of DIE.

Interventions: After thorough counseling, 179 women were invited to participate in a prospective cohort study with 2 treatment options: IVF without undergoing laparoscopic surgery (group A, n = 105) and extensive laparoscopic excision of DIE before IVF (group B, n = 64). Ten women were lost to follow-up. The IVF outcomes were compared between the 2 groups. **Measurements and Main Results:** In group B, patients had 5 ± 2 (mean \pm SD) DIE lesions excised during laparoscopy. Patient characteristics in groups A and B, respectively, were: age (32 ± 3 vs 32 ± 3 years, $p = .94$), infertility duration (29 ± 20 vs 27 ± 17 months, $p = .45$), day-3 serum follicle-stimulating hormone levels (5.6 ± 2.5 vs 5.9 ± 2.5 IU/L, $p = .50$), and previous IVF attempts (1 ± 1 vs 2 ± 1 , $p = .01$). The IVF outcomes differed between groups A and B, respectively, with regard to total dose of recombinant follicle-stimulating hormone required to accomplish ovulation induction (2380 ± 911 vs 2542 ± 1012 IU, $p = .01$), number of oocytes retrieved (10 ± 5 vs 9 ± 5 , $p = .04$), and pregnancy rates (24% vs 41% , $p = .004$), but not number of embryos transferred (3 ± 1 vs 3 ± 1 , $p = 1$). The odds ratio of achieving a pregnancy were 2.45 times greater in group B than in group A.

Conclusion: Extensive laparoscopic excision of DIE significantly improved IVF pregnancy rates of women with infertility-associated DIE. *Journal of Minimally Invasive Gynecology* (2009) 16, 174–180 © 2009 AAGL. All rights reserved.

- ***Interventions***: After thorough counseling, 179 women were invited to participate in a prospective cohort study with 2 treatment
- Options: IVF without undergoing laparoscopic surgery (**group A, n=105**) and extensive laparoscopic excision of DIE before IVF (**group B, n=64**). Ten women were lost to follow-up. The IVF outcomes were compared between the 2 groups.
- ***Measurements and Main Results***:
 - Patient characteristics in groups A and B, respectively, were: age (3263 vs 3263 years, p5.94), infertility duration (29620 vs 27617 months, p5.45), day-3 serum follicle-stimulating hormone levels (5.662.5 vs 5.962.5 IU/L, p5.50), and previous IVF attempts (161 vs 261, p5.01). The IVF outcomes differed between groups A and B, respectively, with regard to total dose of recombinant follicle-stimulating hormone required to accomplish ovulation induction (23806911 vs 254261012 IU, p5.01), number of oocytes retrieved (1065 vs 965, p5.04), and pregnancy rates (24% vs 41%, p5.004), but not number of embryos transferred (361 vs 361, p51).
 - ***The odds ratio of achieving a pregnancy were 2.45 times greater in group B than in group A.***



- *surgical procedures were carried out without major complications such as hemorrhage, surgical infection, anastomosis dehiscence, or bowel fistulas; laparotomy and blood transfusion were not required for any patient; and 1 patient had a pudendal nerve lesion caused by extensive dissection that required postoperative physical therapy for 6 months.*

Accepted Manuscript

Title: Factors associated with pregnancy after in vitro fertilization in infertile patients with posterior deep pelvic endometriosis: A retrospective study

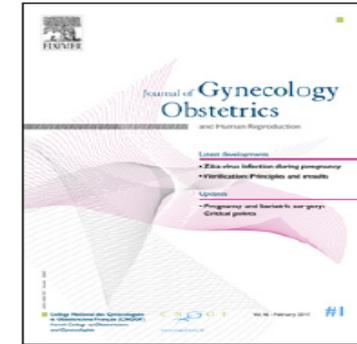
Author: C. Rubod A. Fouquet S. Bartolo J. Lepage A. Capelle
C. Lefebvre E. Kamus D. Dewailly P. Collinet

PII: S2468-7847(18)30153-3
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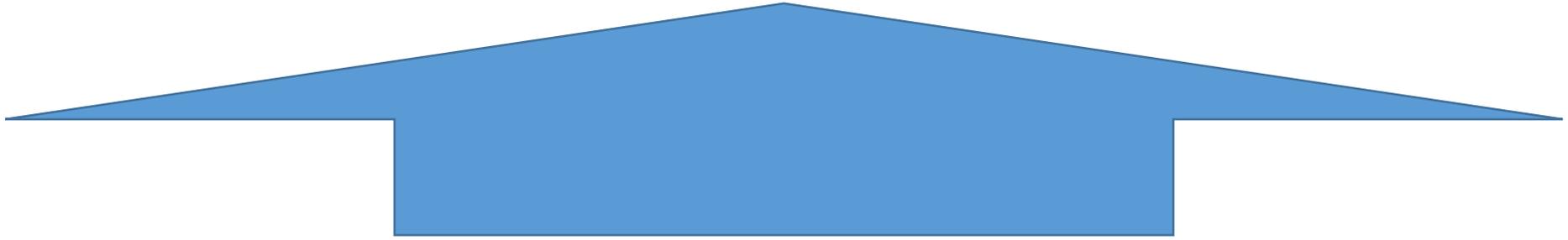


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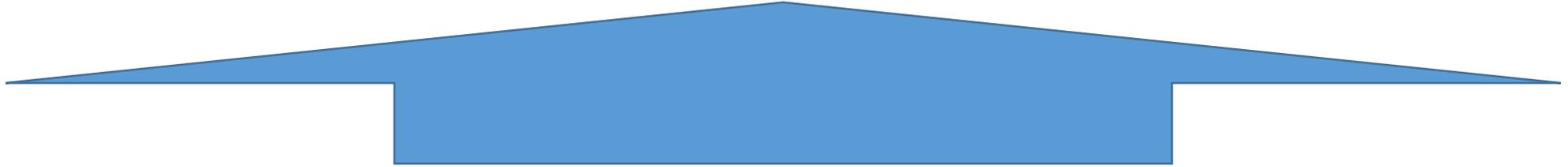
- ***Material and methods***: *230 women were included in this retrospective observational study*, between January 1th, 2007 and September 30th, 2013, at the University Hospital of Lille
- . A large set of variables were recorded and their association with the chance of pregnancy was analyzed by multivariate analysis (MVA), including *patients' features, endometriosis items, surgery procedures and IVF data*

- Results : ***After 2 IVF attempts***, 48.7% of the 230 women achieved a pregnancy, including 39.1% of ongoing pregnancies.
- ***Logistic regression analysis retained five variables significantly associated to the chance of pregnancy:***
- ***Oocyte retrieval number*** (OR= 0.468 (0.296-0.739) p=0.001)
- ***Age*** (OR=0.888 (0.811-0.974) p=0.011)
- ***Single embryo transfer number*** (OR=1.494 (1.036-2.153) p=0.031)
- ***Presence of a recto-uterine nodule*** (OR=0.454 (0.235-0.877) p=0.019)
- ***IVF technique*** (OR=0.509 (0.272-0.951) p=0.034).

- **Conclusion**: The presence of a recto uterine nodule is associated with a lower chance of pregnancy after IVF.
- **It has to be checked by prospective studies** whether the finding of a rectouterine nodule whose pejorative effect has not been reported so far should encourage to perform surgery before IVF in patients with deep endometriosis



- *The rate of surgical complications was comparable to literature data .*
- *The **IVF complications** in this series included **ovarian hyperstimulation syndrome (7%)**, **hemorrhage (1.3%)**, **infection (0.9%)**, and **thrust endometriosis (0.4%)**.*



*Study **did not provide** data on **surgical complications** but **mentioned IVF complications**, including **infection and hemorrhage** (no cases in the complete surgery group and 7.7% in the IVF with no previous surgery group).*

Cumulative pregnancy rate after ICSI-IVF in patients with colorectal endometriosis: results of a multicentre study

- **Prospective longitudinal multicentre study from January 2005 to June 2011.**
- Included 75 patients with colorectal endometriosis and proved infertility without prior surgery for deep infiltrating endometriosis. .
- **RESULTS:** *For CPR per patient analysis, the total number of cycles was 113 and the median number of cycles per patient was 1 (range: 1-3). In the whole population the CPR per patient after three ICSI-IVF cycles was 68.6%. The CPR for patients with or without associated adenomyosis was 19 and 82.4%, respectively (P= 0.01). In addition, a patient age over 35 years (P= 0.02) and anti-Mullerian hormone serum level under 2 ng/ml (P= 0.02) were associated with a decreased CPR per patient. At multivariable analysis, adenomyosis [HR = 0.34, 95% CI (0.12-0.99), P= 0.49] was associated with a decreased CPR.*
- **CONCLUSIONS:** Our data confirm that ICSI-IVF offers a high CPR per patient. However, determinant factors of CPR should be taken into account when informing couples of their options.

Laparoscopic treatment of bowel endometriosis in infertile women

2009 Jul;24(7):1619-25. doi: 10.1093/humrep/dep083. Epub 2009 Apr 8.

- **Three groups of infertile patients were included** in the study.
- *Group A (60 women) consisted of patients who underwent surgery for endometriosis with colorectal segmental resection.*
- *Group B, 40 patients with evidence of bowel endometriosis underwent endometriosis removal without bowel resection.*
- *Group C consisted of 55 women who underwent surgery for moderate or severe endometriosis with at least one endometrioma and deep infiltrating endometriosis but without bowel involvement.*
- The women were clinically evaluated before laparoscopy and then at 1 month, at 6 months and at each year up to 4 years after surgery.
- **Main outcome measures were surgical complications as well as post-operative pregnancy rate, time to conception and monthly fecundity rate.**

- **Results:** *Among the women with DIE and no bowel involvement* (N.=1295), no preoperative data on spontaneous pregnancy rate (PR) were available. *The postoperative spontaneous PR rate in these women was 50.5% (95% Confidence Interval [CI] =46.8-54.1) and overall PR (spontaneous pregnancies and after MAR) was 68.3% (95% CI=64.9-71.7).* No evaluation of fertility outcome according to locations of DIE was feasible.
- *For women with DIE with bowel involvement without surgical management (N.=115), PR after MAR was 29%; 95% CI=20.7-37.4* *For those with bowel involvement who were surgically managed (N.=1320), postoperative spontaneous PR was 28.6% (95% CI=25-32.3) and overall postoperative PR was 46.9% (95% CI=42.9-50.9)*

- **Results:** *The monthly fecundity rates (MFR) in groups A, B and C were 2.3, 0.84 and 3.95%, respectively. The difference in the MFR between groups was significant ($P < 0.05$).*
- **Conclusions:** *The presence of bowel infiltration by endometriosis seems to negatively influence the reproductive outcome in women with endometriosis-associated infertility. The complete removal of endometriosis with bowel segmental resection seems to offer better results in terms of post-operative fertility.*

Colorectal endometriosis and fertility

2017 Feb;209:86-94

- **Objective:** The goal of this review was to assess the impact of colorectal endometriosis on spontaneous fertility and the potential benefit of Medically Assisted Reproduction (MAR) (in vitro fertilization and intrauterine insemination) and surgery on fertility outcomes.
- **Results:** Spontaneous pregnancy rate (PR) in patients undergoing resection of DIE but leaving in situ colorectal endometriosis was 26.5% (95% CI=14-39). PR after MAR was 27.4% (95% CI=19-35) and the overall PR was 37.9% (95% CI=29-37).
- After colorectal surgery, among the 855 patients with and without proved infertility, the spontaneous PR was 31.4% (95% CI=28-34) without difference between the groups. PR after MAR was 19.8% (95% CI=17-22). PR after MAR in patients with and without proved infertility was 21.4% (95% CI=18-25) and 15.5% (95% CI=11-20), respectively. *The overall PR after colorectal surgery was 51.1% (95% CI=48-54).*



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Prior colorectal surgery for endometriosis-associated infertility improves ICSI-IVF outcomes: results from two expert centres

Marcos Ballester^{a,b,c,1,*}, Horace Roman^{d,1}, Emmanuelle Mathieu^{a,b}, Salma Touleimat^d,
Jeremy Belghiti^{a,b}, Emile Daraï^{a,b,c}

^a Department of Obstetrics and Gynecology, Tenon University Hospital, Assistance Publique Hôpitaux de Paris, Paris, France

^b GRC-6 UPMC: Centre Expert en Endométriose (C3E), Université Pierre et Marie Curie, Paris, France

^c Unité INSERM UMR_S 938, Université Pierre et Marie Curie, Paris, France

^d Department of Obstetrics and Gynecology, Rouen University Hospital, Rouen, France

- ***Results:***

- The median number of ICSI-IVF cycles per patient was one (range: 1–4). Of the 60 women, 36 became pregnant (i.e., overall pregnancy rate = 60%). The CPR was 41.7% after one ICSI-IVF cycle, 65% after two ICSI-IVF cycles and 78.1% after three ICSI-IVF cycles .
- ***A decreased CPR was observed for women who required segmental colorectal resection compared to those who underwent rectal shaving or full thickness disc excision ($p = 0.04$). A trend for a decreased CPR was observed for women who received a first ICSI-IVF cycle more than 18 months following surgery ($p = 0.07$). Among the nine women with prior ICSI-IVF failure, five (55.5%) became pregnant after surgery.***

High postoperative fertility rate following surgical management of colorectal endometriosis

Horace Roman^{1,*}, Isabella Chanavaz-Lacheray¹, Marcos Ballester^{2,3,4}, Sofiane Bendifallah^{2,3,4}, Salma Touleimat¹, Jean-Jacques Tuech⁵, Marilena Farella¹, and Benjamin Merlot⁶

¹Expert Center in the Diagnosis and Multidisciplinary Management of Endometriosis, Rouen University Hospital, 76031 Rouen, France

²Department of Obstetrics and Gynecology, Tenon University Hospital, Assistance Publique Hôpitaux de Paris, Paris, France ³GRC-6 UPMC: Centre Expert en Endométriase (C3E), Université Pierre et Marie Curie, Paris, France ⁴Unité INSERM UMR_S 938, Université Pierre et Marie Curie, 75020 Paris, France ⁵Department of Surgery, Rouen University Hospital, 76031 Rouen, France ⁶Clinique Tivoli-Ducos, 33000 Bordeaux, France

*Correspondence address. Clinique Gynécologique et Obstétricale, CHU «Charles Nicolle», 1 rue de Germont, 76031 Rouen, France. Tel: +33-232-888-754; Fax: +33-235-981-149; E-mail: horace.roman@gmail.com

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MAIN RESULTS AND THE ROLE OF CHANCE

Among **the 55 patients** enrolled at Rouen University Hospital, **25 had conservative and 30 had radical surgery**, and their postoperative follow-up varied from **50 to 79 months**.

- **23** of whom had unsuccessfully attempted to conceive for more than 12 months before surgery (**63%**).
- **At the end of follow-up, 29 patients achieved pregnancy (81%), and natural conception was recorded in 17 of them (59% of conceptions).**

- *Can laparoscopic removal of deep infiltrating endometriosis lesions before frozen embryo transfer cycle improve pregnancy outcomes in recurrent implantation failure patients?*

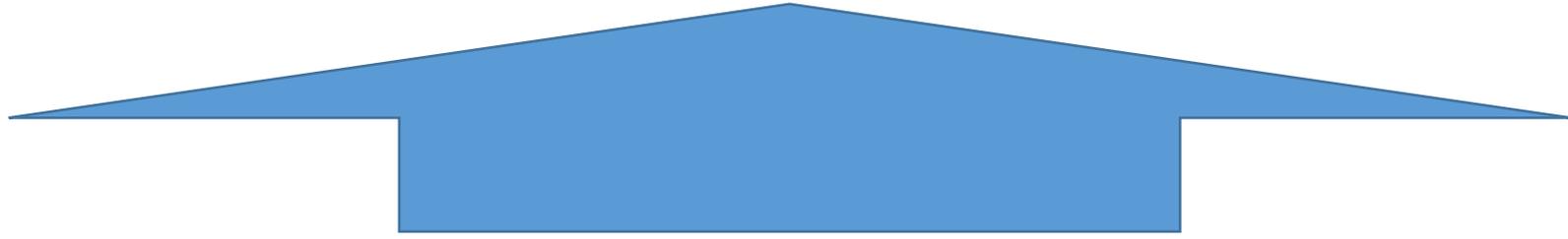
- **Soheila Arefi ^{1#}, Khadijeh Shadjoo ^{1#}, Mina Ataei ^{1,2}, Arash Mohazzab ^{1,3}, Roya Padmehr ^{1*}**

- ¹ Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran.

- ² Department of Obstetrics and Gynecology, Social Determinants of Health, Research Center, School of Medical Sciences, Alborz University of Medical Sciences, Karaj, Iran.

- ³ Department of Epidemiology, School of Public Health, Iran University of Medical Sciences, Tehran, Iran

- #The authors equally contributed to this work.



- **Methods:** this ambispective cohort study was performed on endometriosis patients with history of RIF who attended Avicenna Infertility Clinic, Iran from April 2018 to March 2021.
- *A total of 121 patients'* medical records were evaluated and the patients were divided into *two groups including endometriosis and RIF patients who underwent laparoscopic surgery for endometriosis treatment before FET cycle (Case group) and endometriosis and RIF patients who chose not to undergo a laparoscopic surgery for endometriosis treatment (Control group).*
- Follow-up interviews with outpatients were conducted to gather pregnancy outcomes.

- **Results:** *results showed that laparoscopic removal of endometriotic tissues 4-6 months prior to FET cycles could increase ongoing pregnancy and live birth rates in RIF patients suffering from stage III–IV and DIE.*
- **Subgroup analysis indicated that pregnancy outcomes in women with Anti-Müllerian hormone (AMH) <0.7 ng/ml were not affected by laparoscopic surgery before FET cycle.**

Endometriosis-associated infertility: surgery and IVF, a comprehensive therapeutic approach

Pedro N Barri *, Buenaventura Coroleu, Rosa Tur, Pedro N Barri-Soldevila, Ignacio Rodríguez

Service of Reproductive Medicine, Department of Obstetrics, Gynecology and Reproduction, Institut Universitari Dexeus, Gran Via Carles III 71–75, 08028 Barcelona, Spain

* Corresponding author. E-mail address: pbarri@dexeus.com (PN Barri).



Dr Pedro N Barri was born in Barcelona in 1949. He graduated from the Faculty of Medicine in Barcelona in 1971 and completed his doctorate in 1993 with a thesis entitled “Respuesta Anómala a la Estimulación de la Maduración Folicular en Fecundación In Vitro” with qualification Cum Laude. He is Director of the Department of Obstetrics, Gynaecology and Reproductive Medicine at USP Institut Universitari Dexeus, Honorary President of the Spanish Fertility Society, Honorary member of the Argentina Society of Sterility and Fertility, emeritus member of the Executive Committee of the ISGE since 1998, member of the French Society of Sterility and member of the ASRM.

- *This observational study looked at the reproductive outcome achieved after treating a group of 825 patients aged between 20 and 40 years with endometriosis-associated infertility during the period 2001–2008*
- *The combined strategy of endoscopic surgery and subsequent IVF led to a total of 318 pregnancies, which represents a combined clinical pregnancy rate of 65.8%. .*

**The effects of other factors in
endometriotic patients with infertility**

- It is difficult to establish the specific contribution of DIE and its removal on IVF results because DIE does not usually appear as an isolated condition. *DIE is frequently associated with OMAs and adenomyosis . DIE may have a negative impact on IVF outcomes when associated with OMA.*

The impact of endometrioma on in vitro fertilisation/intra-cytoplasmic injection IVF/ICSI reproductive outcomes: a systematic review and meta-analysis

Sallwa M. Alshehre^{1,3}  · Brenda F. Narice¹ · Mark A. Fenwick¹ · Mostafa Metwally²

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Abstract

Background Assisted reproductive technologies (ART) such as in vitro fertilisation (IVF) and intra-cytoplasmic sperm injection (ICSI) are often used to aid fertility in women with endometrioma; however, the implications of endometrioma on ART are unresolved.

Objective To determine the effect of endometrioma on reproductive outcomes in women undergoing IVF or ICSI.

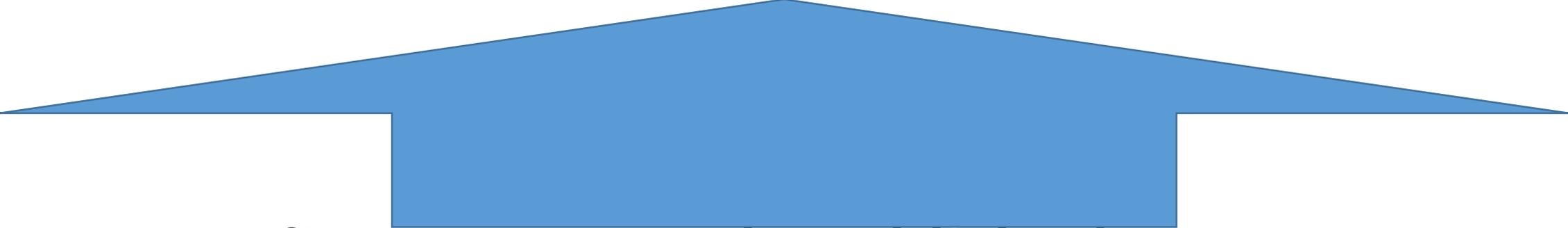
Methods A systematic review and meta-analysis was conducted to identify articles examining women who had endometrioma and had undergone IVF or ICSI. Electronic searches were performed in PubMed, BIOSIS and MEDLINE up to September 2019. The primary outcome was live birth rate (LBR). Secondary outcomes included clinical pregnancy rate (CPR), implantation rate (IR), number of oocytes retrieved, number of metaphase II (MII) oocytes retrieved, number of embryos and top-quality embryos and the duration of gonadotrophin stimulation and dose.

Results Eight studies were included. Where significant heterogeneity between studies was identified, a random-effects model was used. The number of oocytes (weighted means difference; WMD-2.25; 95% CI 3.43 to - 1.06, $p=0.0002$) and the number of MII oocytes retrieved (WMD-4.64; 95% CI 5.65 to - 3.63, $p<0.00001$) were significantly lower in women with endometrioma versus controls. All other outcomes, including gonadotrophin dose and duration, the total number of embryos, high-quality embryos, CPR, IR and LBR were similar in women with and without endometrioma.

Conclusion Even though women with endometriomas had a reduced number of oocytes and MII oocytes retrieved when compared to women without, no other differences in reproductive outcomes were identified. This implies that IVF/ICSI is a beneficial ART approach for women with endometrioma.

Keywords Endometrioma · IVF/ICSI · Reproductive outcomes · Oocyte · Fertility

- The number of oocytes (weighted means difference; WMD-2.25; 95% CI 3.43 to - 1.06, $p = 0.0002$) and the number of MII oocytes retrieved (WMD-4.64; 95% CI 5.65 to - 3.63, $p < 0.00001$) were significantly lower in women with endometrioma versus controls.
- All other outcomes, including gonadotrophin dose and duration, the total number of embryos, high-quality embryos, CPR, IR and LBR were similar in women with and without endometrioma.
- **Conclusion Even though women with endometriomas had a reduced number of oocytes and MII oocytes retrieved when compared to women without, no other differences in reproductive outcomes were identified. This implies that IVF/ICSI is a beneficial ART approach for women with endometrioma.**

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- **According to a recently published meta-analysis, women with OMA undergoing IVF had similar reproductive outcomes compared with those without OMA [33,34], and surgical treatment of OMA did not affect the IVF outcome compared with those who did not receive OMA surgery.**

- **The presence of concomitant adenomyosis or hydrosalpinx has also been associated with a detrimental effect on IVF outcomes (5,36,37)**

Take home message

- *Surgery of DIE lesions can be often technically difficult and is associated with major and minor complications, especially in cases with colorectal involvement: hemorrhage, infections, laparo conversion, fistula, and bladder and bowel dysfunction [41–44].*
- *Studies included in the meta analysis provide few data on safety, but they did not report major complications, perhaps because the surgeries were performed by experienced surgical teams, which is associated with lower incidence of postoperative complications[45–47].*

- ***Not performing a surgery*** is not free of risks, and patients with ***untreated bowel DIE*** have a risk of complications during IVF and the subsequent pregnancy [48–51].
- **Postponing the surgery** may also be related to higher morbidity because of ***the progression of deep infiltrating rectosigmoid nodules, particularly during periods without amenorrhea*** [52].
- ***The benefits of surgery would not be limited to fertility improvement*** because it is associated with a **decrease in symptoms and recommended for symptom control according to current guidelines** [2–4,53].

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