GYNECOLOGY

Recurrence of hydrosalpinges after cuff neosalpingostomy in a poor prognosis population*

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Abstract *Purpose:* The purpose of this study was to determine the recurrence rate of hydrosalpinges after cuff neosalpingostomy in poor prognosis candidates.

Methods: Forty consecutive patients with hydrosalpinx treated with cuff neosalpingostomy were included. Main outcome measures were recurrence rate of hydrosalpinx after cuff neosalpingostomy, intrauterine and ectopic pregnancy rates.

Results: Intraoperatively, the mean size of the hydrosalpinx was 1.9 ± 0.7 cm, and 77% of patients had evidence of pelvic adhesions. Recurrence of hydrosalpinx, whether unilateral or bilateral was 70% (28/40) per patient. Intrauterine and ectopic pregnancy rates were 5% (2/40) and 2.5% (1/40), with a total pregnancy rate of 7.5% (3/40).

Conclusions: Most patients experience recurrence of hydrosalpinx after cuff neosalpingostomy, thus requiring additional surgery such as salpingectomy prior to in vitro fertilization (IVF). In a poor prognosis population, salpingectomy should be considered as the primary treatment for hydrosalpinx prior to IVF.

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Introduction

Hydrosalpinx, a common cause of tubal factor infertility, is characterized by fluid accumulation within the fallopian tube due to distal tubal obstruction. Development of hydrosalpinx can be secondary to pelvic inflammatory disease, prior pelvic surgery, previous ectopic pregnancy or endometriosis [1]. In vitro fertilization (IVF) is an established treatment modality for tubal factor infertility associated with hydrosalpinx.

Several reports have suggested decreased implantation and pregnancy rates in patients undergoing IVF in the presence of hydrosalpinges [2–4]. Lower pregnancy rates associated with hydrosalpinx are thought to be secondary to retrograde drainage of the hydrosalpingeal fluid into the uterine cavity, which may interfere with implantation. Hydrosalpingeal fluid has also been reported to adversely affect embryogenesis, as well as markers of endometrial receptivity [5–7]. Surgical treatment of hydrosalpinges may reverse these adverse effects [7].

Surgical treatment options for patients with hydrosalpinx prior to IVF include salpingectomy, proximal tubal occlusion or neosalpingostomy. In a prospective randomized trial, salpingectomy prior to IVF was reported to improve pregnancy rates [8]. In a retrospective study, proximal occlusion of fallopian tubes with hydrosalpinges achieved similar pregnancy rates compared to patients who had salpingectomies [9]. No differences were observed in implantation and pregnancy rates when Murray and colleagues [10] compared salpingectomy, proximal occlusion and neosalpingostomy procedures in a retrospective study.

Table 1 Patient characteristics

Age (years)	35.5 ± 5.5 (21–42)
Gravidity	1.25 ± 1.2 (0–4)
Parity	0.73 ± 0.9 (0–3)
Duration of infertility (years)	6.6 ± 3.9 (2–19)
Prior pelvic surgery	45% (18/40)
Previous ectopic pregnancy	18% (7/40)
History of sexually transmitted disease	48% (19/40)
Chlamydia titer positive	88% (35/40)

Whereas some patients prefer the option of neosalpingostomy and even poor prognosis cases may derive some pregnancy benefit from patent oviducts, hydrosalpinges can recur after neosalpingostomy and additional surgery may be required. The purpose of this study was to determine the recurrence rate of hydrosalpinges after cuff neosalpingostomy in a poor prognosis population.

Materials and methods

We reviewed the medical records of patients who underwent cuff neosalpingostomy for the treatment of hydrosalpinx in the Reproductive Endocrinology and Infertility Clinic at the Los Angeles County-University of Southern California Medical Center between 1999 and 2002. The study was approved by the University of Southern California Health Sciences Institutional Review Board.

Patient characteristics are summarized in Table 1. In addition to history and physical examinations, all patients were evaluated with chlamydia trachomatis titers and a pre-operative hysterosalpingogram (HSG). Hysterosalpingograms were reviewed by the reproductive endocrinology and infertility fellow and attending staff prior to surgery to confirm the diagnosis of hydrosalpinx, and additionally for the presence of rugae and salpingitis isthmica nodosa. Only those patients with complete distal tubal obstruction, which was confirmed intraoperatively by chromopertubation, were included into the study. Patients with partial obstruction who had salpingolysis and/or fimbrioplasty were excluded from the study. Patients with a history of previous neosalpingostomy and those without a postoperative evaluation of tubal patency were also excluded.

Patients underwent cuff neosalpingostomy by laparoscopy ($n = 32$) or laparotomy ($n = 8$). Cuff neosalpingostomy was bilateral in 75% (30/40) of the cases and unilateral in 25% (10/40). In these 10 cases, unilateral rather than bilateral cuff neosalpingostomy was performed due secondary to a normal or an absent contralateral tube, bipolar disease or contralateral salpingectomy.

The reproductive endocrinology and infertility fellow was the primary surgeon in all surgical cases under direct supervision by attending staff. Intraoperatively, the size of the
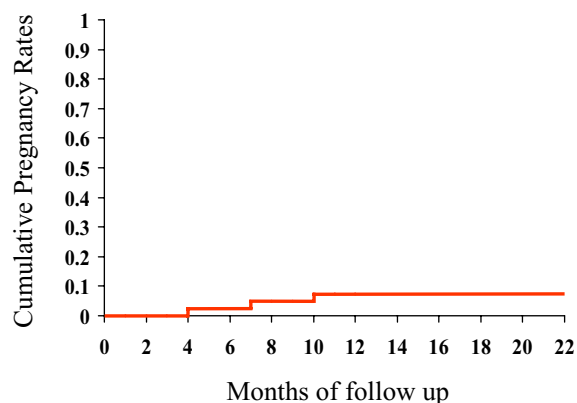
Fig. 1 Life-table analysis and cumulative pregnancy rates

hydrosalpinx, presence of rugae and adhesions were documented. Once hydrosalpinx was confirmed by chromopertubation, distal neosalpingostomy was achieved by electrocautery in the cutting mode at 20 Watts. The distal edges were then everted and secured with interrupted sutures of 4-0 or 6-0 delayed absorbable suture. Tubal patency was evaluated by either a post-operative HSG or a second-look laparoscopy. All patients were followed in the reproductive endocrine clinic for at least 12 months after surgery with the longest follow-up of 22 months. Statistical analysis was achieved by Fisher's Exact Test and Life-Table Analysis.

Results

The overall pregnancy rate was 7.5% (3/40), with an intrauterine pregnancy rate of 5% (2/40) and an ectopic pregnancy rate of 2.5% (1/40). Cumulative pregnancy rates utilizing life-table analysis are shown in Figure I. Recurrence of hydrosalpinx was observed in 70% (28/40) of patients. In 4 of the 28 patients, unilateral patency with contralateral recurrent hydrosalpinx was noted. Recurrence rate of hydrosalpinx per tube cuffed was 57% (40/70). The occlusion rate was only 36% (4/11), when tubal rugae were present on preoperative HSG. When the contralateral fallopian tube was normal ($n = 4$), patency rate was 100%. Mean (range) size of hydrosalpinx was 1.9 ± 0.7 cm (1.0–4.0 cm), and 77% of patients had evidence of pelvic adhesions. Even though 48% (19/40) of patients gave a history of sexually transmitted disease, 88% (35/40) tested positive for chlamydia trachomatis titer.

There was no association between the recurrence of hydrosalpinx and the presence of a positive chlamydia titer, salpingitis isthmica nodosa on preoperative hysterosalpingogram, presence of adhesions, or whether the surgery was done by laparoscopy or laparotomy. However, there was a statistically significant association between the finding of bilateral hydrosalpinges and the recurrence of

hydrosalpinges following surgery (O.R. = 6.0, 95% CI: 1.02–38.60, $p < 0.05$). The presence of rugae observed on the preoperative hysterosalpingogram significantly decreased the odds of recurrence of hydrosalpinges after cuff neosalpingostomy (O.R. = 0.1, 95% CI: 0.01–0.63, $p < 0.005$).

Discussion

We reviewed the outcome of cuff neosalpingostomy for the treatment of hydrosalpinx in our clinic over a span of three years. The group of patients included in this study constituted a poor prognosis population due to the following characteristics: a relatively older population (mean age 35.5 ± 5.5 years), high prevalence of prior ectopic pregnancy and pelvic surgery, most patients having serological evidence of chlamydia trachomatis infection, and presence of large hydrosalpinges with adhesions intraoperatively.

In this poor prognosis population, high recurrence rate of hydrosalpinx after cuff neosalpingostomy was thought to be secondary to significant tubal damage. Additional factors may have contributed to the low pregnancy rate such as long duration of infertility and the age of the patients. High recurrence and low pregnancy rates were similar to those reported in the literature with similar prognostic factors [11–14].

We did not observe any association between the recurrence of hydrosalpinx and the presence of salpingitis isthmica nodosa or a positive chlamydia trachomatis titer. Pelvic adhesions did not impact the probability of recurrence in our study. These findings are consistent with several previous studies [14–17] but contrast with those of others [11, 12, 13, 18]. Whereas the type of surgical procedure was not associated with recurrence of hydrosalpinx (laparoscopy versus laparotomy), presence of rugae on preoperative HSG significantly decreased the odds of recurrence. This may be due to a lesser degree of tubal damage when tubal rugae are present [19]. Severity of tubal damage may be more significant when both fallopian tubes are affected rather than unilateral disease. This statement is supported by our data, which demonstrated a significant increase in the recurrence of bilateral hydrosalpinges compared to unilateral disease.

It was an interesting finding that only 48% of patients reported a history of sexually transmitted disease, but in actuality 88% of patients demonstrated serological evidence of prior chlamydia trachomatis infection. This is probably secondary to the asymptomatic course observed with chlamydial infection. It appears from our data that testing for chlamydia trachomatis titer is more reliable than history alone in predicting exposure to sexually transmitted diseases.

Management of distal tubal disease remains as a controversial issue. Currently there are two main treatment options of hydrosalpinx: surgical removal of hydrosalpinges prior to IVF (salpingectomy) or conservative surgery (neosalpingostomy) to allow natural conception. Salpingectomy is currently recommended to all patients with hydrosalpinx regardless of its severity prior to IVF. Whereas evidence suggests lower pregnancy rates with the presence of hydrosalpinges [3, 4, 8, 20–22], such data are not stratified based on the severity of the disease and co-existing conditions. Therefore, a universal recommendation of salpingectomy may not be applicable to all patients with distal tubal obstruction.

This is in part due to the heterogeneity of the clinical and pathological findings in patients with hydrosalpinx. Some patients may have mild unilateral disease with a normal appearing and functional contralateral fallopian tube, others may present with bilateral large hydrosalpinges with the absence of tubal rugae suggesting more advanced disease.

It has previously been reported that thick-walled hydrosalpinges with absent tubal rugae and bilateral disease were associated with lower pregnancy rates [23, 24]. However, cuff neosalpingostomy may still be a treatment option for patients who have favorable prognosis such as unilateral disease, presence of tubal rugae and for those who wish to entertain the option of natural conception. Pregnancy rates following conservative surgery for the treatment of hydrosalpinx have been reported to range from 15–53% [25–29]. Patient should be counseled based on the severity of the disease and the expected outcome following conservative surgery.

Currently, there are no prospective data comparing the surgical options for the treatment of hydrosalpinx prior to IVF. On the basis of the present study, cuff neosalpingostomy results in a low spontaneous pregnancy rate and a high rate of recurrence of hydrosalpinges. Therefore, salpingectomy and IVF should be strongly considered as the primary therapy in poor prognosis patients with bilateral hydrosalpinges. Cuff neosalpingostomy may be considered if the hydrosalpinx is unilateral and the contralateral tube is normal or in cases with rugae visible by pre-operative HSG.

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