



Contents lists available at ScienceDirect

Gynecology and Minimally Invasive Therapy

journal homepage: www.e-gmit.com

Original article

Effect of different ectopic pregnancy treatments on cryopreserved embryo transfer outcomes: A retrospective cohort study

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ARTICLE INFO

Article history:

Received 27 June 2016

Received in revised form

2 January 2017

Accepted 3 January 2017

Available online xxx

Keywords:

cohort study

cryopreserved embryo transfer

ectopic pregnancy

in vitro fertilization

ABSTRACT

Objective: To evaluate the effects of different treatment methods for previous ectopic pregnancies (EP) on cryopreserved embryo transfer (CET) outcomes.**Materials and Methods:** This was a retrospective cohort study. Patients with EP histories were divided into four groups based on their previous EP treatments: Group 1—unilateral tubal removal; Group 2—bilateral tubal removal or unilateral tubal removal with contralateral tubal ligation; Group 3—conservative surgery group; and Group 4—conservative medication group. A total of 1333 women with previous histories of being admitted to the hospital for CET treatment were consecutively enrolled between January 2009 and December 2014.**Results:** Patients who underwent bilateral tubal ligation or removal had a lower miscarriage rate [8.88% vs. 3.46%, $p = 0.006$, odds ratio = 2.718, 95% confidence interval (CI) = 1.301–5.677] than those who underwent unilateral tubal removal. No significant difference was observed in the rate of EP after CET in the four groups in women with EP histories. ($p_1 = 0.258$, 95%CI = 0.113–1.836; $p_2 = 0.137$, 95%CI = 0.975–0.997; $p_3 = 0.314$, 95%CI = 0.987–1.001; $p_4 = 0.198$, 95%CI = 0.987–1.001). The groups were not different with regard to other pregnancy outcomes.**Conclusion:** There was no significant difference among EP treatment methods with regard to their impacts on CET outcomes in women with EP histories. Bilateral tubal ligation or removal surgery can decrease the miscarriage rate after CET.Copyright © 2017, The Asia-Pacific Association for Gynecologic Endoscopy and Minimally Invasive Therapy. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Ectopic pregnancy (EP) is a dangerous complication during early pregnancy. Pioneer studies have found that both previous EP and *in vitro* fertilization and embryo transfer (IVF-ET) are risk factors for EP recurrence.^{1–10} Thus, it can be speculated that women with EP histories who undergo IVF-ET have a higher risk of EP recurrence than other women. In general, there are three ways to cope with

EP—medical treatment by methotrexate (MTX) injection, radical surgery (salpingectomy), and conservative surgery (salpingostomy).¹¹ Many studies have investigated the influence of different EP treatment methods on pregnancy. Previous studies have reported that there was no significant difference in subsequent spontaneous fertility following different EP treatments.^{11,12} However, in two other studies, it was determined that conservative surgery is superior to radical surgery at preserving fertility.^{13,14} However, few studies have investigated the effects of the three main EP treatments on IVF-ET outcomes. According to current clinical knowledge, the cryopreserved embryo transfer (CET) cycle can significantly decrease the EP rate in IVF-ET.^{7,10,15,16} In this study, we discuss the effect of different treatment methods on the recurrence risk of EP in CET cycles.

Conflicts of interest: We declare that there are no conflicts of interest.

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Materials and methods

Patients

This retrospective cohort study was performed at the Center for Reproduction, Shandong University, Jinan, China. Our analysis of the data was approved by the Institutional Review Board of Shandong University. A total of 1333 women with previous histories of being admitted to the hospital for CET treatment were consecutively enrolled between January 2009 and December 2014. The method for identifying patients and assigning groups are shown in Figure 1. The authors already had access to identifying information during data collection.

All embryos were transferred in autologous cycles, and all outcomes were derived from the first CET cycle. We categorized the women into four groups based on the treatment methods used and whether the connection between the fallopian tubes and uterus had been severed. The women in Group 1 underwent unilateral removal surgery, and the women in Group 2 underwent bilateral tubal removal or unilateral tubal removal with contralateral tubal ligation. These women received ligation/removal of the contralateral tube because of a ruptured tubal ectopic pregnancy or serious adhesion and hydronephrosis. The women in Group 3 underwent conservative surgery (salpingostomy), and the women in Group 4 underwent conservative medical treatment with MTX and/or other drugs, such as Chinese herbal medicine and mifepristone, without any abdominal surgery. The outcome rates, including ectopic pregnancy rate, clinical pregnancy rate, delivery rate, miscarriage rate, implantation rate, and ongoing pregnancy rate, were calculated according to the methods described in our former study.¹⁷

Because patients in Groups 1, 3, and 4 had at least one fallopian tube, we compared pregnancy outcomes among them and compared data from Groups 1 and 2 separately.

The exclusion criteria were as follows: (1) the previous EP did not result from a natural pregnancy; (2) repeated implantation failure (underwent more than 3 cycles but did not become pregnant); (3) oocyte donor treatment cycles; and (4) the presence of other diseases, such as chromosome abnormalities, malignant intracavitary lesions, and a history of myomectomy. The baseline characteristics of the women studied are shown in Table 1.

Statistical analysis

Statistical analysis was conducted using SPSS version 19.0 (SPSS Inc., Chicago, IL, USA). The normally distributed data were expressed as mean \pm standard deviation. The categorical data and the quantitative data were analyzed by χ^2 tests and *t* tests, respectively. A *p* value < 0.05 was considered statistically significant. We used Cox regression to calculate the odds ratios (ORs) and 95% confidence intervals (CI) to investigate the associations between the treatment types. Additional factors that would influence pregnancy outcomes, including age, body mass index, polycystic ovarian syndrome, mycoplasma infection, tuberculosis infection, untreated hydrosalpinx, endometrium thickness, and endometriosis, were also evaluated. In order to evaluate the results from different groups, we defined the statistical outcomes of Group 1 versus Group 3 as *p*₁, Group 3 versus Group 4 as *p*₂, Group 1 versus Group 4 as *p*₃, and Group 1 versus Group 2 as *p*₄.

Ethics statement

This study was a retrospective analysis of clinical practice outcomes, and our analysis of the data was approved by the Institutional Review Board of Shandong University. We obtained informed consent from the patients before they participated in a clinical study or experiment.

Results

Unilateral tubal removal was performed in 473 women (35.48%), bilateral tubal removal or unilateral tubal removal with contralateral tubal ligation was performed in 260 women (19.50%), conservative surgery was performed in 435 women (32.63%), and conservative medication was administered to 159 women (11.93%). The baseline data are shown in Table 2.

Among the 1333 women who attempted to conceive again, 831 (62.34%) were clinical pregnant after CET cycles. Of these pregnancies, 9 (1.08%) were EPs, 690 (83.03%) were delivered (term and preterm births), and 98 (11.79%) were miscarried. The pregnancy outcomes in the four groups are as follows.

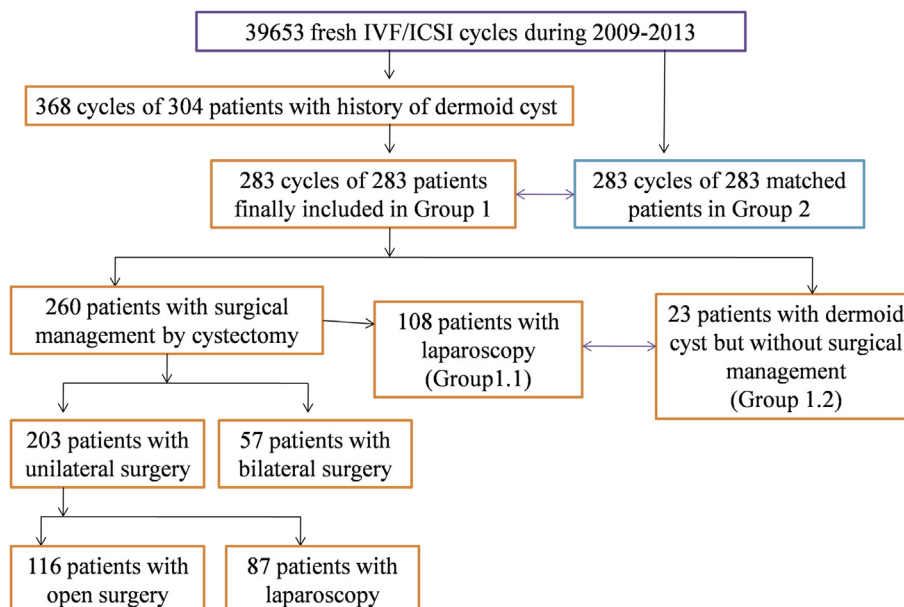


Figure 1. Database searching pathway and group divisions of women with ectopic pregnancy histories. CET = cryopreserved embryo transfer.

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