

Preliminary results of tubal surgery with pregnancy outcome

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Summary

Purpose of investigation: To assess the preliminary results of tubal surgery and its effect on pregnancy outcome. **Materials and Methods:** The study included 440 patients with unilateral or bilateral tubal disease as the only cause of the infertility. All patients undergoing a laparoscopy for infertility were studied in reproductive surgery centre. The fallopian tube was classified into class I-IV. The studied outcomes were live birth, ectopic pregnancy, and miscarriage. After 12 months, cumulative conception rate was calculated. **Results:** In the 440 patients, 172 patients with mild salpinx abnormality (class I) had a 34% cumulative pregnancy rate, 151 patients with moderate salpinx abnormality (class II) had a 16% cumulative pregnancy rate, and 77 patients with severe salpinx abnormality (class III) had a 10% cumulative pregnancy rate. No intrauterine pregnancies were observed in the severe group of 40 patients (class IV). **Conclusion:** Surgical laparoscopy is helpful for class I and II tubal abnormality, while it is not for class III and IV abnormalities.

Key words: Infertility; Laparoscopy; Pregnancy outcome.

Introduction

Of couples with infertility, 25% have complete or partial blockage of the fallopian tube [1]. Treatment of tubal infertility is an important and current problem. The standard modality of treatment of tubal factor infertility is either tubal surgery or in-vitro fertilization and embryo transfer (IVF-ET). Since the advent of IVF, the role of tubal surgery has diminished. However, in China, IVF-ET is not subsidized by the government health service. Therefore the cost of IVF is beyond the ability of most people to afford. Surgical laparoscopy costs only one fifth of IVF-ET and provides natural intrauterine pregnancy opportunity for tubal infertility. Because of the increasing prevalence of infertility and the cost-effectiveness of its treatment, surgical laparoscopy is widely performed in China. The American Fertility Society (AFS) score has been used widely in China for predicting pregnancy outcome and guiding infertility surgery. After finishing the first step of a hysterosalpingography check, the clinical management of tubal infertility remains confusing.

Salpingoscopy is an endoscopic technique that allows the direct visualization of the tubal mucosa. The status of the tubal mucosa is the best prognostic factor when evaluating patients with tubal infertility. The prognostic value of salpingoscopy during operative laparoscopy for tubal factor infertility in terms of reproductive outcome has been confirmed [2-4]. A prognostic classification system of the health of the fallopian tube based on salpingoscopy has previously been proposed [5]. However, salpingoscopy, performed during laparoscopy, has not reached wide

acceptance in China due the costly, non-user-friendly, dedicated instrumentation needed. Moreover, it is reported that direct visualization of the ampullary mucosa by salpingoscopy can allow the detection of intraluminal adhesions that place the patient at increased risk for a repeat ectopic pregnancy [6] and hydrosalpinx [7].

In this study, the authors evaluated fallopian tubal status by chromopertubation and AFS. The aim of the present study was to observe the effect of surgical intervention on pregnancy outcomes for different tubal statuses.

Materials and Methods

The study design was approved by the Medical Research Review Board of Women's Hospital (School of Medicine, Zhejiang University, Hangzhou, People's Republic of China; RRBNO: 20120009). The study included 440 infertile patients diagnosed by preoperative hysterosalpingography undergoing tubal surgery that were available for analysis between January 2012 and December 2012. Patients' characters are shown in Table 1. Inclusion criteria: infertility history was longer than one year; husband semen was normal; inpatient for tubal disease; no more than moderate endometriosis; normal uterus; normal ovarian function; with follow-up conditions. Exclusion criteria: infertility history was shorter than one year; husband semen was abnormal; abnormal uterus; moderate or severe endometriosis; ovarian dysfunction; without follow-up conditions. Patients signed the informed consent before operation. Doctors decided to retain or remove diseased fallopian tube according to the wishes of patients and AFS scores (Table 2). Fallopian tubal patency was tested by chromopertubation using methylene blue during operative laparoscopy. All primary infertilities had hysteroscopy performed during laparoscopy. Tubal surgery included pelvic fimbrioplasty,

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Table 1. — Comparison of patients' basal features and pregnancy outcome.

	Class I	Class II	Class III	Class IV	<i>p</i>
Number	172	151	77	40	>0.05
Age (years)	28.01±6.1	29.06±5.2	30.01±4.4	28.06±3.4	>0.05
Primary infertility	52	42	38	38	>0.05
Second infertility	68	75	72	55	>0.05
Duration of infertility (years)					
1—4	110	80	93	47	>0.05
5—9	6	23	30	19	
10—14	3	10	11		
≥15	0		1	7	
Endometriosis (mild)	80	62	20	10	>0.05
Husband normal semen parameter	168	145	68	40	>0.05
Tubal surgery					
Fimbrioplasty	128	77	6	2	
Salpingolysis	35	74	36	8	
Normal pelvic	9	9	6	1	
Single salpingectomy	0	0	27	9	
Bilateral salpingectomy	0	0	0	2	20
Pregnancy outcome					
Miscarriage	1	3	0	0	
Ectopic	0	0	0	1	
Full term	61	23	6	0	<0.05*

*With statistical difference.

salpingolysis, single salpingectomy, and bilateral salpingectomy. Tubal status was divided into class I-IV.

The cumulative pregnancy follow-up period was 12 months after surgery. All those who conceived were booked for antenatal care and delivery at the Women's hospital, School of Medicine, Zhejiang University.

Statistical analysis

The studied outcomes were live birth, ectopic pregnancy, and miscarriage. Statistical analysis was performed using SPSS Version 13.0 statistical package software. Results were analyzed with one-way ANOVA for categorical variables. Cumulative conception rate (CCR) was calculated with the use of Kaplan-Meier survival analysis. There was significant difference if *p* was less than 0.05.

Results

Patients' characters and pregnancy outcomes

According to the AFS score, 440 patients were divided into four groups: class I, II, III, and IV. As shown in Table 1, there were no statistical differences among the four groups in the basic characters, including: age, number in each group, primary infertility, second infertility, duration of infertility, husband sperm status, and endometriosis (*p* > 0.05). The authors did reconstructive surgery for all class I-II patients, retaining fallopian tube for class III-IV according to patients' desires. In the class I group, fimbrioplasty was the main surgical method, accounting for 74.4%. Salpingolysis accounted for 20.3%. The remaining nine patients were normal pelvic. In the class II group, fimbrioplasty and

Table 2. — Score-combination of chromopertubation and AFS.

		< 3cm	3.5 cm	> 5 cm
Range of adhesion	left	1	4	6
	right	1	4	6
		Normal/thin	Moderate thickness/ edema	Thickness/ stiff
Tubal wall thickness	left	1	4	6
	right	1	4	6
		normal/75%	35%-75%	<35%
Fimbria mucosa	left	1	4	6
	right	1	4	6
		no	<3cm	> 3 cm
Hydrosalpinx	left	0	10	20
	right	0	10	20
		1cm	<3cm	> 3 cm
Ampulla diameter	left	1	4	6
	right	1	4	6
		patency	part patency	no patency
Chromopertubation	left	0	10	20
	right	0	10	20

Classification:

I: 1-10 scores; II: 11-20 scores; III: 21-30 scores; IV: >31 scores

salpingolysis accounted for a similar ratio; they were 50% and 49%, respectively. The remaining nine patients were normal pelvic. In the class III group, salpingolysis and single salpingectomy accounted for the highest ratios; they were 46.8% and 35%, respectively. In the class IV group, bilateral salpingectomy accounted for 50% while salpingolysis and single salpingectomy accounted for 20% and 22%, respectively. Pregnancy outcomes showed that 62 (35.5%) patients got pregnant including one abortion in 172 class I patients. Twenty-three (15.2%) patients got pregnant after reconstructive surgery except for three abortions in 151 class II patients. Six (8%) patients got pregnant in 77 class III patients. No intrauterine pregnancy was observed in 40 class IV patients except one ectopic pregnancy.

Relationship between follow-up and pregnancy outcomes

Figure 1 reveals the cumulative pregnancy rate in 12 month follow-ups among different groups. The curve shows that the pregnancy rates increased gradually and did not reach the top in classes I and II at the end of the 12th month.

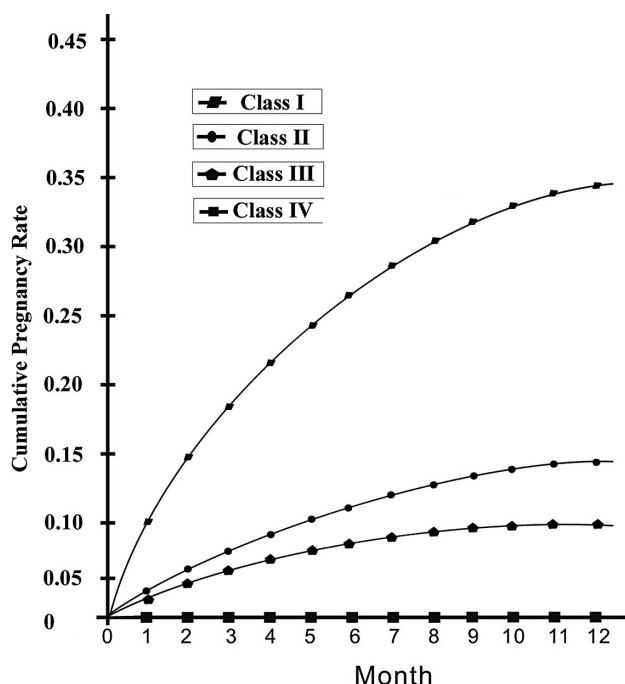


Figure 1. — Cumulative rate was the union factor. Cumulative conception rate (CCR) was calculated with the use of Kaplan-Meier survival analysis. ANOVA was used to analyze variable groups including class I, II, III, and IV, $p < 0.05$. Horizontal axis represents the month. Vertical axis represents the cumulative rate. Student–Newman–Keuls (SNK) was used for comparing the difference between two groups. Class I vs II, $p > 0.05$. Class I vs III, $p < 0.05$. Class I vs IV, $p < 0.05$. Class II vs III, $p < 0.05$. Class II vs IV, $p < 0.05$. Class III vs IV, $p < 0.05$.

Cumulative pregnancy rates in class III increased gradually also, but at the end of the 12th month, it reached a plateau. There was no increased rate in the class IV group. At the end of the 12th month, the cumulative pregnancy rate in classes I, II, III, and IV was 35%, 15%, 8%, and zero, respectively. After surgical laparoscopy, cumulative natural pregnancy rates in the class I-II groups were significantly higher than in the class III-IV groups ($p < 0.05$).

Discussion

Pregnancy outcomes after reconstructive tubal surgery for adnexal adhesions and distal tubal occlusions are thought to be related to the extent of pelvic adhesion and to tubal disease. Based on various parameters, several classification systems have been proposed to assess the extent of tubal disease in order to predict pregnancy outcomes (5, 8-13). However, none of the classifications can be a one-step solution to predicting pregnancy outcomes and avoiding tubal surgeries.

The AFS score system has been used nearly 30 years since 1988. The AFS scoring system is a measurement

tool to standardize the measurement of pelvic endometriosis so that doctors working at different hospitals will classify patients in a similar way. It is widely used in Chinese hospitals during laparoscopic subfertility surgery. AFS provides effective evaluation criterion for judging the degree of tubal lesions. However, because the AFS score focuses on the pelvic adhesion, and not on the tubal interluminal mucosal lesions and stenosis, this leads to insufficient or excessive assessments for tubal lesions, which then may lead to removal of normally functioning fallopian tubes or to the retention of non-functioning fallopian tubes.

Since the first report on the value of salpingoscopy at the time of microsurgery [14], there has been increasing interest in salpingoscopy and improved salpingoscopic techniques to detect intraluminal lesions [15, 16]. Now, salpingoscopy is an important tool for detecting mucosal abnormalities, and for eventually referring patients for assisted reproductive technology. Due to the great influence of severity of tubal intraluminal mucosal, authors stated that “there was no correlation between the presence or extent of pelvic adhesion and the presence or extent of intraluminal adhesion.” However, although salpingoscopy accurately assesses tubal mucosa lesions, it allowed improved selection of patients who are candidate for tubal surgery but it is not a substitute for tubal surgery.

Manna *et al.* [13] affirmed the prognostic role of salpingoscopy in infertility patients and suggested that patients with tubal infertility should be offered operative laparoscopy with salpingoscopy as the first step of treatment. Salpingoscopy combined with operative laparoscopy may be the best procedure for infertility patients [3]. However, in China, because of the high costs and lack of skilled technicians associated with salpingoscopy, application of salpingoscopy is limited.

In contrast, testing fallopian tubal patency using chromopertubation using methylene blue is cheap. Chromopertubation plays a prognostic role as the other study stated that when there is a discordant patency the pregnancy rates could be somewhat reduced [17]. The present results showed chromopertubation combined with operative laparoscopy can effectively evaluate fallopian tubal internal patency and external mechanism adhesion. The score combination connected the chromopertubation (nature of the mucosal pattern, diameter of the hydrosalpinx, expandability of the ampulla) and AFS score. Egbert *et al.* analyzed the importance of three factors derived from the hysterosalpingography (nature of the mucosal pattern, diameter of the hydrosalpinx, expandability of the ampulla) and of four factors from the findings at laparoscopy (extent of adhesions, nature of adhesions, thickness of tubal wall, and diameter of the hydrosalpinx), and they indicated that a favorable score on the nature of mucosal pattern in one or both tubes concurs with good pregnancy prospects. In contrast, the presence of an unfavorable score for most of the factors in

at least one tube is associated with a poor fertility prognosis, regardless of the condition of the other tube [18]. According to the present authors' classification, class I-II patients can benefit from reconstructive tubal surgery, as studies showed that after three years follow-up, mild tubal lesion and unilateral hydrosalpinx patients with tubal disease in the removal of water side, the cumulative pregnancy rate was 55% [19]. All of the hydrosalpinx patients were classified into class III or IV. Based on the cumulative pregnancy life-table, patients in class III-IV were recommended to undertake salpingectomy. It is not helpful for these patients to undergo prolonged observation periods. Salpingectomy or hysteroscopic tubal occlusion of functionless hydrosalpinx has the advantage of adding a valuable evaluation of the endometrial cavity prior to IVF/ICSI. It should be an option for treatment protocol in cases of functionless hydrosalpinx [20, 21]. They have little chance of conceiving naturally from reconstructive salpinx surgery [22, 23]. Operative laparoscopy is expected to become the last resort for guiding natural pregnancy or IVF-ET. Postoperative procedures following female pelvic reproductive surgery had no significant impact on the odds of pregnancy, live birth, ectopic pregnancy or miscarriage [24].

The present results were consistent with the management of hydrosalpinx among Society for Reproduction Endocrinology and Infertility (SREI) / Society of Reproductive Surgeons, which recommend removing a unilateral hydrosalpinx before controlled ovarian hyperstimulation [25]. Recurrent hydrosalpinx may cause failed uterine pregnancy [26, 27]. The fact that no pregnancy was observed in patients that underwent bilateral salpingostomy in the severe degree group further proved a high score-combination score is a poor fertility prognosis for patients, which was consistent with previous evidence supported that only unilateral salpingostomy for a unilateral hydrosalpinx (bilateral salpingostomy for bilateral hydrosalpinx) [28].

Conclusions

The authors suggest a longer observation period for class I-II group patients after surgical laparoscopy, while no longer than one year for class III-IV group patients.

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