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Fallopian tube stripping forceps: a novel instrumental design for distal tubal pregnancy laparoscopy

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ABSTRACT

Objective: To compare a new method using fallopian tube stripping forceps (FTSF) for salpingostomy in laparoscopic tubal pregnancy management.
Study design: Comparative observational study. A total of 102 patients with ampullary tubal pregnancy were treated as follows: 56 patients (Group 1) underwent stripping by FTSF, and 46 patients (Group 2) underwent salpingostomy. The bleeding, operation time, persistent ectopic pregnancy (EP) rate, and the first reproductive performance were investigated.
Results: We found less intraoperative bleeding, shorter operation times, and lower rates of EP recurrence in Group 1 compared with Group 2. In contrast, we observed no significant differences in the persistent EP rate, the occurrences of spontaneous intrauterine pregnancy and miscarriage, and the rates of successful IVF between the two groups.
Conclusion: For distal tubal pregnancy with an ectopic mass ≤30 mm, laparoscopic fallopian tube stripping assisted by FTSF may be an easy, less-damaging, conservative operational modality with lower recurrent EP compared with salpingostomy for patients who desire future pregnancy.

Introduction

Ectopic pregnancy (EP) is the most common gynecological surgical emergency in the world and is increasing in incidence [1]. It is well known that tubal pregnancy (TP) constitutes 95% of all EPs, and distal TP, which includes ampullary and fimbrial pregnancy, is the most common form of TP, accounting for more than 75% [2]. Therefore, there is a need for the sound surgical management of distal pregnancy in these patients. An ideal surgical modality for TP may involve a conservative, relatively easy, less traumatic technique with a low recurrence of EP, low persistence of EP, and high incidence of future intrauterine pregnancy.

Laparoscopic salpingostomy has been found to be a safe and effective procedure [2] and is considered the most common conservative surgical treatment for TP to date. However, ciliary destruction from coagulation, adhesion around the tubal incision wound, and tubal fistula may occur after laparoscopic salpingostomy [3]. To protect the salpingeal mucosa, stripping out of the fallopian tube by squeezing with minimal tubal trauma may be a sound method theoretically, and this method is known as "tubal milking" for distal TP at laparotomy [4,5]. We had attempted this approach under laparoscopy using traditional tools such as grasping forceps; but an unsatisfactory success rate, tubal tearing, incomplete trophoblastic tissue removal, and persistent EP (PEP) were observed.

We then developed a novel laparoscopic tool called fallopian tube stripping forceps (FTSF). In distal TP with an ectopic mass ≤30 mm, which is the most common diameter of TP mass, we observed a highly successful stripping rate without tubal tearing. In this first clinical study, we analyzed the outcome of 56 patients with distal TP who underwent fallopian stripping by FTSF compared with that of 46 patients who underwent salpingostomy, to determine whether laparoscopic fallopian tube stripping by FTSF is a safe and effective treatment procedure for women with distal TP.

Materials and methods

A comparative observational study design was adopted. Between January 1, 2008, and June 31, 2010, patients with a diagnosis of TP hospitalized at the Obstetric and Gynecologic Hospital in Chongqing, China, were enrolled in this study.

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The Institutional Review Board of the hospital approved the study, and all participants provided written informed consent before enrollment. All of the patients preferred not to undergo salpingectomy. According to the inclusion criteria, transabdominal or transvaginal ultrasound imaging was performed on patients with EP, and the diagnosis was confirmed by HCG, the progesterone level, and ultrasonography. The exclusion criteria included the following: HCG > 10,000 mIU/ml, presence of fetal heart beat (FHB) (parameters unsuitable for successful conservative surgery and for achieving future pregnancy [6]), suspicion of ruptured TP, and women with a history of EP or who suffered from an additional gynecological disease, such as adenomyoma, genital malignant tumor, genital malformation, imperforation and sactosalpinx. All of the patients in this study were duly notified of the benefits, curative effects, potential risks, and uncertain fertility issues related to stripping by FTSF. A total of 84 patients who agreed to participate in this trial and undergo this new surgical procedure involving stripping by FTSF were placed in the FTSF group (Group 1). In contrast, the 64 patients who decided against stripping were placed in the salpingostomy group (Group 2) and underwent salpingostomy.

Of the 148 women diagnosed with EP, a total of 46 patients in the two groups (28 in Group 1 and 18 in Group 2) were excluded because of the following surgical findings: diameter of the hematosalpinx >30 mm (our previous research demonstrated a relatively high tubal tearing rate of approximately 25% with a diameter of the hematosalpinx >30 mm); factors interfering with the assessment of future pregnancy, including compact fallopian tube adhesion, fimbrial atresia, serious pelvic adhesion, and pelvic endometriosis; and non-ampullary pregnancy not suitable for stripping, such as isthmic TP and ovarian pregnancy. Two patients who suffered tubal rupture during stripping were switched to salpingostomy. The remaining 102 patients (56 in Group 1 and 46 in Group 2) entered the subsequent study. A chart depicting the two patient cohorts is provided in Fig. 1.

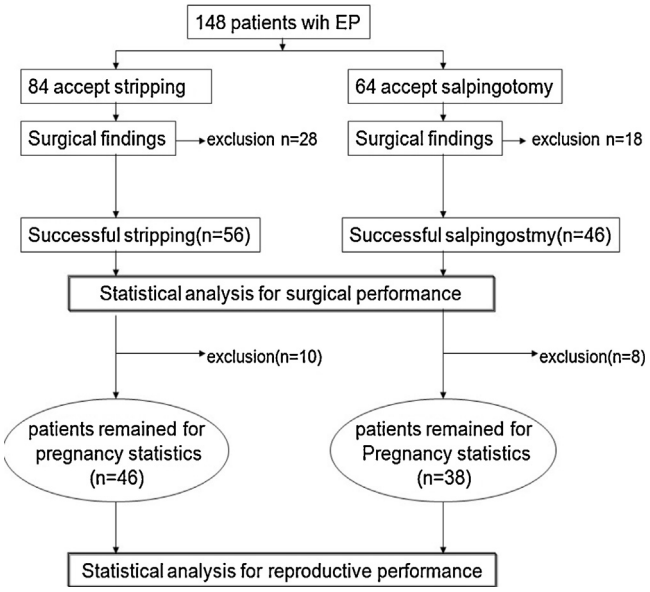

Fig. 1. Patient cohort chart: 148 patients were divided into 2 groups, 28 patients in Group 1, and 18 patients in Group 2 were excluded due to surgical findings. 56 in Group 1 and 46 in Group 2 were included in statistical analysis of surgical performance. After surgery, 10 patients in Group 1 and 8 patients in Group 2 were excluded for pregnancy not desired, failed stripping and lost in follow-up, the remaining women (46 in Group 1 and 38 in Group 2) were included in comparative reproductive performance evaluation following the respective procedure.

FTSF design

FTSF features a control clamp, a drive rod, and two hinged stripping clamp plates (Fig. 2). The latter are curved rigid clamping pieces with an inner circular arc in the middle of each piece. When the two clamp plates are closed, an ellipsoid forms, and the width of the space between the two plates is just as thick as a closed fallopian tube (2 layers of tubal wall) or a little wider (Fig. 3). The terminal portion of the two clamp plates is curved laterally, similar to a fish mouth. Using the FTSF design, trophoblast tissue can be extruded from the fallopian umbrella without any tubal tearing and other fallopian trauma.

Surgical procedures

Patients were placed in the low dorsolithotomy position, under general anesthesia with endotracheal intubation and continuous bladder drainage, Pneumoperitoneum was maintained at a pressure of 12 mm Hg. The three trocar positions were as follows: A 10-mm subumbilical port was used for the laparoscope. A 10-mm trocar was placed at the left lateral edge of the rectus abdominis muscle at the level of the umbilicus, and a 5-mm port was placed 2 cm from the left anterior superior iliac spine. Any prior hemorrhage present in the pelvic cavity was sucked out by a suction machine. In Group 1, the fallopian tube with the embryo was stripped from the isthmic to the fimbrial terminal end three to five times until the blood clots and the trophoblast tissue were completely aspirated from the fallopian tube (Fig. 4). In Group 2, salpingostomy was accomplished by the method of Fujishita et al. [3]. The blood loss during surgery was estimated by calculating the volume of the blood sucked out. A pathological examination was used to confirm the embryo tissues from all of the patients.

The patients were discharged on the morning of postoperative day 2, and their serum hCG levels were monitored on an outpatient

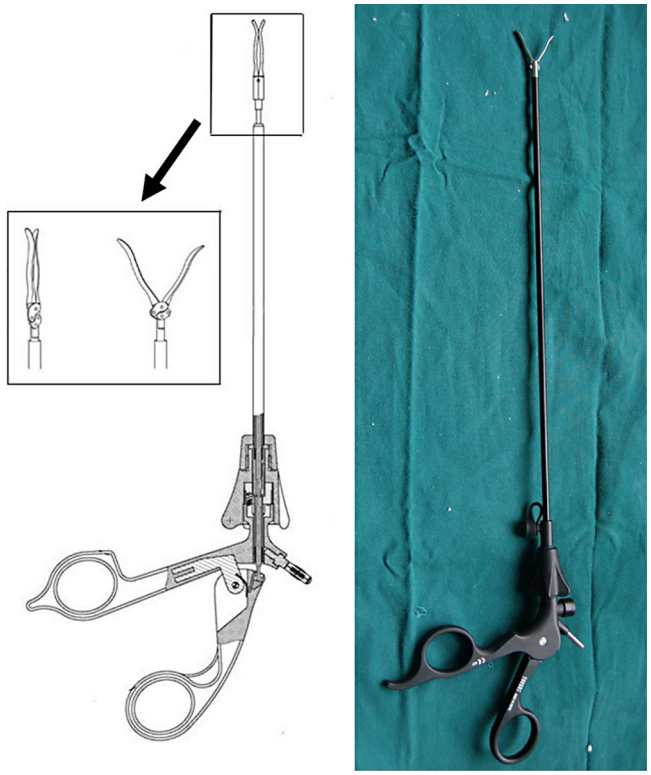

Fig. 2. The structure diagram of FTSF: stripping clamp plates are curved rigid clamping pieces. The fish mouth structure of the terminal can help to avoid the tubal tearing.