

# Clinical analysis of 65 cases of laparoscopic treatments on tubal infertility caused by tubal distortion

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## Summary

**Objective:** This study aims to investigate the clinical value of laparoscopic treatment on tubal infertility caused by tubal distortion. **Materials and Methods:** A total of 65 cases of patients with tubal infertility were divided into three groups based on tubal distortion degree, i.e., 21 cases had a minimum angle of tubal distortion  $<45^\circ$  (A group), 39 cases had a distortion angle between  $45^\circ$  and  $90^\circ$  (B group), and five cases had a distortion angle between  $90^\circ$  and  $145^\circ$  (C group). The pregnancy outcome and the impact of tubal distortion degree on pregnancy outcome were analyzed 6 to 24 months after operation. **Results:** The total pregnancy rate of these 256 cases were 43.75% with an intrauterine pregnancy rate of 40.23% and an ectopic pregnancy rate of 3.52%. In the simple distortion tubal infertility cases, the total pregnancy rate was 44.62%. In Group A, five cases became pregnant after operation (33.33%); in Group B, 19 cases (48.72%); and in Group C, three cases (60%). The differences in pregnancy rate between Groups A and B and Groups A and C were statistically significant ( $p < 0.05$ ), whereas that between Groups B and C was not ( $p > 0.05$ ). **Conclusion:** Tubal plastic surgery via laparoscopy is an effective way to treat infertility caused by tubal distortion by restoring the normal shape of oviducts, especially in cases when the minimum angle of tubal distortion is greater than  $45^\circ$ .

**Key words:** Laparoscopy; Tubal distortion; Infertility.

## Introduction

Infertility is a common condition that affects 15% of couples trying to conceive a baby [1]. The evaluation of infertility includes an assessment of both female and male partners to determine the factors that contribute to the difficulty in conception<sup>1</sup>. Female factors account for approximately 40% of infertility occurrences [2].

Tubal infertility, which has shown an increasing trend, is the leading cause of female infertility [3]. The tubal distortion caused by chronic tubal inflammation or abnormal development of the oviduct changes the normal tubal function, reduces its peristalsis, and affects ovum movement by carrying the ovum to the ampullary portion, thereby ultimately leading to infertility.

This paper aims to study the diagnosis and treatment of tubal distortion. The study included 65 cases of infertility caused by tubal distortion that have undergone laparoscopic operation. This study aims to assess the clinical value of laparoscopic operation in the treatment of tubal infertility and to provide guidance to the treatment of infertility caused by fallopian tube distortion by analyzing the clinical outcomes of 265 cases.

## Materials and Methods

### General data

From February 2008 to October 2010 in the First Affiliated Hospital of Zhengzhou University, 256 females suffering from tubal infertility were treated by laparoscopic fallopian tube cos-

metic surgery. Their sexual life was normal, and immune factors and male infertility factors, such as spermatogenic obstacles and insemination disorder, were eliminated. Moreover, patients associated with ovulation disorders, uterine factors, endometriosis, or pelvic tuberculosis were also excluded. Before the operation, hysterosalpingography was conducted, which suggests tubal abnormality. Other routine laboratory tests were normal, and no operative contraindications were observed. Based on the intraoperative situation, the authors ruled out cases with hydrosalpinx, pelvic adhesions, and adopted cases in which the fallopian tube was soft and whose fimbriated extremity and Douglas lacuna were normal in the follow-up group. The authors were able to determine if pregnancy occurred by telephone follow-ups over the next six to 24 months. This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the First Affiliated Hospital of Zhengzhou University. Written informed consent was also obtained from all participants.

### Surgical technique

Three to seven days after menstruation, the patients underwent laparoscopic fallopian tube cosmetic surgeries under general anesthesia operated by the same doctor. The situation of the Fallopian tubes was assessed using optical lens and surgery was then conducted following intraoperative findings. For simple distorted tubal cases, the fallopian tube was pulled to return to its normal form. Images were obtained using a digital camera, and the fallopian tubes twist angles were measured. The minimum twist angle of the fallopian tubes of each patient was recorded. These 65 patients were divided into three groups based on the measured minimum angle. A total of 21 cases had a minimum angle of tubal distortion that was smaller than  $45^\circ$  (A

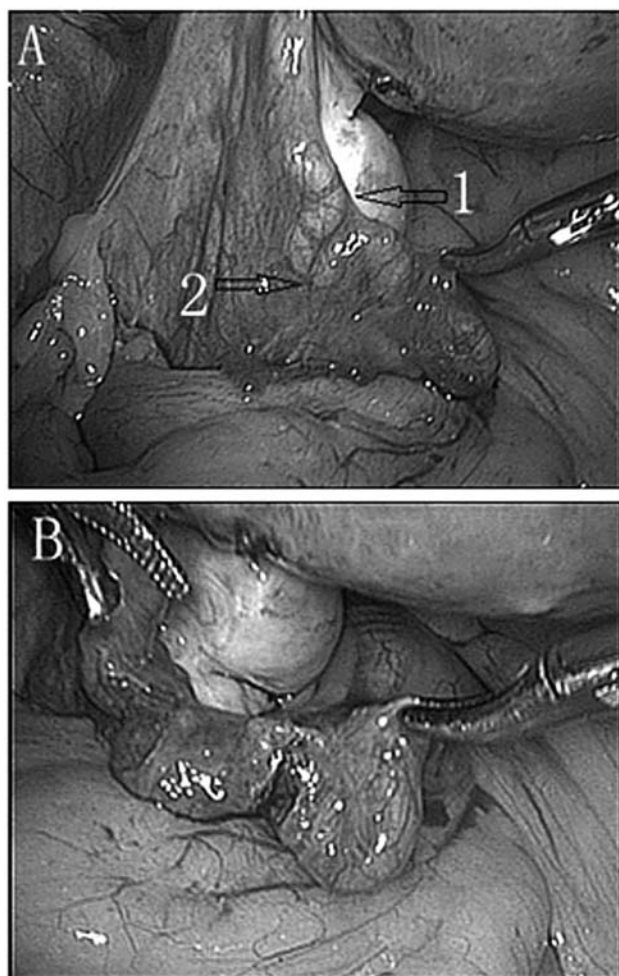


Figure 1. — The form of the fallopian tubes before and after surgery under laparoscopy. A) shows the twisted form of the fallopian tube under the optical lens. Arrow 1 indicates that the angle of the fallopian tube is about  $145^\circ$  and arrow 2 indicates that the angle is less than  $45^\circ$ ; therefore, it is considered that the patient's minimum angular of fallopian tube is less than  $45^\circ$ . B) shows the postoperative form of the fallopian tube after laparoscopic fallopian tube cosmetic surgeries.

group), 39 cases had a minimum angle between  $45^\circ$  and  $90^\circ$  (B group), and five cases had a minimum angle between  $90^\circ$  and  $145^\circ$  (C group). The twist serosa was initially separated with a monopolar electrocautery hook (Figure 1), and hysteroscopy was then performed to detect the uterine cavity. Ultimately, hydrotubation was conducted, and the meilan liquid flowed out from the fimbria extremity of the operated patients. The pelvic area was thoroughly rinsed after surgery, and drugs (sodium hyaluronate injection) were applied to the wound to prevent adhesion. Antibiotics were taken for three days after surgery. Sexual intercourse and tub baths were contraindicated for one month and contraception was also recommended for one month prior to pregnancy attempts.

Table 1. — Findings of postoperative pregnancy.

Postoperative time (minutes)	No. of intrauterine pregnancies	No. of ectopic pregnancies	Total
1 ~ 6	20	1	21
7 ~ 12	5	2	7
13 ~ 24	1	0	1
Total	26	3	29

Table 2. — Relevance of the minimum angle of tubal distortion and postoperative pregnancy rate.

Group	No.	Pregnancy rate No. (%)	Intrauterine pregnancy rate No. (%)
A	21	7 (33.33%)	5 (23.81%)
B	39	19 (48.72%)	18 (48.72%)
C	5	3 (60.00%)	3 (60.00%)
Total	65	29 (44.62%)	26 (40.00%)

### Statistical analysis

The data was analyzed with the SPSS13.0 software, and the Chi-square ( $\chi^2$ ) significance test was conducted. When  $p < 0.05$ , the difference indicated statistical significance.

## Results

### Postoperative Pregnancy

A total of 112 (43.75%) patients became pregnant, which comprised 103 (40.23%) intrauterine pregnancies and nine (3.52%) ectopic pregnancies. This result was obtained via telephone follow-ups six to 24 months after surgery. Among them, 65 patients suffered from simple tubal distortion, 29 from postoperative pregnancies, and 27 from intrauterine pregnancies. Postoperative pregnancy within six months was observed in 20 cases, which was 68.97% of the total pregnant patients (Table 1).

### Relevance analysis between the angle of tubal distortion and pregnancy rate

Relevance analysis results between the angle of tubal distortion and pregnancy rate are as follows (Table 2): seven cases (33.33%) were pregnant and whose minimum angle of tubal distortion was smaller than  $45^\circ$  (Group A); 19 (48.72%) were those whose distorted angle was between  $45^\circ$  and  $90^\circ$  (Group B); three (60%) were those whose angle of tubal distortion was between  $90^\circ$  and  $145^\circ$  (Group C). The pregnancy rate differences among Groups A and B and Groups A and C were statistically significant ( $p < 0.05$ ), whereas that between Groups B and C was not ( $p > 0.05$ ).

## Discussion

According to statistics, among the various reasons for infertility, female factors accounted for approximately 40% [4], of which the oviduct is the primary factor. The obstruction of the fallopian tube accounts for 30%-40% of

tubal infertility [5]. Subtle variations may cause infertility [6]. The fallopian tube is a pair of elongated muscular tubes, and the contraction of the muscles helps move the ovum and transport the oosperm. The transport of the ovum in the fallopian tube relies on the contraction of the smooth muscles, which removes the fimbriated extremity to the ovary during ovulation. The subatmospheric pressure caused by the contraction of the smooth muscles and the wiggle? of the infundibulum portion indraft the ovum into the fallopian tube. After the ovum enters the fallopian tube, the normal transportation of the ovum relies on the contraction of the tubal muscle. In addition, tubal peristalsis can promote sperm movement from the uterine cornu to the ampulla portion and the oosperm to the uterus cavity. Hence, tubal peristalsis contributes to fertilization and transportation of the oosperm. Chronic tubal inflammation, the sequelae of pelvic inflammation, and tubal growth abnormalities can cause the contraction of the tubal serosa and disorder of the fallopian tube [7]. In serious cases, the obstruction of the tube not only depressed the peristalsis of the tubes but also affected fallopian tubal fluid flow, which ultimately resulted in infertility [8]. The inflammation can also cause the tissues to release prostaglandins, leukocyte chemotactic factor, and other inflammatory mediators, which affect fertilization, embryo implantation, and cleavage. Thus, embryonic development is hindered [9]. Meanwhile, an inflammation of approximately 30% caused by microbial factors is subclinical asymptomatic [10].

Laparoscopic operation is not only helpful in diagnosing the etiology of infertility, but also creates appropriate conditions for the release of the twisted oviduct [11]. Laparoscopy has an amplification effect; thus, the exposed vision is clearer and more open, which increase the accuracy of the operation [12]. However, a non-significant reduction in pregnancy rate occurred with increasing magnification [13]. Compared with traditional operation, laparoscopic operation is performed in confined environments. Thus, the abdominal tissue is not exposed to air. This condition reduces tissue drying and contamination, thereby reducing interference to other organs and tissues in the abdomen. Pelvic electrocoagulation completes the incision and hemostasis, which reduces the likelihood of foreign bodies to enter the surgical site [14, 15]. Furthermore, the use of saline to thoroughly rinse the pelvic and abdominal cavity, either intraoperatively and postoperatively, can improve the abdominopelvic microenvironment and reduce the incidence of adhesions after the operation. Thus, suffering is largely relieved and patients can regain their normal functions in the early postoperative days. Moreover, their gastrointestinal functions also recover quickly. This practice can also reduce the adhesion after operation. The use of laparoscopic fallopian tube cosmetic surgery can release the twisted serosa, recover its normal form and peristalsis function, guarantee the transportation of the ovum and the oosperm, and ultimately improve pregnancy rate.

However, several data indicate a non-significant difference in pregnancy rates between open and laparoscopic techniques for lesser degrees of tubal damage [16], which must be further investigated. Based on follow-up results, in the first six postoperative months, the pregnancy rate after operation was highest. After six months, pregnancy rates increased with the passing of time, but the total constituent ratio declined. Therefore, patients should attempt pregnancy as early as possible after one month of contraception. The data shows that when the minimum angles of tubal distortion are  $< 45^\circ$ ,  $45^\circ$  to  $90^\circ$ , and  $90^\circ$  to  $145^\circ$ , the intrauterine pregnancy rates are 23.81%, 48.72%, and 60.00%, respectively. Pregnancy rates after laparoscopic treatment are different in relation to tubal status [17]. Thus, when the minimum angle is less than  $90^\circ$ , the fallopian tube distortion degree is lower, and the pregnancy rate after operation is higher. However, when the angle is over  $90^\circ$ , the postoperative pregnancy rate does not significantly increase. These results are in agreement with those of Maranas' study on tubo-peritoneal infertility [18].

For infertilities caused by fallopian tube distortion, especially patients whose minimum angle of the twisted tube is larger than  $45^\circ$ , satisfactory results were always obtained when laparoscopic operation was performed [19]. In addition, compared with the assisted reproductive technology, laparoscopic operation is simple, convenient, and inexpensive. Studies have considered the use of laparoscopy as an alternative to IVF [18]. Moreover, natural pregnancy after operation can reduce the psychological burden of patients and their families, which indicates its significant clinical value.

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