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Mini Review

Laparoscopic Management of Hydrosalpinx before Intra-Cytoplasmic Sperm Injection: Salpingectomy versus Proximal Tubal Cut

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Abstract

Objective: To compare the effect of laparoscopic salpingectomy and proximal Fallopian tubal cut on ovarian function after controlled ovarian hyperstimulation.

Methods: Sixty patients undergoing their first IVF-ET cycle were divided into (group I) 30 patients undergoing laparoscopic salpingectomy, and (group II) 30 patients undergoing proximal tubal cut.

Main outcome measure(s): Antral follicular count, basal antimullerian hormone(AMH) levels before and3 months after surgery, operative time , total dose and duration of IVF stimulation, number of retrieved and fertilized oocytes, and the number of embryos transferred, and pregnancy rate.

Result(s): There was a significant differences in ovarian reserve (AFC, AMH level) among the two studied groups before or after surgery. The mean AMH value was similar before and after laparoscopic proximal tubal division. The AMH value significantly decreased after laparoscopic salpingectomy. The operative time in the PTD group was significantly shorter than in the salpingectomy group. Total dose and duration of stimulation and the number of retrieved and fertilized oocytes were not significantly different between the two groups.

Conclusion(s): Laparoscopic salpingectomy or proximal tubal division gives similar responses to IVF-ET cycles. However, proximal tubal division preserved ovarian function.

Keywords: Hydrosalpinges; IVF; Ovarian response; Salpingectomy; Fallopian tube division

Introduction

Tubal disease, particularly hydrosalpinx, has a detrimental effect on in vitro fertilization (IVF) cycle outcome [1]. Although, prophylactic salpingectomy for large hydrosalpinges could improve pregnancy and live birth rate in women undergoing IVF [2], the effect of salpingectomy on ovarian function remains a matter of debate.

Decreased ovarian response ipsilateral to the site of salpingectomy was shown in one study [3], in another study no significant differences in the response to ovarian stimulation before and after salpingectomy were noted when patients were used as their own controls [4]. Due to the close anatomical association of vascular and nervous supply of tubes and ovaries, partial disruption of ovarian blood supply is possible after unilateral or bilateral salpingectomy [5].

Standell et al. [4] recommended cautious use of electrocautery, with resection very close to the actual tube to avoid damage to the medial tubal artery, and to leave a portion of an adherent tube on the ovary rather than performing unnecessary radical salpingectomy. In cases where it would be difficult to perform the salpingectomy close to the fallopian tube, Lass recommended clamping the proximal part of the hydrosalpinx in combination with distal fenestration [6]. In recent years, laparoscopic proximal tubal occlusion procedure is performed more often.

This study compares the effect of laparoscopic salpingectomy with proximal tubal division on ovarian function assessed as ovarian response to IVF treatment for infertility patients with hydrosalpinx.

Patients and Methods

This study was carried out on a cohort of sixty infertile patients with hydrosalpinges undergoing laparoscopic salpingectomy and proximal tubal division before in vitro-fertilization. It was conducted in laparoscopy and assisted reproductive units of the Shat by University hospital between July 2016 and November 2017.

Inclusion criteria were infertile Patients with tubal factor of infertility under 40 years of age during their first IVF-ET cycle, all patients underwent transvaginal ultrasound examination and hysterosalpingography using an oil-based radiographic contrast agent. The presence of hydrosalpinges was diagnosed before laparoscopic surgery, and the diagnosis was confirmed at the time of laparoscopy.

Exclusion criteria were patients with pyosalpinx or hematosalpinx, patients with contraindications to laparoscopy, Patients with mixed infertility factors and those who had hydrosalpinges less than 3cm were also excluded from the study.

Patients were divided into two groups (group I) including 30 patients undergoing laparoscopic salpingectomy unilateral or bilateral, and (group II) 30 patients undergoing proximal tubal division unilateral or bilateral. The decision to perform either salpingectomy or tubal division was left to the surgeon.

Laparoscopic salpingectomy was performed using bipolar cauteries. Adhesiolysis was performed if necessary. The mesosalpinx was transected just below the fallopian tube to minimize any compromise to the collateral blood supply of the ipsilateral ovary. The fallopian tube was transected 0.5 cm from the cornual region. Proximal tubal occlusion was performed using a bipolar cautery applied at two sites separated by approximately 1 cm on the isthmic portion of the affected tube, and the hydrosalpinx was not drained.

Ovarian stimulation protocol

All women were treated according to a standardized long step-down ovarian stimulation protocol. Pituitary down regulation was achieved using GnRH agonist triptorelin (Decapeptyle, Ferring, Keil Germany) in all patients as a subcutaneous dose of (0.1mg) daily starting in the midluteal phase of the preceding menstrual cycle. The initial administered dose of hMG (Fostimone, 75IU Ibsa, Switzerland) and 3-6IM ampules of urinary FSH were individualized according to the patient's age, and response calculated. Baseline serum FSH, and serum E2 concentrations were measured on day 3 of the ovarian stimulation and then repeated daily or every other day according to the individual's response to stimulation. Transvaginal ultrasound scan was arranged routinely on day 8 and day 10 of the ovarian stimulation and every 2 days thereafter. When at least three follicles reached a mean diameter of ⩾18mm, hCG human chorionic gonadotropin 10,000IU (Choriomon, Ibsa Switzerland) was administered.

Assessment of ovarian response and pregnancy outcome

Serum AMH level and AFC were measured before surgery and 3 months after surgery but before commencing ovarian stimulation. Ovarian response to stimulation was calculated as the total dose and duration of hMG administration, the number of retrieved and fertilized oocytes, and the number of embryos transferred.

Statistical analysis

Data are presented as mean±SD. Differences between groups were tested using one way ANOVA, χ2-test, and calculation of the Z-ratio as appropriate. The Statistical Package for Social Sciences (SPSS 15.0, Chicago) was used for statistical analysis. P<.05 was considered statistically significant.

Results

The baseline clinical data and outcome of the first treatment cycle for groups I and II were shown in Table 1, the two groups were compared for age, and basal AMH levels. Groups I and II were compared for the antral follicle count before and after surgical procedures. The operative time in (group I) was significantly shorter than that of (group II) (1 hour vs. 0.50 hour, P<0.001). Serum AMH levels were significantly lower in group I compared with group II after laparoscopic surgery, (P<.05). The AMH levels were significantly lower after surgery than before surgery in group I (P<0.001) while, in group II, the AMH levels after laparoscopic surgery were compared to those before surgery (P=0.449).

Table 1: Baseline clinical and post surgery data for patients included in the study.

Age (years)	Salpingectomy Group	PTD Group	P-Value
	33.4±4.38	**31.4±4.75**	**0.09**
Basal AMH Level Before Surgery	1.68±1.01	2.18±.80	0.082
Basal AMH Level After Surgery	1.53±1.01a	2.16±0.76	0.049b
AFC (Before Surgery)	9.04±3.98	10.0±3.28	0.384
AFC (After Surgery)	7.70±3.55	9.93±2.91	0.002
Operative Time (Hours)	1.0±0.0	0.50±0.0	<0.001c

Data are expressed as Mean±SD.

a: Significant differences between group I and II.

b: P=.049(group I: baseline pre surgery vs. post surgery serum AMH levels).

c: P<0.001 (operative time In group A vs. group B).

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The response to COH in the two studied groups was summarized in Table 2. The required gonadotropin doses until oocyte retrieval, duration of stimulation, number of retrieved and fertilized oocytes were compared between the two groups with no statistically significant difference in each parameter except duration of stimulation.

Table 2: Response to controlled ovarian hyper stimulation in the studied groups.

Total Dose of hMG (Ampoules)	Salpingectomy Group	PTD Group	P Value
	41.09±6.7	**44.4±8.041**	**0.091**
Duration of hMG Stimulation (days)	14.07±2.62	11.53±1.14	0.001
No. of Oocytes Retrieved	16.2±1.2	17.5±1.8	0.11
No. of Oocytes Fertilized	6.11±3.5	7.1±3.5	0.206
Number of Embryo Transferred	4.1±2.13	5.19±2.54	0.126

Note: Data are expressed as Mean±SD unless otherwise indicated.

Discussion

Several reports have indicated that the presence of hydrosalpinx adversely affects both implantation and pregnancy rates [7-10]. Two meta-analyses have shown a reduction by half in the probability of achieving a pregnancy in the presence of hydrosalpinx and a doubled rate of miscarriage [11,12]. The decreased pregnancy rate may be correlated with the size of the hydrosalpinges, as such an association has not been observed in women with hydrosalpinges not visible on ultrasound [13].

Prophylactic salpingectomy in women with large hydrosalpinges has recently been shown to be beneficial in terms of increased pregnancy and live birth rates after IVF treatment [2]. However, the effect of salpingectomy on ovarian function has been debated and the results of previous published studies are not entirely in consensus. The close anatomical association of the vascular and nervous supply to the fallopian tubes and ovaries constitutes the rationale for the risk of impaired ovarian function after surgery. To avoid disrupting the normal blood flow to the ovary, Lass [6] recommended clamping the proximal part of the hydrosalpinx in combination with distal fenestration in those cases where it would be difficult to perform the salpingectomy close to the fallopian tube.

Several recent reports have indicated that patients who underwent salpingectomy showed no impairment of ovarian stimulation for ART treatment [14-16]. On the other hand, Lass et al. [6] reported that a significant reduction in the number of developed follicles and retrieved oocytes was noted from the ovary ipsilateral to which a unilateral salpingectomy had been performed [17]. A theoretical decrease in ovarian blood perfusion may result after the salpingectomy, once some of the blood supply to the ovary is received through the branches of the uterine artery and the mesosalpingeal vascular arcade. Thus, bilateral salpingectomy could diminish ovarian function. In the rat model, a reduction in ovarian blood supply may have had a direct effect on ovulatory function [18], whereas in the rabbit model, fimbriectomy resulted in a reduced number of the corpus luteum [2].

Proximal tubal occlusion represents a significantly less invasive approach that requires less surgical dissection and operative time while still eliminating the retrograde flow of hydrosalpingeal fluid into the endometrial cavity. In one study the clinical impact of proximal tubal occlusion and salpingectomy was evaluated before IVF in patients with hydrosalpinges [19]. The implantation, clinical-pregnancy, and ongoing-pregnancy rates were comparable to those who underwent salpingectomy or proximal tubal occlusion. Moreover, the approach and method of laparoscopic proximal division of the fallopian tubes was easier and safer than laparoscopic salpingectomy.

In this study, we found that the management of hydrosalpinges by laparoscopic salpingectomy or proximal tubal division gives similar response to controlled ovarian hyperstimulation. But when comparing baseline pre surgery with post surgery serum AMH levels, the latter were significantly decreased in the salpingectomy group. Thus salpingectomy may have a negative effect on ovarian reserve, compared with tubal division or no surgery.

Our results run in agreement with a recent study which found that laparoscopic proximal tubal division preserved ovarian function and was an optimal operative method for infertility patients with hydrosalpinges [5]. Also, the operative time in the PTD group was significantly shorter than that of the salpingectomy group, because the severe adhesion and large hydrosalpinges lengthened the operative time.

Between October 2012 and May 2013 Ye et al. [20], conducted a retrospective analysis of the effect of salpingectomy on serum antiMu¨ llerian hormone level and ovarian reserve. A total of 198 women were included; 83 received unilateral salpingectomy, 41 bilateral salpingectomy, and 74 no tubal surgery. The baseline characteristics of the groups were similar. The mean AMH level was significantly higher in women without tubal surgery as compared with those with bilateral salpingectomy (183.48 vs 127.11fmol/mL; P_.037). The mean FSH level was significantly lower in women without surgery as compared with those with bilateral salpingectomy (7.85 vs 9.13mIU/mL; P¼ .048). No significant differences in duration of gonadotropin therapy, amount of gonadotropin used, estradiol level on the human chorionic gonadotropin injection day, thickness of the endometrium, number of oocytes retrieved, number of 2-pronuclei, viable embryos, and good quality embryos were found between the 3 groups [20]. Our study results are similar to those results as regard ovarian reserve and controlled ovarian hyperstimulation cycle except for duration of gonadotropin therapy.

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Between April 2001 and January 2004 Gelbaya et al. [5] conducted a retrospective study to compare the effect of prophylactic laparoscopic salpingectomy versus division of the fallopian tubes on ovarian response to gonadotropins in women undergoing IVF. One hundred sixty-eight women with tubal factor infertility were included, Sixty-five women with hydrosalpinges had either salpingectomy (n_40, group A) or proximal tubal division (n_25, group B), while the remaining women with tubal disease but without hydrosalpinges acted as the control group (n_103, group C). In group A, baseline FSH levels were significantly raised after surgery compared with before surgery. Postsurgery FSH concentrations were significantly higher in group A compared with group B. The number of follicles (15-20mm) was significantly lower in group A compared with group B and group C. The number of oocytes retrieved per cycle was significantly lower in group A compared with group B. There were no significant differences in pregnancy rates and miscarriage rates among the three groups [5]. Our result showed that IVF cycle outcomes were unaffected by salpingectomy, as great care was taken to transect the mesosalpinx just below the fallopian tube in an effort to minimize compromise to collateral ovarian blood supply. A more extensive transection of the mesosalpinx could have a deleterious effect. Also, in their study patients with mixed infertility factors were included and this could affect the response to stimulation.

In an interesting study on hysteroscopic occlusion of the hydrosalpinx prior to IVF, Ten women with uni- or bilateral hydrosalpinges in whom laparoscopy was felt to be contraindicated were studied [6]. Hysteroscopic placement of Essure devices was performed in an office setting. All patients had successful placement of the Essure devices without any complications. Proximal tubal occlusion was confirmed by hysterosalpingography in 9 out of 10 patients. A 40% ongoing pregnancy rate was achieved with 20% live births after one IVF cycle and/or frozen embryo transfer. And the author concluded that proximal occlusion of hydrosalpinges with Essure devices before IVF is a successful treatment for patients with a contraindication for salpingectomy [6].

Conclusion

In conclusion, surgical management of hydrosalpinges by either laparoscopic salpingectomy or proximal tubal division gives statistically similar responses to controlled ovarian hyper stimulation. However, salpingectomy in women with a hydrosalpinx may not be without reproductive risks. So, laparoscopic proximal division of fallopian tubes should be recommended for the treatment of hydrosalpinges rather than laparoscopic salpingectomy, especially for ovarian reserve.

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