UNILATERAL HYDROSALPINX AND IN VITRO FERTILISATION

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JEDNOSTRANI HIDROSALPINKS I IN VITRO FERTILIZACIJA

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ABSTRACT

We completed a retrospective analysis of laparoscopic procedures (salpingectomy, proximal electrocoagulation of tubes and salpingoneostoma formation) in 30 patients who were treated for fallopian tube infertility. The main cause of infertility was the alteration of the fallopian tubes by a hydrosalpinx. Observed parameters included the following: age, time period and duration of infertility before surgery, number of applied assisted procedures before surgery, number and type of previous operations, number and outcome of previous pregnancies, new outcome and number of realised pregnancies. In the group of examined cases, no male infertility was involved. Applied diagnostic methods included transvaginal ultrasound, laparoscopy and hysterosalpingography.

We categorised the level of the pathological changes of the tubes through clinical examination and complementary technological procedures: (1) a hydrosalpinx is visible with ultrasound before IVF treatment (2) and a hydrosalpinx is visible with ultrasound during IVF treatment (during stimulation), hysterosalpingography and laparoscopy.

The aim of this study was to determine the efficacy of applied laparoscopic procedures and the impact of these procedures on improving results of the treatment of infertility in cases of IVF.

The results and the conclusion are that laparoscopic salpingectomy, because of hydrosalpinx, improves IVF success in patients who undergo this procedure compared with patients who do not have a salpingectomy as a pretreatment for IVF.

Key words: *infertility, hydrosalpinx, laparoscopy, IVF*

SAŽETAK

Urađena je retrospektivna analiza laparoskopskih postupaka (salpingektomija, proksimalna elektrokoagulacija jajovoda i salpingoneostoma) kod 30 pacijentkinja koje su lečene zbog tubarnog uzroka bračne neplodnosti. Osnovni uzrok neplodnosti bili su izmenjeni jajovodi u vidu hidrosalpinksa. Posmatrani parametri su godine starosti, vremenski period i trajanje neplodnosti pre operacije, broj primenjenih asistiranih postupaka pre operacije, broj i vrsta prethodnih operacija, broj i ishod prethodnih trudnoća, novi ishod i broj realizovanih i iznešenih trudnoća. U grupi isptivanih žena nije postojao muški uzrok neplodnosti. Primenjene dijagnostičke metode su transvaginalni ultrazvuk, histerosalpingografija i laparoskopija.

Nivo patološke izmenjenosti jajovoda smo kategorisali kliničkim pregledom i komplementarnim tehnološkim postupcima: hidrosalpinks vidljiv ultzrazvukom pre tretmana IVF, hidrosalpinks vidljiv ultrazvukom tokom tretmana IVF (prilikom stimulacije), histerosalpingografski i laparoskopijom.

Cilj rada je da utvrdimo uspešnost primenjenih laparoskopskih postupaka i njihov uticaj na poboljšanje rezultata u lečenju neplodnosti kod primene IVF-a.

Očekivani reztultati i zaključak su da laparoskopska salpingektomija zbog hidrosalpinksa značajno poboljšava uspešnost IVF u odnosu na pacijentkinje koje nisu imale salpingektomiju kao pretretman IVF.

Ključne reči: *sterilitet, hidrosalpinks, laparoskopija, IVF*

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INTRODUCTION:

A hydrosalpinx is a distally blocked fallopian tube that is filled with serous, mostly clear liquid. Expanded tubes look like sausages, and they can reach a diameter of up to several centimetres.

In the normal function of the fallopian tubes, endosalpinges or cilia are involved in the mobilisation of items towards the uterus, and tube liquid has its own dynamics in the peritoneal cavity where it is further absorbed. If tube fimbria get stuck, it results in obstruction and the accumulation of tube fluid, thus damaging the endometrium by various mechanisms. Then, the tube cannot participate in the reproductive process.

The main cause of distal tube occlusion is pelvic inflammatory disease (PID) as a result of ascending infection, usually by chlamydia and gonorrhoea. All pelvic infections do not cause tube occlusion. Tube tuberculosis is a very rare cause of tube occlusion and hydrosalpinx formation.

Other causes of distal occlusion are adhesive formations from previous surgeries, endometriosis and cancer, which can originate in the tube, ovary or other surrounding organs (1).

Since tube function is blocked, infertility is a common symptom. These infections usually affect both tubes, although changes can often be unilateral. Before infection, tube fluid is sterile and does not contain any infectious agents.

A hydrosalpinx can be diagnosed with a transvaginal ultrasound when the liquid fills, extends and descends in the tubes and shows the typical 'echo lucent' look. Diagnostic methods include the following: transvaginal ultrasound; hysterosalpingography; and laparoscopy, which, in addition to being diagnostic, also prepares the platform for intervention.

In the twentieth century, patients with tube causes of infertility were subjected to corrective surgery (anastomosis of tubes), opening the distal end of the tube (salpingostoma) and the removal of adhesions (adhesiolysis). Unfortunately, the level of pregnancy after these interventions was very low, and the infectious process was constantly returning and damaging the tube, again causing a hydrosalpinx and the formation of adhesions. Ectopic pregnancy is a typical complication of such tube alterations (2).

The reason IVF was originally performed was for tube causes of infertility. The first report from 1994 showed a reduced number of pregnancies and an increased number of abortions for patients with a hydrosalpinx compared with patients with other tube disorders (3).

Today, IVF has become the main treatment for women with a hydrosalpinx who want to become pregnant when male factor infertility is excluded. Several studies show that patients with an untreated hydrosalpinx have a lower level of conception than the control group, and it is thought that tube fluid, which enters into the tube cavity, changes the local environment or affects the embryo (3,4,5).

In recent years, several authors have reported the probability of more successful IVF treatment in cases where unilateral or bilateral salpingectomy has been previously performed. The conclusion was based on nonrandom data. Many data indicate that women with diseases of the fallopian tubes have poor IVF success and a statistically significant benefit of surgical treatment for a hydrosalpinx (6–10).

In cases of extensive inflammatory tube pathology, unilateral or bilateral salpingectomy not only improves IVF results but, in some cases, also reduces the risk of chronic pelvic pain and acute inflammatory processes in response to follicular aspiration or embryo transfer. Among the potential advantages of this procedure, the biggest advantage is the prevention of ectopic ampullary pregnancy. In any case, the risk of intramural ectopic pregnancy still remains after salpingectomy (11).

AIM OF THE WORK AND HYPOTHESES

Our working hypothesis is that unilateral laparoscopic salpingectomy or proximal tube electrocoagulation applied in infertility cases involving a unilateral hydrosalpinx leads to an increase in the number of realised pregnancies.

The aim of our study was to determine whether laparoscopic unilateral salpingectomy or proximal tube electrocoagulation with a unilateral hydrosalpinx increased the success of realised and accomplished pregnancies.

MATERIALS AND METHODS

The research was conducted by examining the documentation of the gynaecology department in the gynaecology and obstetrics services in Health Center Valjevo, as well as by insight into the therapeutic procedures of assisted reproduction in the Special Gynaecology Hospital "Ivanovic" in Belgrade.

The study was approved by the Ethics Committee of the Health Center Valjevo, and all patients signed a consent form, agreeing they were familiar with all aspects of treatment and accepting the appropriate, indicated operational procedure.

The study was retrospective in the form of nonrandom controlled clinical experiments.

The research involved 30 patients.

The criteria for inclusion in the study were the following:

- the presence of unilateral sactosalpinx, verified by transvaginal ultrasound, hysterosalpingography and laparoscopy
- infertility for longer than two years
- previously failed assisted procedure/s with the presence of sactosalpinx
- partner normospermia

Excluded from the study were all patients diagnosed with the following:

- the presence of active infection of the cervical canal and vagina
- the presence of an active urinary tract infection
- the presence of ovarian cysts
- ovarian endometriosis
- uterine myomas located so that they could be a cause of obstruction of tube mobility

All examined women were divided into three groups depending on which type of surgery was done:

- unilateral removal of tubes (salpingectomy) at 5–7 mm from the uterine horns
- electrocoagulation of one fallopian tube at 5–7 mm from the uterine horns with the evacuation of the sactosalpinx contents
- reconstruction of an abdominal mouth of one of the tubes with adhesiolysis

After the patients were informed in detail about the type, benefits and risks of operative treatment, their written consent was obtained for the appropriate operational procedure. According to the protocol of preoperational preparation, all patients were ambulatorily prepared.

The success or failure of surgical procedures for all patients was determined through an analysis of completed pregnancies. The results of biochemical, clinical and ultrasound data of verified pregnancies was compared. Most important, the number of realised pregnancies were analysed. The following were parameters: age, duration of infertility, number and type of previous operations and number and type of previous assisted procedures. The condition of patients' infants were analysed according to Apgar score.

Assisted procedures were attempted 60 days after operative treatment in the period of endometrial renewal.

The health condition of all patients, the way in which pregnancy was achieved, and the type and number of assisted procedures were followed for at least one year after the laparoscopic operations.

Patients who achieved and realised pregnancy were checked until their children's births and again seven days after the births.

Statistics

In the statistical analysis, the following methods were used: descriptive statistics, the relative numbers and the absolute numbers.

RESULTS

Data from 30 patients who had a unilateral hydrosalpinx were analysed.

The average age of these women was 34.8 ± 4.4 years, while the average duration of infertility was 8.0 ± 3.7 years.

The distribution of pregnancies and their outcomes in the period prior to our operation is shown in Table 1.

Table 1

	N	%	% In the group of women who were pregnant
Ectopic pregnancy	11	36.7	55.0
spontaneous abortion	8	26.7	40.0
Spontaneous abortion and ectopic pregnancy	1	3.3	5.0
Total number of women who were pregnant	20	66.7	100.0
Women who were not pregnant	10	33.3	
Total	30	100.0	

Out of 30 patients, 20 of them became pregnant. Eleven patients had ectopic pregnancies, eight had spontaneous abortions, one patient had an ectopic pregnancy and a spontaneous abortion, and 10 patients did not become pregnant.

The distribution of patients with a unilateral hydrosalpinx according to the type of previous operations is shown in Table 2.

Table 2

	H	%	% Of women who have had previous surgery
salpingectomy	8	26.7	57.1
Neostoma formation	5	16.7	35.7
salpingectomy and neostoma formation	1	3.3	7.1
Total number of women who had operations	14	46.7	100.0
Women who did not have operations	16	53.3	
Total	30	100.0	

Of the 14 patients who had operations, 8 had salpingectomies, 5 had salpingoneostoma formations and one patient had both operations. In total, nine salpingectomies were done because of ectopic pregnancies, and three ectopic pregnancies were treated with ampullary methotrexate. Sixteen patients did not have operations.

In addition to the type of previous surgery, the distribution of women with unilateral sactosalpinx by the type of previous assisted procedure has been analysed, and the results are shown in Table 3.

Table 3.

	H	%	% Of women who have had previous assist. procedure
IVF	19	63.3	86.4
IUI	2	6.7	9.1
IVF i IUI	1	3.3	4.5
Total of women who have had previous assist. procedure	22	73.3	100.0
Women who have not had previous assist. procedure	8	26.7	
Total	30	100.0	

Out of the 30 patients, one or both assisted procedures had been completed in 22. IVF was applied in 19 women,

IUI in 2 women, and both IVF and IUI in 1 woman. In eight women, we applied no assisted procedures.

All women were analysed in relation to the type of our operations we applied based on indications and the patient's own wishes, as well as according to treatment outcome.

The distribution of these patients in relation to the type of operation and the outcome of treatment is shown in Table 4.

Table 4.

		The final outcome				Total
		failed fertilisation	spontaneous abortion	Ectopic pregnancy	Realised pregnancy	
Type of the new operations	salpingectomy	2	0	0	15	17
	Electrocoagulation	1	0	0	2	3
	Neostoma formation	2	3	4	1	10
Total		5	3	4	18	30

From a total of 30 patients, 5 had failed fertilisation, 3 had spontaneous abortions and 4 had ectopic pregnancies, while 18 patients had realised pregnancies. In relation to the type of operation, it is evident that the greatest success was with women who had salpingectomies (15 of 17 women) or proximal tube electrocoagulation (2 of 3 women).

DISCUSSION

Tube pathology affects the expression of the endometrial integrity during implantation windows, and in some cases, the expression may be reestablished after removing the pathological tubes (3,12,13). Tube pathology increases the number of macrophages in the endometrium compared with the number of macrophages in the endometria of fertile women. Despite the large number of studies concerning tube pathology with a hydrosalpinx and embryo implantation, the pathophysiology remains unclear (3).

A hydrosalpinx is formed after the destruction of fimbria and, consequently, by the accumulation of different tube secretions. These secretions can reach the uterus. The resulting dysfunction of endometrial receptivity can interrupt the process of embryo implantation. If these hypotheses are correct, bilateral salpingectomy directly affects the cause of endometrial alteration and reestablishes its receptivity (3,12,13). The consequence is the possibility of embryo implantation, which becomes possible after this procedure. The result is spontaneous pregnancy soon after unilateral salpingectomy in hydrosalpinx (3,12,14,15).

In our research, we chose 30 patients who had sactosalpinges with presently severe pathology of their tubes. The patient selections were made after reviewing the internal genital organs with adequate complementary diagnostic procedures: transvaginal sonography; diagnostic laparoscopy; and hysterosalpingography, which is also a platform for the implementation of operational procedures (salpingectomy, proximal tube electrocoagulation with evacuation of the liquid of a hydrosalpinx and salpingoneostoma formation).

Access to surgical treatment was indicated and conditioned, in our opinion, by irreversible pathological changes in the fallopian tubes (sactosalpinx is visible with ultrasound with a diameter of two or more centimetres; it appears as a fallopian tube with severe inflammatory pathology and very thick wall with completely reduced fimbrial device and obliterant mouth with or without the presence of adhesions) and the patient's own consent to the recommended operating procedure.

Other observed parameters were patient age, duration of infertility, number and type of previous operations and assisted procedures, new types of operations, number and type of new assisted process and final outcome.

In many other studies, which had a self-control group, before surgical treatment, the selection for salpingectomy was only based on the number of failures in the application of IVF. These data are taken into account although there was no control group.

Our research was a clinically controlled experiment involving patients whose homogeneity was conditioned by pathological tube substratum, and who are themselves a self-control group.

In this way, optimal conditions were created for observing the desired variables by the type of applied surgical methods.

Due to the high success of the IVF method, which, in all reproductive periods of life, surpasses the performance of spontaneous conception, the indications for ART methods are broad. Among the most important, of course, is emergency IVF, IVF in late reproductive age, and IVF as a substitute for reconstructive surgical techniques of tube infertility treatment in the second half of the reproductive period of life (16).

From a total of 30 patients with unilateral hydrosalpinx, 5 had failed fertilisations, 3 had spontaneous abortions, 4 had ectopic pregnancies and 18 patients had realised pregnancies. In relation to the type of operation, the most success was seen in women who had salpingectomies (15 of 17 women) (Table 4). This result favours the hypothesis of dysfunction of endometrial receptivity and its alteration after the removal of the hydrosalpinx (3,12,14,15).

The largest number of patients had a salpingectomy %), while the tubes were electrocoagulated in the rarest types of operations %). Salpingectomy and proximal electrocoagulation of tubes are procedures that have the same goal, but we performed one or the other according to indications. This type of operation was two times more frequent than formation and is applied only when the patient desires the operational technique. (Table 4).

In all 30 patients, IVF was applied. To patients who required conservation tubes (salpingoneostomas), IVF was also applied by their own choice. The other 25 patients (83.3%) remained pregnant, while 5 patients (16.7%) did not become pregnant. Out of 25 women who became pregnant, 18 women had realised pregnancies (72%), 3 women had complications in the form of spontaneous abortion (12%) and 4 women had ectopic pregnancies (16%).

CONCLUSION

Patients who underwent unilateral laparoscopic salpingectomies or proximal tube electrocoagulations because of unilateral hydrosalpinges as pretreatment for IVF had a greater ability to generate and realise pregnancies compared with patients who used IVF with the hydrosalpinges still present.

After applied laparoscopic procedures before IVF, the number of complications, spontaneous abortions and ectopic pregnancies was significantly reduced.

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