Salpingectomy or proximal tubal occlusion of unilateral hydrosalpinx increases the potential for spontaneous pregnancy

Arthur W. Sagoskin, Bruce A. Lessey, Gilbert L. Mottla, Kevin S. Richter, Ryszard J. Chetkowski, AnneLynn S. Chang, Michael J. Levy and Robert J. Stillman

1Shady Grove Fertility Reproductive Science Center, Rockville, MD, 2Center for Women’s Medicine, Division of Reproductive Endocrinology and Infertility, Greenville, SC and 3Alta Bates IVF Program, Alta Bates Medical Center, Berkeley, CA, USA

4To whom correspondence should be addressed at: Shady Grove Fertility Reproductive Science Center, 15001 Shady Grove Road, Suite 400, Rockville, MD 20850, USA. E-mail: ARTSAGOS@aol.com

BACKGROUND: Studies carried out over the past 10 years have suggested that hydrosalpinges reduce the pregnancy rate in IVF. Here we report our observations of spontaneous pregnancies in patients who underwent salpingectomy (n = 18) or proximal tubal occlusion (n = 7) following diagnoses of unilateral hydrosalpinges and patent contralateral tubes. METHODS: This multi-centre, retrospective study included 25 infertility patients with known unilateral hydrosalpinges with a patent contralateral Fallopian tube. Laparoscopic treatment of unilateral hydrosalpinges by either salpingectomy or tubal occlusion was performed in each patient. Rates of subsequently observed spontaneous pregnancy, and time to pregnancy, are reported. RESULTS: The average duration of infertility in these patients was 3 years with a range of 1–10 years. Following laparoscopic surgical treatment, a total of 22 patients (88%) achieved intrauterine pregnancies, all without IVF treatment. Pregnancies occurred in an average of 5.6 months with a range of 1–21 months. There were no ectopic pregnancies in the study population. CONCLUSIONS: Selected patients with unilateral hydrosalpinges and a patent contralateral Fallopian tube may exhibit increased cycle fecundity after salpingectomy or proximal tubal occlusion of the affected tube and conceive without the need for IVF.

Key words: hydrosalpinx/IVF/salpingectomy/tubal occlusion

Introduction

Tubal disease, secondary to a number of causes, continues to be a major source of infertility in young, otherwise fertile couples. With advances in IVF it is becoming current practice to treat these patients with IVF rather than attempting restoration of tubal function. In addition, the negative impact of communicating hydrosalpinges on implantation rates in IVF has been well documented (Kassabji et al., 1994; Strandell et al., 1994, 1999; Vandromme et al., 1995; Akman et al., 1996; Fleming and Hull, 1996; Katz et al., 1996; Blazar et al., 1997; Nackley and Muasher, 1998; Zeyneloglu et al., 1998; Camus et al., 1999; Cohen et al., 1999), leading many to remove damaged Fallopian tubes prior to IVF. We previously reported reduced IVF pregnancy rates in our patients with either unilateral or bilateral communicating hydrosalpinges, consistent with earlier findings (Murray et al., 1998). Treatment by either salpingectomy or proximal tubal occlusion prior to IVF restored the pregnancy rates to those expected for patient age and tubal factor without hydrosalpinges. Since that time, we have noted the occurrence of spontaneous pregnancies after surgery in patients with unilateral hydrosalpinges with a normal contralateral tube. Here, we report these findings in a multi-centre series of patients undergoing such treatment for unilateral hydrosalpinges with either proximal tubal occlusion or salpingectomy, and demonstrate a high pregnancy rate without the need for IVF.

Materials and methods

This report is a retrospective multi-centre analysis of 25 patients with documented unilateral hydrosalpinges in the presence of a patent normal contralateral Fallopian tube. All patients at the three centres with this diagnosis between September 1992 and November 2002 underwent laparoscopic examination and either unilateral salpingectomy or proximal tubal occlusion, and were included in the analysis.

Results

The mean patient age was 33 years at the time of treatment, with a range of 26–41 years. The average duration of infertility was 3 years with a range 1–10 years. Laparoscopic unilateral salpingectomies were performed on 18 patients and proximal tubal occlusion on the remaining seven. None had complica-
tions during or after their surgery. Over time, 22 patients achieved intrauterine pregnancies without IVF treatment (88%) (Table I). Spontaneous pregnancies occurred in 21/22 patients. In 17 of these patients who became pregnant, timed coitus was chosen prior to any other planned treatments. In four patients who became pregnant, IVF was planned, but spontaneous pregnancy occurred prior to initiating their IVF cycle. The average time to pregnancy was 5.6 months with a range of 1–21 months. One additional patient became pregnant after a cycle of gonadotrophins and intrauterine insemination (IUI), following 10 months of timed intercourse. That patient had had a previous failed cycle of gonadotrophin stimulation and IUI prior to her tubal surgery. Three women did not become pregnant. There were no ectopic pregnancies in this study population and all had singleton pregnancies.

Comparing the two methods of treatment, pregnancy rates appear comparable (Table II), although sample sizes are not large enough for meaningful statistical comparisons. However, the variance in time to pregnancy was significantly less following salpingectomy compared with proximal tubal occlusion ($P < 0.01$, variance ratio $F$-test), and the mean time to pregnancy was significantly shorter following salpingectomy compared with proximal tubal occlusion (3.1 versus 12.3 months, $P = 0.018$, Welch $t$-test for unequal variance). Age and years of infertility did not differ significantly between the two surgical treatments.

**Discussion**

The optimal treatment to improve fecundity in patients with hydrosalpinges continues to be a subject of debate. In a large, prospective IVF trial examining the effect of salpingectomy for patients with unilateral and bilateral hydrosalpinges, Strandell et al. (1999, 2001) reported significant improvement in IVF outcome only in the subgroups of bilateral and ultrasound visible hydrosalpinges. A recent meta-analysis of randomized studies concluded that salpingectomy enhances IVF success and should be considered for all women with hydrosalpinges.

### Table I. Patient age, duration of infertility, surgical intervention, and pregnancy outcome of all patients included in the analysis

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age (years)</th>
<th>Years of infertility</th>
<th>Type of surgery</th>
<th>Pregnant (+/−)</th>
<th>Months from surgery to pregnancy</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>26</td>
<td>1.5</td>
<td>Salpingectomy</td>
<td>+</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>27</td>
<td>2.5</td>
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<tr>
<td>3</td>
<td>27</td>
<td>1.5</td>
<td>Proximal occlusion</td>
<td>+</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>28</td>
<td>2</td>
<td>Salpingectomy</td>
<td>+</td>
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<tr>
<td>5</td>
<td>29</td>
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<td>Salpingectomy</td>
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<tr>
<td>6</td>
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<td>5</td>
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<tr>
<td>7</td>
<td>30</td>
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<tr>
<td>8</td>
<td>31</td>
<td>1.5</td>
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</tr>
<tr>
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<tr>
<td>10</td>
<td>31</td>
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<td>7</td>
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<td>31</td>
<td>3</td>
<td>Salpingectomy</td>
<td>+</td>
<td>8</td>
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<tr>
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<td>32</td>
<td>4</td>
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<td>18</td>
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<td>14a</td>
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<tr>
<td>15</td>
<td>32</td>
<td>10</td>
<td>Proximal occlusion</td>
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<tr>
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<td>33</td>
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<td>Proximal occlusion</td>
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<td>17</td>
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<tr>
<td>25</td>
<td>41</td>
<td>1</td>
<td>Salpingectomy</td>
<td>+</td>
<td>2</td>
</tr>
</tbody>
</table>

*Pregnancy with cycle of controlled ovarian stimulation (COS)/intrauterine insemination (IUI), post surgery, after 10 months attempting pregnancy with timed intercourse. Previous cycle COS/IUI without pregnancy prior to surgery.

### Table II. Comparison of cycle statistics between surgical interventions

<table>
<thead>
<tr>
<th>Treatment method</th>
<th>Patient age (years)*</th>
<th>Years of infertility*</th>
<th>Pregnancy rate (%)</th>
<th>Months to pregnancy*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salpingectomy ($n = 18$)</td>
<td>33.2 ± 5.0</td>
<td>2.6 ± 1.6</td>
<td>88.9 (67–98%)</td>
<td>3.1 ± 2.8</td>
</tr>
<tr>
<td>Proximal tubal occlusion ($n = 7$)</td>
<td>32.4 ± 3.3</td>
<td>3.9 ± 3.2</td>
<td>85.7 (45–99%)</td>
<td>12.3 ± 6.7</td>
</tr>
</tbody>
</table>

*Values are mean ± SD.

†95% confidence intervals.
prior to IVF (Johnson et al., 2002). In the present study, we examined only patients with longstanding infertility and unilateral hydrosalpinges and observed them over time, without IVF treatment. In this select group of patients, it would appear that either unilateral salpingectomy or proximal tubal occlusion was very effective in restoring normal fertility. What was most striking about these results was the short duration of time between surgery and pregnancy, in most individuals. This observation of spontaneous pregnancy after unilateral salpingectomy of a hydrosalpinx has been observed previously (Choe and Check, 1999; Aboulghar et al., 2002).

The treatment of unilateral and bilateral hydrosalpinx remains controversial. Even though intrauterine pregnancy rates remain low after neosalpingostomy (Rock et al., 1978), some investigators still feel that neosalpingostomy is indicated in a select subgroup of patients (Taylor et al., 2001). Many studies have shown that patients with hydrosalpinges undergoing IVF without proximal ligation or salpingectomy of the affected tubes have a lower pregnancy rate compared with those without hydrosalpinges (Kassabji et al., 1994; Strandell et al., 1994, 1999; Vandromme et al., 1995; Akman et al., 1996; Fleming and Hull, 1996; Katz et al., 1996; Blazar et al., 1997; Murray et al., 1998; Nackley and Muasher, 1998; Zeyneloglu et al., 1998; Camus et al., 1999; Cohen et al., 1999). Decreased implantation rates have also been reported in patients with hydrosalpinges demonstrated by sonography (Andersen et al., 1994).

There are various ideas formulated to explain this negative effect of the hydrosalpinges. One theory suggests a mechanical effect of hydrosalpinx fluid mediated by ‘reﬂux currents that may thrust embryos away from the implantation site’, thus affecting pregnancy rates (Eytan et al., 2001). Most theories support the concept of a negative effect of the hydrosalpinx fluid on endometrial receptivity, supported by the observation of an impairment of endometrial crvβ3 integrin expression in women with this disorder (Meyer et al., 1997; Bildirici et al., 2001). Still others have suggested a toxic effect of hydrosalpinx fluid on embryo quality, although not all studies agree (Sachdev et al., 1997; Granot et al., 1998; Koong et al., 1998; Strandell et al., 1998).

The present data clearly support surgical treatment of a unilateral hydrosalpinx, in selected infertile patients with a normal patent contralateral tube. Salpingectomy or proximal tubal occlusion may reverse the negative impact on implantation rates, presumably through the prevention of hydrosalpinx fluid efﬂux into the uterine cavity, thus avoiding adverse effects on endometrial receptivity. The overall increase in cycle fecundity in these patients treated with salpingectomy or tubal interruption suggests an alternative treatment to IVF, especially considering the short time to conception in natural cycles following the surgical treatment. Two studies (Murray et al., 1998; Surrey and Schoolcraft, 2001) demonstrated similar increased pregnancy rates in patients undergoing salpingectomy or proximal tubal occlusion of hydrosalpinges prior to IVF, thus recommending either as treatment prior to IVF.

However, in this study there was a statistically signiﬁcant shorter time to achieve pregnancy in the salpingectomy group compared with the proximal tubal ligation group. This observation among patients attempting spontaneous pregnancy raises the question as to whether the residual non-communicating hydrosalpinx in those patients who underwent proximal tubal occlusion continues to allow a hostile environment, increasing the time to pregnancy. The sequelae of ocluding a tube (as opposed to resection) were not examined. However, removal of a large hydrosalpinx, when possible, may avoid the need for further surgery for such reasons as pelvic pain. It should be noted that normal tubal anatomy and fimbria on the remaining contralateral tube is probably an important prognostic factor in the overall success that we observed and should be considered at the time of laparoscopy.

The findings in the present study demonstrated that 88% of patients achieved a spontaneous pregnancy in an average of 5.6 months after surgery. It has been reported that non-IVF pregnancy rates in patients with a unilateral hydrosalpinx treated with neosalpingostomy were higher than in patients with bilateral hydrosalpinges treated with neosalpingostomy (Dlugi et al., 1994; McComb and Taylor, 2001). The McComb study also suggests that the difference in pregnancy rates is probably secondary to the removal of the detrimental effect of the hydrosalpinx fluid. An ectopic pregnancy rate of 5.3% was reported in the Dlugi study and 4% in the McComb study, whereas no ectopic pregnancies were noted in our series. In fact, ectopic pregnancy rates have been reported to be higher in patients undergoing IVF who have had previous distal tubal surgery (Zouves et al., 1991).

In conclusion, selected patients with a unilateral hydrosalpinx and a normal patent contralateral Fallopian tube may increase their fecundity after salpingectomy or proximal tubal occlusion of the affected tube, without the need for IVF. It appears, though, that salpingectomy is more effective in achieving a spontaneous pregnancy sooner. Unilateral salpingectomy or proximal tubal occlusion may be a better option than attempted neosalpingostomy since the latter choice has an associated increased risk for ectopic pregnancy or re-occlusion of the treated tube. The apparent increase in spontaneous conception following unilateral surgery is a compelling reason to consider this as the first option prior to attempting IVF. Given the relatively limited size of this select patient population and the strength of the observed trends, randomization of patients to a prospective trial, while always ideal, may present practical and perhaps even ethical concerns.

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