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Impact of laparoscopic salpingectomy on clinical pregnancy, live birth, and miscarriage rates in women with hydrosalpinx

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ABSTRACT

Introduction: This study was planned to investigate the effect of L/S salpingectomy to be performed before IVF/ICSI on clinical pregnancy, live birth, and abortion rates in infertile patients diagnosed with hydrosalpinx.

Materials and Methods: Forty patients who were found to have hydrosalpinx in routine evaluations before ART were included in the study. The diagnosis of Hydrosalpinx (HX) was made by transvaginal ultrasonography or hysterosalpingography (HSG). Based on HSG or sonography, a unilateral or bilateral hydrosalpinx was noted as being present or absent. A hydrosalpinx was defined as an echo-free cyst-like fluid accumulation or irregular cystic lesion located outside the ovary and uterus. Salpingectomy was recommended because it may adversely affect ART results. The patients were divided into two groups according to their salpingectomy decisions. Group 1 (n=23) consisted of patients with uni or bilateral HX and accepted salpingectomy. Group 2 (n=17) consisted of patients who were found to have uni or bilateral HX but did not accept salpingectomy. Fifteen patients who did not have HX and were planned for IVF/ICSI due to unexplained infertility were accepted as the control group. The primary outcome measures of the study were detection of serum beta-hCG levels, clinical pregnancy rate (CPR), live birth rate (LBR), and miscarriage rate.

Results: Positive beta-hCG was detected in 11 of 23 patients who underwent salpingectomy (47.8%), while hCG was positive in six of 17 patients who did not undergo salpingectomy (35.2%). In the salpingectomy group, clinical pregnancy was detected in 10 patients (43.4%), nine patients had a live birth (39.1%), and abortion was found in 1 patient (9.0%). In the group that did not undergo salpingectomy, clinical pregnancy was detected in 5 patients (29.4%), three patients gave live birth (17.6%), and abortion was found in 2 patients (33.3%). Positive beta-hCG (47.8% vs. 35.2%, $p<0.01$), CPR (43.4% vs. 29.4%, $p<0.002$), and LBR (39.1% vs. 17.6%, $p<0.001$) were found to be significantly higher in the salpingectomy group compared to the non-salpingectomy group. Abortion rates were significantly higher in the group that did not undergo salpingectomy (33.3% vs. 9.0%, $p<0.01$). The hCG positivity, CPR, and LBR of the unexplained infertile patients were similar to the salpingectomy group. In this group, pregnancy test positivity was found in seven of 15 patients (46.6%), clinical pregnancy was found in 6 patients (40%), and five patients had a live birth (33.3%). Abortion was detected in one case in the control group (14.2%).

Conclusion: Performing salpingectomy for HX improves clinical pregnancy and live birth rates and reduces miscarriage rates.

Keywords: Hydrosalpinx, Salpingectomy, Laparoscopy, Pregnency, Miscarraige

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Introduction

Hydrosalpinx (HX) is an important tubal pathology that impairs tubal anatomy and functions and prevents oocyte-sperm interaction. The presence of HX should be investigated in routine ultrasonography and hysterosalpingography (HSG) examination performed before ART. Although the previous pelvic infections are the most common cause of HX, sometimes, the underlying cause cannot be detected. Infections that cause blockage of the tubal passage lead to the accumulation of a toxic fluid in the fallopian tubes. The accumulated fluid can become infected over time. HX may cause subfertility or miscarriage by, (i) disrupting oocyte sperm transport, (ii) making the tubal environment unsuitable for fertilization, (iii) preventing blastocyst formation, and (iv) impairing endometrial receptivity. HX fluid may reach the endometrium by tubal passage or diffusion and impair receptivity.[1-3]

There is no medical treatment for HX. Antibiotics or anti-inflammatory drugs do not provide a definitive solution. Ultrasonography-guided drainage of HX is not recommended because fluid accumulation occurs again. Tubal occlusion can be done with hysteroscopy. However, the fluid accumulating behind may reach the endometrium through diffusion and adversely affect the results of ART.[1] The definitive treatment for HX is radical salpingectomy. All fallopian tubes, including the affected tubal section, must be removed. Salpingectomy with conventional laparoscopy forms the basis of HX treatment. Laparoscopy is the most preferred method because it provides faster recovery and anatomical vision compared to salpingectomy with laparotomy. Thanks to the L/S, the anastomoses in the mesosalpinx are easily separated and the deterioration of ovarian blood flow is prevented. Thus, the risk of ovarian failure due to salpingectomy is minimized.[4-6] During L/S, peritoneum, ovaries, other tubes, and uterus are visualized and additional pathologies are treated. An increase in pregnancy rates and a decrease in abortion rates have been reported after salpingectomy. This study was planned to investigate the effect of L/S salpingectomy to be performed before IVF/ICSI on clinical pregnancy, live birth, and abortion rates in infertile patients diagnosed with HX.

Materials and Methods

Forty patients who were found to have HX in routine evaluations before ART were included in the current retrospective study. The diagnosis of HX was made by transvaginal ultrasonography or HSG. All participants had a transvaginal ultrasound or HSG scan. Based on HSG or sonography, a unilateral or bilateral HX was noted as being present or absent. A HX was defined as an echo-free cyst-like fluid accumulation or irregular cystic lesion located outside the ovary and uterus. Salpingectomy was recommended because it may adversely affect ART results. The patients were divided into two groups according to their salpingectomy decisions. Group 1 (n=23) consisted of patients with uni or bilateral HX and accepted salpingectomy. Group 2 (n=17) consisted of patients who were found to have uni or bilateral HX but did not accept salpingectomy. Fifteen patients who did not have HX and were planned for IVF/ICSI due to unexplained infertility were accepted as the control group. The patients in the control group were matched with the other two groups in terms of age and body mass index (BMI).

Patients with HX in Group 1 underwent laparoscopy during the mid-luteal phase and uni-or bilateral salpingectomy was performed. The patients in Group 2 underwent IVF/ICSI without salpingectomy. In the salpingectomy group, the fallopian tubes were completely removed. Not only the area of HX but also the entire tubes were removed laparoscopically. Since the ovaries are fed by both the ovarian artery and the ovarian branches of the uterine artery, the mesosalpinx was opened to make the ovarian branches of the uterine artery visible to prevent possible ovarian failure, and the tubes were removed. Thus, since the anastomoses were not tied, the blood flow to the ovary was not affected. Patients in the salpingectomy group were started on IVF/ICSI treatment 3 months after the procedure. Antagonist protocol was applied to all patients in HX and control groups.

Recombinant follicle stimulating hormone (Gonal-F, Merck Pharmaceutical Group Inc, Turkey) was initiated as the initial dose on the 3rd day of the menstrual cycle. Transvaginal ultrasonography was used for monitoring the folliculogenesis. GnRH antagonist (Cetrotide 250 µg, Merck Serono, Turkey) was added daily when the leading follicle reached a diameter of 14 mm. When the mean diameter of two or three leading follicles reached 17–18 mm single dose of recombinant HCG was used to induce ovulation. The oocyte pick-up was carried out either 35 or 36 h after ovulation trigger. Single embryo transfer was performed under ultrasound guidance using a soft tip catheter. A single top quality embryo on day 3 or 5 was transferred. Luteal phase support with progesterone was

continued until the day of the pregnancy test. The primary outcome measures of the study were detection of serum beta-hCG levels, clinical pregnancy rate (CPR), live birth rate (LBR), and miscarriage rate. CPR defined as evidence of a gestational sac confirmed by ultrasound examination at the 4th week of transfer. LBR defined as delivery of a live fetus after 24 completed weeks of gestational age. Serum beta-hCG levels were measured in all patients on the 12th day of embryo transfer. The loss of fetus before 20 weeks of gestation was defined as miscarriage. The study was approved by the Local Ethics Committee (Approval No: E2-21-684).

Statistical Analysis

SPSS 21.0 (IBM Corporation, Armonk, NY, USA) was used for the statistical analysis of the data. The quantitative data were expressed as mean±standard deviation. The normality distribution of data was analyzed with Shapiro–Wilk test and found to normal. The continuous variables were analyzed by one-way ANOVA test. P<0.05 was considered significant.

Results

The ages and BMI of the patients in the salpingectomy and non-salpingectomy groups were found to be similar. Patients in the control group were also similar to the other groups in terms of age and BMI. IVF/ICSI was successfully performed in all groups. Infertility duration, RFSH dose, endometrial thickness, number of eggs collected, number of MII oocytes, and number of 2 PN zygotes were found to be similar in both HX and control groups. Beta-HCG positivity, clinical pregnancy, and LBRs were significantly higher in the salpingectomy group than in the non-salpingectomy group. Abortion rates in the group that did not undergo salpingectomy were higher than both the control group and the salpingectomy group.

Positive beta-hCG was detected in 11 of 23 patients who underwent salpingectomy (47.8%), while hCG was positive in six of 17 patients who did not undergo salpingectomy (35.2%). In the salpingectomy group, clinical pregnancy was detected in 10 patients (43.4%), nine patients had a live birth (39.1%), and abortion was found in 1 patient (9.0%). In the group that did not undergo salpingectomy, clinical pregnancy was detected in 5 patients (29.4%), 3 patients gave live birth (17.6%), and abortion was found in 2 patients (33.3%). Positive beta-hCG (47.8% vs. 35.2%, p<0.01), CPR (43.4% vs. 29.4%, p<0.002), and LBR (39.1% vs. 17.6%, p<0.001) were found to be significantly higher in the salpingectomy group compared to the non-salpingectomy group. Abortion rates were significantly higher in the group that did not undergo salpingectomy (33.3% vs. 9.0%, p<0.01). The hCG positivity, CPR, and LBR of the unexplained infertile patients were similar to the salpingectomy group. In this group, pregnancy test positivity was found in seven of 15 patients (46.6%), clinical pregnancy was found in 6 patients (40%), and five patients had a live birth (33.3%). Abortion was detected in one case in the control group (14.2%).

Discussion

HX is the most serious disease that causes tubal factor infertility. HX is detected in 10–30% of patients presenting with tubal factor infertility. Obstruction of the distal tubal leads to the formation of pockets of fluid, leading to subfertility. IVF/ICSI success rates are significantly reduced in HX cases compared to healthy controls. If there is no contraindication for surgery, laparoscopic salpingectomy is the first treatment option. Essure can be used in severe pelvic adhesions. However, Essure does not significantly increase pregnancy rates. Distal tubal surgery is not preferred because it leads to ectopic pregnancy.[7]

Although it is known that HX adversely affects the fertility outcome, some problems regarding its treatment continue. Salpingectomy carries two different problems for the physician and the patient. Most patients think that their fertility is completely over when their tubes are removed. For this, it is necessary to provide educational information about the anatomy and physiology of the tubes to the patients, if necessary, to ensure that they receive psychological support. From the point of view of the physician, the possible negative effects of salpingectomy on ovarian reserve may cause him to behave timidly in the treatment. There are few studies showing that salpingectomy reduces ovarian reserve.[6] Vignarajan et al.[6] reported a significant decrease in serum AMH levels after salpingectomy. However, this study was not supported by further studies. In a study by our team, we showed that salpingectomy improves fertility by eliminating pathological inflammation in the endometrium.[3] Similarly, it has been reported that expression of endometrial receptivity genes is increased after salpingectomy.[8]

In this present study, we showed that the clinical pregnancy and LBRs of patients who underwent salpingectomy for HX were significantly higher than those who did

not undergo salpingectomy. Salpingectomy also provided a significant reduction in abortion rates. All these findings support the positive effects of salpingectomy on fertility outcome. Hysteroscopic tubal blockade or laparoscopic proximal tubal occlusion also positively affects fertility outcomes.[4,6] However, since the HX fluid will remain in place, it may reach the endometrium by diffusion and adversely affect implantation rates. While the pregnancy rate after tubal occlusion was 45%, it was found to be around 62% after salpingectomy.[4,6] This finding in favor of salpingectomy should be considered in clinical practice. If the anastomoses of the fallopian tubes are well preserved during laparoscopy, the ovarian reserve is minimally affected. In fact, comparing the three different methods used in HX management is important in terms of finding answers to the questions in our minds. A meta-analysis published by Xu et al.[5] compared salpingectomy, proximal tubal occlusion, and hysteroscopic Essure insertion. Salpingectomy and proximal tubal occlusion were found to be similar in terms of effectiveness. Essure use was found to be less effective than both methods.[5]

In our study, salpingectomy significantly increased the fertility outcome and significantly decreased the abortion rates. Removal of HX tissue positively affected fertility by increasing receptivity gene expression and reducing pathological inflammation.[3] Seli et al.[9] reported that LIF expression increased after salpingectomy. Removal of alkaline and infected fluid-filled HX may have increased pregnancy rates by preventing this fluid from reaching the endometrium. Myometrial peristaltism may also have returned to normal as the mechanical effect of HX has disappeared. In IVF/ICSI cycles without HX removal, pregnancy rates decrease due to the toxic effect of the fluid or mechanical effect, while abortion rates increase.

Conclusions

If HX is detected before the treatment in patients applying for IVF/ICSI, it should be removed laparoscopically. Thus, both pregnancy rates increase and abortion rates decrease. Other pathologies detected in the peritoneum and ovaries during laparoscopy can be treated simultaneously, resulting in better IVF/ICSI results.

Disclosures

Ethichs Committee Approval: The study was approved by the Local Ethics Committee (Approval No: E2-21-684).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – S.S.E., H.A.; Design – S.S.E., H.A.; Supervision – S.S.E.; Materials – S.S.E., H.A.; Data collection and/or processing – S.S.E., H.A.; Analysis and/or interpretation – S.S.E.; Literature search – S.S.E., H.A.; Writing – S.S.E., H.A.; Critical review – S.S.E., H.A.

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