



Laparoscopic management of recurrent ectopic pregnancy: A retrospective cohort study describing 10-years of experience in a tertiary care hospital



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ABSTRACT

Objective: Recurrent ectopic pregnancy (REP) is rare, but can have severe consequences for patients. The aim of this study was to report outcomes of laparoscopic management of REP in our center.

Methods: Retrospective cohort study including REP treated surgically at a single, tertiary-care academic medical center between 2009 and 2018. All patients undergoing laparoscopic salpingostomy or salpingectomy were included. Patients were then followed up to monitor outcomes of future reproductive events.

Results: Of 41 eligible patients, 14 suffered from ipsilateral recurrence including 5 cases of tubal stump pregnancy. In the other 27 cases, the REP occurred in the contralateral tube that was previously unaffected. All patients with ipsilateral recurrence underwent salpingectomy. In patients with contralateral recurrence, salpingectomy was carried out in 21 patients (77.8%) and salpingostomy in 6 patients (22.2%). 32 patients (78%) subsequently sought to conceive either spontaneously or by in vitro fertilization. The subsequent live birth rates were 51.8% (14/27) in the salpingectomy group and 60.0% (3/5) in the salpingostomy group.

Conclusion: Where trained laparoscopists and adequate facilities are available, it is possible to achieve acceptable reproductive outcomes after REP irrespective of the surgical approach.

1. Introduction

Ectopic pregnancy (EP) account for ~2% of all pregnancies¹ and 95% of these embed in the fallopian tube.² In recent years, EPs have become more common because of tubal obstruction; this has largely been due to increasing rates of sexually transmitted diseases such as chlamydia, and advances in assisted reproductive technology.^{3,4}

Surgical treatment for ectopic pregnancy aims to provide life-saving intervention and, where possible, preserve fertility. Current treatment options include a radical (salpingectomy) and more conservative approach (typically salpingostomy).⁵ Salpingectomy is the treatment of choice if the fallopian tube is extensively diseased or damaged. With advancements in transvaginal sonography and increasingly sensitive β -human chorionic gonadotropin (β -hCG) assays, it has become

increasingly common to diagnose EP at an earlier gestation age (before rupture occurs). For women who wish to preserve fertility, salpingostomy, therefore, has gradually replaced salpingectomy as the surgical procedure of choice for EP.

A history of EP has long been considered as a major risk factor for subsequent recurrence of EP.^{6,7} If a woman has been previously treated for EP, she has a 9- to 17-fold increase in the risk of a recurrent ectopic pregnancy (REP).⁷

To date, little is known about the association between the approach to management of REP and subsequent outcomes of fertility treatment. This study aimed to fill this knowledge gap by describing our experience of laparoscopic management of REP in our center in a retrospective cohort study. These data will enable improved counseling of women who suffer REP in the future.

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2. Methods and materials

This retrospective cohort study included all cases of REP managed by laparoscopic surgery at the Minimally Invasive Surgery Unit, Peking University People's Hospital, China between 1 January 2009 and 31 December 2018. Approval was obtained from the Research Ethics Committee of Peking University People's Hospital. Institutional review board approval was obtained to extract anonymized data from patient medical records. Given the retrospective design, patient-level consent was not required.

It is standard practice in our center to video record all cases of laparoscopic management of REP as part of medical record keeping. During this study, the status of the fallopian tube was evaluated by reviewing the operation notes or video recording of the previous surgical procedure and/or during the second laparoscopic procedure. All REPs were defined at the point of laparoscopic visualization. Further details of the included cases were obtained from clinical records including the mode of presentation, diagnosis, surgical details, and treatment outcomes.

2.1. Surgical treatment (salpingostomy or salpingectomy)

The technique for laparoscopic salpingostomy performed here has been previously described.⁸ After injecting 5 ml vasopressin (5 IU diluted in 20 mL saline) into the mesosalpinx, a 10–15 mm linear incision was performed along the most prominent, antimesial border over the site of the ectopic gestation with a fine needle electrode. The gestational sac was removed *en bloc* and the specimen was placed in a bag and removed intact through an ancillary port. Next, an irrigation probe was used to flush the tube and residual clots. Diluted methotrexate (MTX 20 mg + NS10 ml) is injected into the defect of myometrium to prevent any further growth. Hemostasis was assured and the salpingostomy edges were closed in a single-layer using a continuous 5-0 polyglactin suture. The presence of trophoblastic tissue was verified macroscopically in saline before being sent for pathological confirmatory testing. The pelvis was copiously irrigated with saline at the end of each procedure before being suctioned to dryness. All surgeries were performed by the same physician (J. G.), the director of the department of Reproductive Surgery in our center. Salpingectomy was performed by stepwise dissection of the mesosalpinx followed by cutting along the mesosalpinx using scissors. The incision was closed using a 6-0 prolene suture. The abdominal cavity and the pouch of Douglas were rinsed with saline to prevent subsequent adhesion formation.

Patients were typically hospitalized for 2-days post-surgery and discharged. The serum β -hCG levels were monitored weekly until the levels reached below 5 IU/L.

2.2. Follow-up

Patients were contacted by telephone every 6 months after discharge to follow-up on their fertility and obstetric treatment and outcomes. All patients in this study were followed up for at least 18 months to evaluate whether they achieved spontaneous reproduction or any pregnancies occurring after *in-vitro* fertilization (IVF). The primary outcome measure was the occurrence of a live birth deliveries following spontaneous conception or IVF treatment, for patients in whom a spontaneous pregnancy did not occur.

3. Results

3.1. Patients characteristics

A total of 237 patients with a diagnosis of ectopic pregnancy during the study period were retrieved from our electronic database. Of these, 48 (20.3%) had a recurrent ectopic pregnancy, which was managed laparoscopically and included in the study cohort. All 48 cases were confirmed on histopathology. The cohort included 7 patients who had

had two previous ectopic pregnancies (three total, Fig. 1). Thirty-nine (81.3%) of these women conceived spontaneously, and 9 (18.7%) ectopic pregnancies occurred following IVF treatment.

Table 1 shows the baseline characteristics of included patients. The median age at first operation was 27 years (range 20–38 years), and 32 years at the time of second operation (range 24–43 years). There were 21 nulliparous women (43.8%) and 25 multiparous women (52.1%) in the cohort; the parity of two patients was unknown. Mean gestational age at the time of laparoscopy was 6.6 ± 0.9 weeks. Transvaginal ultrasound revealed the EP as a non-cystic adnexal mass in 91.7% of cases. Preoperative serum β -hCG concentration in patients that underwent salpingectomy and salpingostomy was 2292 IU/L and 2343 IU/L respectively. Five of 48 (10.4%) patients had a ruptured ectopic pregnancy at the time of surgery. The remaining 43 (89.6%) cases had intact ectopic pregnancy.

Among the 41 women with a single previous ectopic pregnancy, during the first procedure, 21 patients underwent radical surgery (salpingectomy) and 21 a conservative approach (salpingostomy) (Fig. 1). 14 women had two ectopic pregnancies in the same tube including 5 cases in the ipsilateral tube remnant (Table 2). In the first surgery, 7 women underwent salpingectomy and the remaining 20 patients underwent salpingostomy. During the second operation, a salpingectomy was done for all these patients. In the final 5 cases, a partial salpingectomy was performed at the first operation. In the other 27 cases, the recurrent EP was found in the previously unaffected tube. In these patients with contralateral recurrence, laparoscopic salpingectomy was carried out in 21 patients, and salpingostomy in 6 patients (Table 2). All operations were successfully completed via laparoscopy without conversion to open surgery.

3.2. Subsequent fertility

The fertility outcomes of women with two episodes of EP are summarized in Table 3. Nine patients did not attempt to conceive again during the follow-up period. Of 32 (78%) women who attempted to conceive after a second EP, 17 (53.1%) patients obtained a live birth. Three of these patients conceived spontaneously and 14 following IVF. The live birth rates were 51.8% (14/27) in the salpingectomy group and in the 60.0% (3/5) in the salpingostomy group.

4. Discussion

Since the first data demonstrating the potential effectiveness of salpingostomy for treatment of EP, this approach has been compared with salpingectomy in several studies.⁹ EP is considered to reoccur more frequently after conservative management (salpingostomy) since implantation may occur in the repaired residual tube after surgery.¹⁰ However, other research has reported no significant difference in the recurrent EP rate after salpingostomy and salpingectomy.^{11–13} Many clinicians prefer a salpingectomy because the operation is typically easier to perform and requires less operating time than a salpingostomy. In the case of reproductive outcomes, it has been reported that salpingostomy may be associated with a lower rate of subsequent intrauterine pregnancy than salpingectomy.^{14,15} In cases of tubal pregnancies and where the opposing fallopian tube appears normal, it has also been reported that laparoscopic salpingectomy does not lower the incidence of post-operative intrauterine pregnancy, but may lower the risks of continuation of an ectopic pregnancy or recurrent ectopic pregnancy.⁵

It should be noted that this evidence relies on the effectiveness of these approaches to management of EP when the contralateral tube is healthy. Salpingectomy may therefore be preferable to salpingostomy where the contralateral tube is healthy, as it is associated with a lower rate of persistent trophoblast and subsequent recurrent ectopic pregnancy (10.3% vs.12.9%), whilst maintaining a similar intrauterine pregnancy rate.¹⁶

There are a number of studies comparing a conservative surgical

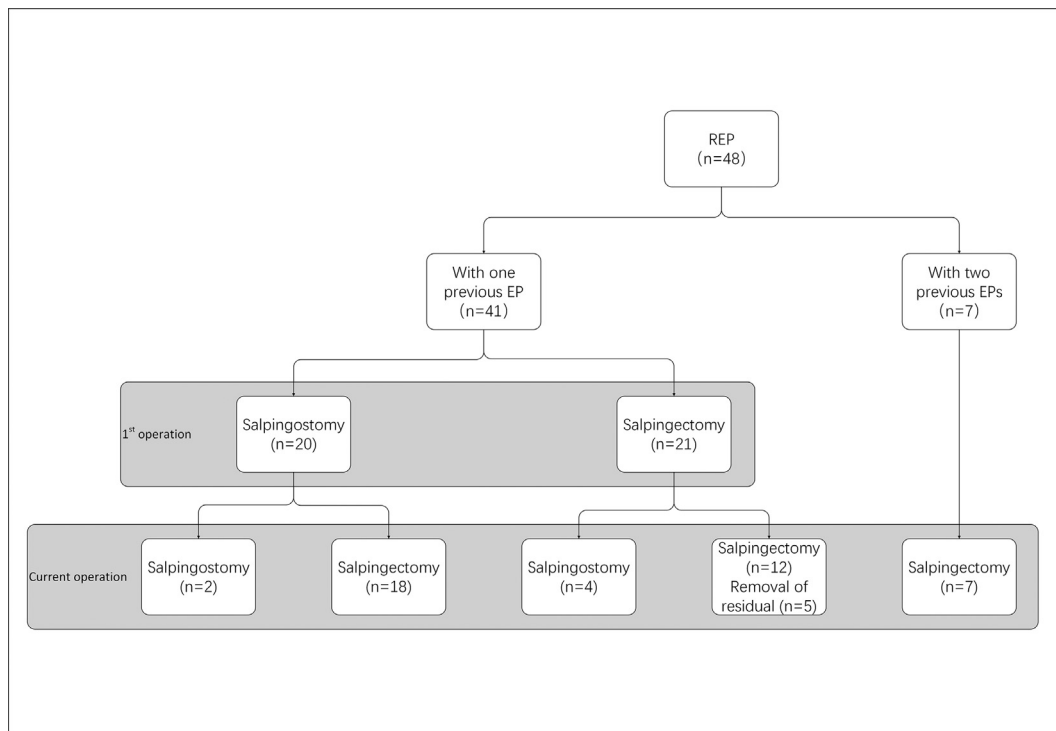


Fig. 1. Flow chart of patients selection

Table 1
Characteristics of women with recurrent ectopic pregnancies.

Variables	
Number of women	48
Median age (range), years	
1st operation	27 (20–38)
Current operation	32 (24–43)
Gestational weeks	6.6 ± 0.9
Parity, n (%)	
0	21 (43.8)
≥1	25 (52.1)
Missing	2 (4.2)
Conceived spontaneously, n (%)	39 (81.2)
Conceived via IVF, n (%)	9 (18.8)
Previous ectopic pregnancy, n	
1	41
2	7
Concentration of β-hCG, UI/L (mean)	2317
Detected by ultrasound, n (%)	44 (91.7)
Ruptured ectopic pregnancy, n (%)	5 (10.4)
Intact ectopic pregnancy, n (%)	43 (89.6)

IVF: in vitro fertilization.

approach (salpingostomy) with salpingectomy in women with tubal pregnancy and a healthy contralateral tube. In an open-label, randomized controlled trial, Mol et al.¹⁵ reported ongoing pregnancy rates of 56.2% and 60.7% in women undergoing salpingostomy and salpingectomy

Table 2
Clinical data of patients with two ectopic pregnancies (%).

Variables	
N	41
Previous ectopic pregnancy	
Ipsilateral/residual	14 (34.1)
Contralateral	27 (65.9)
Type of surgery	
Salpingectomy	35 (85.4)
Salpingostomy	6 (14.6)

Table 3
Reproductive outcomes of women that attempted to conceive after surgery.

	Salpingostomy (n = 6)	Salpingectomy (n = 35)	Total (n = 41 ^a)
Women attempted to conceive, n	5	27	32
Clinical pregnancy, n (%)	4 (80.0)	14 (51.8)	18 (56.3)
Spontaneous, n	1	2	3
IVF, n	3	12	15
Live birth, n (%)	3 (60.0)	14 (51.8)	17 (53.1)

^a Total number of women with recurrent ectopic pregnancies was 48, of which 7 with three ectopic pregnancies were excluded. IVF, *In vitro* fertilization.

respectively. Reproductive outcomes of REP in this study were comparable with previously published data, suggesting either surgical approach to REP is acceptable in an institution with trained laparoscopists and adequate facilities. Most studies have suggested that the choice of operation has little influence on subsequent fertility in women with an intact contralateral tube.¹⁷ But for patients with contralateral tubal pathology or a solitary tube, there is disagreement as to the optimal technique. In this study, it was therefore of particular interest to evaluate fertility outcomes in the 27 patients with repeat ectopic pregnancy for whom the contralateral fallopian tube was already affected by previous EP. 3 of 17 live births occurred after a second EP that was managed using a conservative laparoscopic approach.

Advance in the diagnosis and management of EPs has led to a shift in focus from saving the mother’s life to saving a woman’s fertility. A total of 41 women with two episodes of EPs were included in the present study; 20 of these resulted following salpingostomy and 21 after salpingectomy. There was no significant difference in preoperative baseline characteristics between the salpingostomy and salpingectomy groups.

Another important finding of this study is that we detected REP in ipsilateral fallopian tube remnant in 5 cases who had undergone salpingectomy for tubal pregnancy. In all of these cases, pelvic adhesions were observed around the uterine adnexa during the laparoscopy and salpingectomy of the fallopian tube remnant was performed in the second

operation. Ipsilateral ectopic pregnancy following salpingectomy is rare, with less than a dozen cases reported in the English-language literature over the last 10 years.¹⁸ Although rare, the possibility of EP after salpingectomy should be considered. During salpingectomy, we suggest that the fallopian tube be totally removed and the distal remnant firmly ligated to reduce remnant tubal pregnancies following ipsilateral partial salpingectomy.

4.1. Limitations

In our study, the numbers in each comparator group were too small to comment on the post-ectopic intrauterine pregnancy rates following salpingostomy or salpingectomy. In our clinical practice, we routinely counsel patients, and ask whether they have children and are likely to desire further pregnancies, describing the risk of recurrence. We are then guided by their wishes as to whether to remove the remaining tube.

Prior to the widespread implementation of IVF, salpingostomy was the only approach that could be used to conserve fertility in patients with contralateral disease or salpingectomy. Today, most of these cases are treated with laparoscopic salpingectomy and patients are then referred to an IVF program as desired. Based on our data, with adequate experience in laparoscopy and properly resourced operating rooms, most patients with REP can be treated successfully by laparoscopic salpingostomy, particularly for those with contralateral tubal pathology or a solitary tube. The patient should always be provided with accurate and reliable information on the risks of different treatment approaches and in this case, be reassured about the likely preservation of fertility during subsequent IVF cycles.

Conclusions

Prior to the widespread of IVF, the conservative procedure was the only one possible. Today, most of these cases are treated with laparoscopic salpingectomy and the patients are then referred to an IVF program. Bases on our observation, with adequate experience in laparoscopy, and with proper instruments, some if not all of the patients with REP can be treated successfully by laparoscopic salpingostomy, particular for those with contralateral tubal pathology or a solitary tube. The patient should also be provided with accurate and reliable information on risks of the different treatment approaches and be reassured about the preservation of prospective fertility in subsequent IVF cycles.

Declaration of competing interest

The authors declare that they have no conflicts of interest related to the publication of this article.

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