

The outcome of IVF-ET post embolization of fallopian tube: Case series and literature review at KAMC, Riyadh, Saudi Arabia

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Abstract

Objective: To learn about the results of IVF-ET after embolization of the fallopian tube, to have enough information and data about IVF-ET after embolization of the fallopian tube in KAMC, and to help improve the health care of patients.

Design: Retrospective case series.

Setting: Study was conducted at King Abdul-Aziz Medical City in Riyadh, a tertiary hospital and also teaching hospital.

Patients: All patients who underwent IVF-ET in the period starting from 2016.

Intervention: Fallopian tube embolization followed by IVF-ET.

Outcome: One out of seven patients who underwent IVF-ET got pregnant and delivered a healthy baby.

Conclusion: Hydro-salpinx has an adverse effect on the success of IVF. Plugging fallopian tubes with a platinum micro coil is a good choice to treat hydro-salpinx and the outcome of IVF-ET post embolization still needs more efforts to be improve its results.

Key words:

Fallopian tube, Embolization, in vitro fertilization, embryo transfer, hydro-salpinx.

Introduction:

The fallopian tubes, also known as the uterine tubes, are the tubes that connect the upper end of the uterus to the lateral pelvic wall on both sides of the body. They are contained within the top edge of the meso-salpinx parts of the wide ligament. They pass above the dangling ovaries and end on the side.^[1]

Each uterine tube has an expanded end (infundibulum) that is rimmed with little finger-like projections (fimbriae), an expansion (ampulla) medial to the infundibulum, and a narrow region (isthmus) before each tube joins the body of the uterus.^[1]

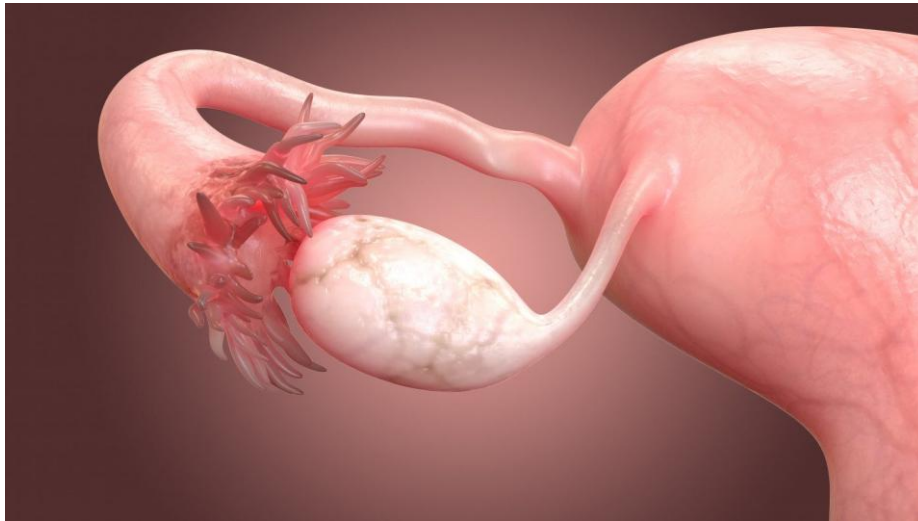


Image no.1: Anatomy of fallopian tubes.

Fallopian tubes are very important organs in reproduction, they represent the exact part of reproductive system in which fertilization takes place. Therefore, any pathology of fallopian tubes may impair fertilization and result in infertility.^[2]

According to current statistics, fallopian tubes represent the main reason for infertility (40%).^[2]

Moreover, several pathological problems can affect fallopian tubes, but the most frequent one is hydro-salpinx (10- 30%).^[2,3,4,5]

Hydro-salpinx is a collection of fluids in fallopian tube that might occur unilaterally or bilaterally, it consists of different groups of pathology in the form of distal tubal occlusion regardless to the cause.^[6]

Many studies reveal that hydro-salpinx has an impact on the likelihood of implantation, furthermore it may boost the risk of early abortion.^[4,5]

Researchers have tried to understand the mechanisms by which hydro-salpinx counteract pregnancy. Researchers have tried to figure out how hydro-salpinx prevents pregnancy. They all agree that the fluid from the hydro-salpinx contains bacterial toxins that kill gametes or embryos, that the expression of integrins and

cytokines is decreased, that the receptivity of the endometrium changes, that the embryo is regurgitated by the endometrium, and that there aren't enough nutrients.^[4,7]

There are different procedures to treat or to decrease the impact of hydro-salpinx such as; antibiotics and ultrasound- guided aspiration as non- invasive procedures, proximal tubal ligation, interventional tubal occlusion and salpingectomies as invasive procedures.^[4,8]

The use of extended doses of antibiotics like doxycycline before and after IVF proves to be effective and showed high implantation rates.^[9]

Salpingectomies and ultrasound guided aspiration have showed a high recurrence rate of hydro-salpinx and high ectopic pregnancy rate.^[2,3,4] But insertion of embolism to block uterine tube reveals a less risk, less hospital stay, more proper and can be done under local anesthesia.^[10]

Infertility due to fallopian tube problems is the main indication for in vitro fertilization which in turn is affected by many factors like age, number and quality of embryos transferred, the appearance of endometrium on ultrasound and the quality of ovarian stimulation.^[7] Furthermore, the above mentioned procedures are done prior to IVF and they prove a significantly higher pregnancy rates.^[8]

Here we are reporting a case series of twelve infertile patients due to tubal factors who received their treatment and follow up in king Abdul-Aziz Medical City (KAMC) in Riyadh- Saudi Arabia.

Cases:

A total number of twelve female patients were enrolled to this retrospective case series, eleven of them underwent fallopian tube embolization. Of those eleven, seven patients underwent embryo transfer; six of them did not get pregnant while only one got pregnant after ET.

Data about past medical history were collected from their medical reports; four patients had hypothyroidism and they were on medications, three patients had endometriosis, one had multiple sclerosis and the other four were free of diseases.

According to patient's symptoms, they were suspected to have either infertility due to hormonal imbalances, tubal factors or male factors as a differential diagnosis.

To find out the exact diagnosis, certain investigations were done such as; hormonal profile which include (thyroid stimulating hormone TSH, leutenizing hormone LH, follicular stimulating hormone FSH, estradiol, testosterone, progesterone and prolactin hormone), hystero-salpingiogram in addition to complete blood count CBC.



Image no. 2: hysterosalpingiogram showing bilateral hydro-salpinx of one of the patients who didn't get pregnant.

Procedure:

All patients underwent hysterosalpingiogram to diagnose their hydro-salpinx and if it is unilateral or bilateral, it was done under fluoroscopic in sterile condition.

A 5F Kumpe catheter was passed through vaginal orifice to the endometrial cavity. Then, contrast was injected to reveal fallopian tube blockage extent.

Then stiff glide wire and the catheter were used to canalize fallopian tubes and further the catheter advanced to isthmus, then micro-catheter and a micro- wire system 0.018 were used to canalize fallopian tubes distally.

A 5mm*15cm detachable coil were used to canalize fallopian tubes. Then, 5mm*15cm and 5mm*6cm coils were used to successfully embolize fallopian tubes.

Post embolization, static images were taken and they showed a successful embolization of fallopian tubes with no extravasation or any other complications.

These procedures were done to the seven patients who underwent IVF-ET post-embolization of fallopian tubes.

The case with successful IVF-ET:

33 years old para-1 female with secondary infertility, not known to have any past medical illness or surgery, underwent hysterosalpingiography and was diagnosed with right hydro-salpinx.

Bilateral fallopian tube embolization was done then two embryos were transferred via in vitro fertilization. She got pregnant until term, and she delivered a healthy baby by caesarian section.



Image no. 3: Hysterosalpingiogram showing right hydro-salpinx of the patient who got pregnant.

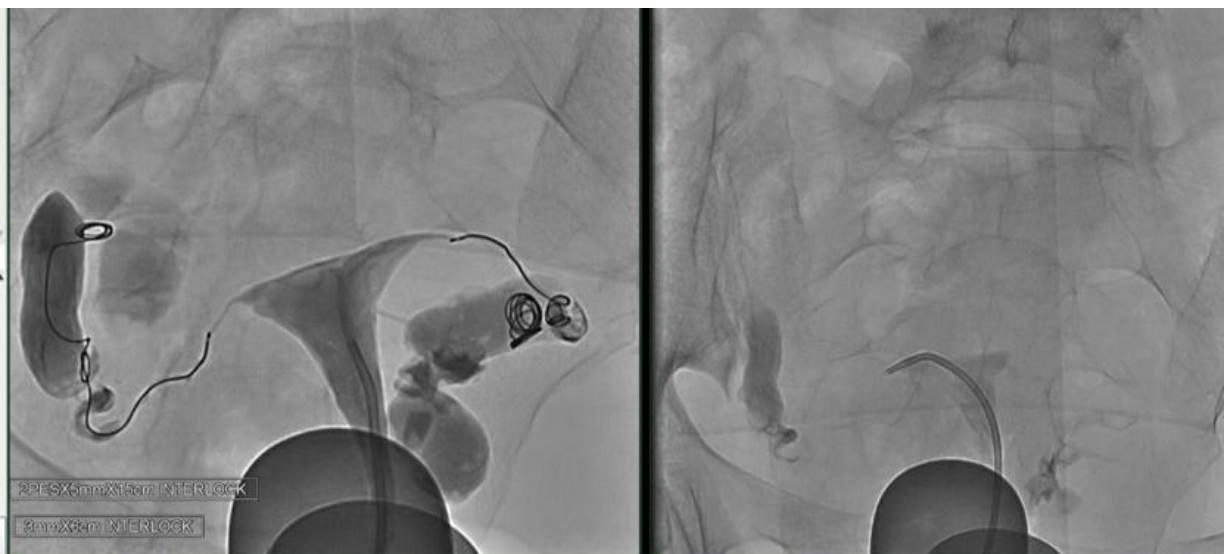


Image no. 4: Fallopian tube embolization by insertion of micro-coil for the patient who got pregnant.

Results:

This case series was designed to assess the outcome of IVF- ET post embolization of fallopian tubes. It was conducted at King Abdul-Aziz Medical City (KAMC) in Riyadh- Saudi Arabia. It is a retrospective study which included all patients who underwent IVF-ET in KAMC in the period started from 2016

A total number of twelve female patients were recruited, all those women were treated and followed up at King Abdul-Aziz Medical City. Of those twelve, 66.7% were aged between (30- 39) years, while 33.3% were (40-49) years old. 25% of them had primary infertility, 16.7% had secondary infertility, 33.3% were para 1, 8.3% was para 0+1, 8.3% was para 1+1 while 8.3% was para 0 due to abortion or ectopic pregnancy.

Regarding hydro-salpinx, 33.3% had bilateral moderate hydro-salpinx, 33.3% had right hydro-salpinx while 33.3 of them had left hydro-salpinx.

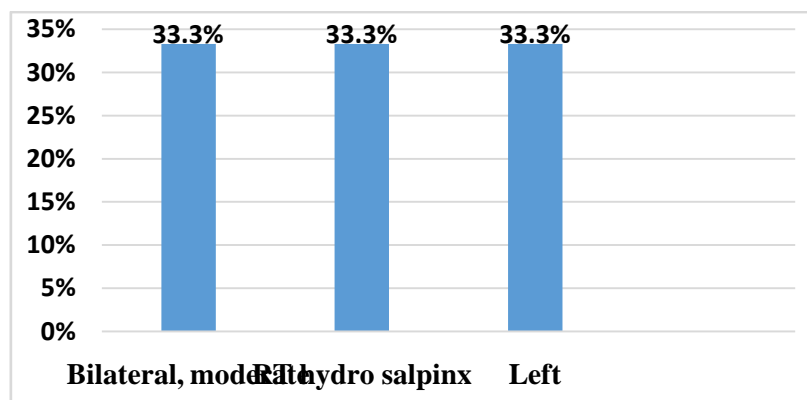


Figure no. 1: hydrosalpinx.

Regarding past medical diseases, 33.3% have hypothyroidism, 25% have endometriosis, 8.3% have multiple sclerosis while 33.3% have no diseases.

When reviewing medical records of the enrolled patients, 8.3% underwent hysteroscopy polypectomy, 50% underwent other abdominal surgeries, 16.7% underwent laparotomy ovarian cystectomy, 8.3% underwent left salpingectomy and appendectomy while 16.7% didn't undergo any type of surgeries.

On the other hand, seven out of twelve patients 58.3% took antibiotics before embolization procedure, while 41.7% of them were not under antibiotics.

Regarding fallopian tube embolization, 91.7% underwent fallopian tube embolization, while 8.3% of the patients didn't undergo embolization.

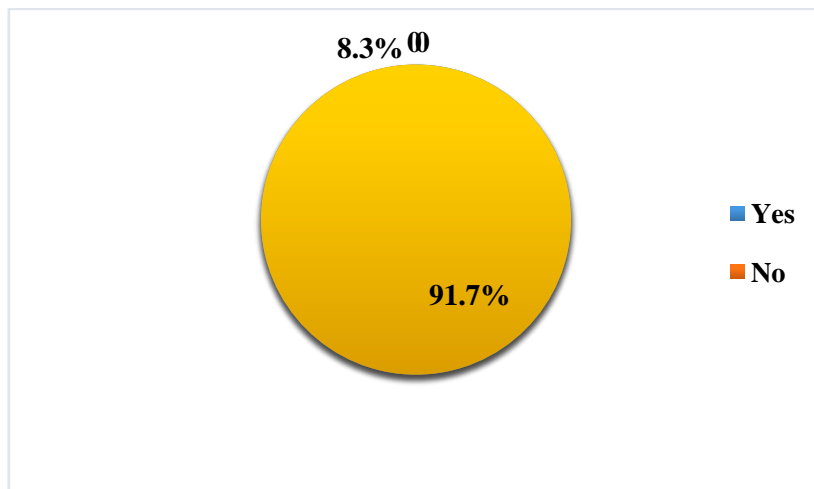


Figure no.2: embolization.

After embolization 91.7% of patients took antibiotics while only 8.3% didn't take antibiotics.

Regarding IVF-ET post embolization of fallopian tubes, seven out of twelve 58.3% underwent embryo transfer, while 41.7% didn't undergo IVF.

Of those women 50% of them did not get pregnant, 8.3% had a fetus while 41.7% did not undergo IVF.

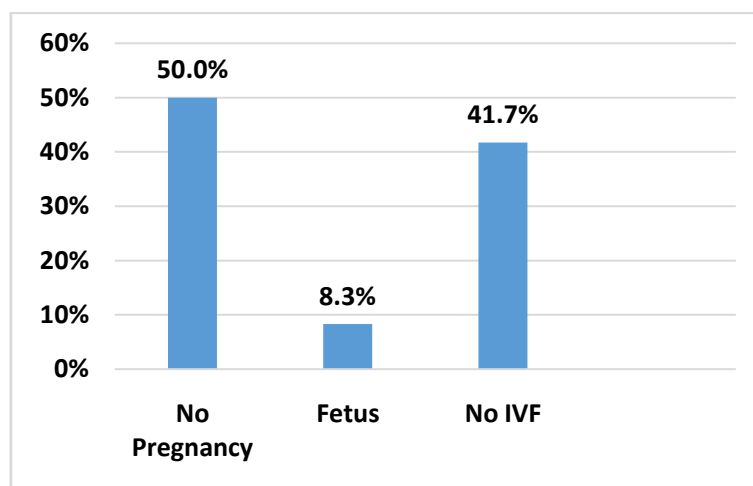


Figure no.3: outcome.

Neither patient had abortion 0% nor patient had ectopic pregnancy 0%.

Review of Literature:

Reproduction in females is a complex series of events culminating in a fertilized egg in fallopian tube. The functions of fallopian tube include ovum pick up, sperm transport, ovum capacitation, sperm capacitation, zygote development and transport. With the advent of human in vitro fertilization (IVF), the role of the tube has become less important, as many of these functions are replicated and replaced in laboratory.^[8]

Methods to evaluate tubal functions

- 1) Hysterosalpingography (HSG) documents if tubes are open or closed.
- 2) Laparoscopy with chromopertubation

The most common manifestation of tubal disease is hydrosalpinx which occurs in 10 to 30% of infertile couples suffering from tubal factors. In addition, hydro-salpinx can exert an adverse effect on outcome of IVF by reducing the chances of implantation and increasing the risk of early pregnancy loss. Proposed mechanisms by which hydrosalpinx affects implantation are by effect of bacterial toxins in the hydrosalpingeal fluid on gametes/embryos, and by reduced expression of cytokines and integrins or by mechanical flushing of embryo from endometrium.

Various methods of pretreatment of hydrosalpinx before IVF are [I] Ultrasound guided hydrosalpinx aspiration [II] Interventional tubal occlusion- Tubal embolization [iii] Salpingectomy [IV] Salpingostomy.

Invasive procedures like salpingectomy and salpingostomy may damage the fallopian ovarian arterial arch resulting in reduced blood supply to ovaries and reduced ovarian gonadotrophic activity. Vaginal USG guided aspiration has advantages like simplicity, efficacy, is less invasive and less expensive while the disadvantage is high recurrence rate of 22 to 30.8%^[9].

Shanshan Zhao et al conducted a randomized controlled trial on 174 patients with hydro-salpinx where study group was pretreated with interventional tubal embolization versus control group with bilateral tubal obstruction. The results of this study concluded a lower rate of early pregnancy loss, higher clinical pregnancy and live birth rates in embolization group compared to control group.^[10]

Interventional immobilization plays a role in hydro-salpinx. Statistical results show that hydro-salpinx can reduce implantation rate and clinical pregnancy rate of IVF-ET while increasing early abortion and ectopica pregnancy rate. Recently, with the development of interventional embolization in the treatment of hydro-salpinx

Hong et al conducted a retrospective analysis of 129 patients with unilateral and bilateral hydro-salpinx. 73 patients in intervention group were treated with fallopian tube embolization followed by IVF-ET. Control group had 56 patients in whom direct IVF-ET was done without pretreatment of hydro-salpinx. Their study concluded that clinical pregnancy rate of control group was significantly lower than intervention group. The abortion rate and ectopic pregnancy rate in control group was significantly higher.^[11]

Discussion:

This retrospective case series reviewed the outcome of IVF-ET post embolization of fallopian tubes and the factors that may affect fertility of the patients who had got their treatment in the period starting from 2016 in king Abdul-Aziz Medical City (KAMC) in Riyadh- Saudi Arabia.

To diagnose hydro-salpinx, some studies used ultrasound as a diagnostic method but, it was proved that ultrasound is not accurate (it detects only 34% of hydro-salpinges), in contrast to hysterosalpingiography which is more accurate.^[12,15] This is why we chose hysterosalpingiography as a diagnostic tool in our study.

Since the IVF-ET era started, different surgical techniques were used prior to IVF in order to clarify and to ensure readiness of fallopian tubes for hosting the new embryo.

Different studies reveal that fallopian tube embolization is the most effective, economical, less invasive technique.^[14] in our study we used embolization method prior to IVF-ET.

It is agreed that hydrosalpinx has a direct impact on IVF and the success rate of pregnancy,^[14,16,17] in the same context, in our study one lady out of seven got pregnant.

Regarding the limitations of this study, the sample size was small, this is why our exclusion criteria were not very strict. Moreover, the analysis in retrospective studies is subjected to inherent bias.^[12] Hence, more prospective studies are needed.

Despite the above-mentioned limitations, this study can provide a data base for treatment of secondary infertile patients in king Abdul-Aziz medical city.

Conclusion

To conclude, this retrospective case series confirmed the concept that hydro-salpinx negatively affects IVF, fallopian tubes embolization remains the most effective and less risky procedure to pretreat hydro-salpinx but, we still need more researches to boost its effect to get more term pregnancies, considering a promising outcome of fallopian tube embolization pre IVF procedure.

References:

1. Gray H. Gray's anatomy. Arcturus Publishing; 2009 Jul 15.
2. Hong X, Ding WB, Yuan RF, Ding JY, Jin J. Effect of interventional embolization treatment for hydrosalpinx on the outcome of in vitro fertilization and embryo transfer. *Medicine*. 2018 Nov;97(48).
3. Gao Q, Wang L, Dang M. Interventional embolization plays a role in hydrosalpinx resulting from fertilization and embryo transfer in vitro.
4. Zhao S, Wang Y, Wang S, Xu X, Kong L. The Beneficial Effect of Fallopian Tube Embolization on the Outcome of IVF-ET for Patients with Hydrosalpinx. The Patient's Perspective. *JFIV Reprod Med Genet*. 2016; 4:177.
5. Yang X, Zhu L, Le F, Lou H, Zhao W, Pan P, Zou Y, Jin F. Proximal Fallopian Tubal Embolization by Interventional Radiology prior to Embryo Transfer in Infertile Patients with Hydrosalpinx: A Prospective Study of an Off-label Treatment. *Journal of Minimally Invasive Gynecology*. 2020 Jan 1;27(1):107-15.
6. Strandell A. The influence of hydrosalpinx on IVF and embryo transfer: a review. *Human Reproduction Update* 2000, Vol. 6, No. 4 pp. 387±395.
7. Strandell A, Lindhard A, Waldenström U, Thorburn J, Janson PO, Hamberger L. Hydrosalpinx and IVF outcome: a prospective, randomized multicentre trial in Scandinavia on salpingectomy prior to IVF. *Human Reproduction*. 1999 Nov 1;14(11):2762-9.

8. Gao Q, Wang L, Dang M. Interventional embolization plays a role in hydrosalpinx resulting from fertilization and embryo transfer in vitro. *Biomedical Research (0970-938X)*. 2017 Jan 1;28(10).
9. Yee B. The fallopian tube and in vitro fertilization. *Clinical obstetrics and gynecology*. 2006 Mar 1;49(1):34-43.
10. Zhao S, Wang Y, Wang S, Xu X, Kong L. The Beneficial Effect of Fallopian Tube Embolization on the Outcome of IVF-ET for Patients with Hydrosalpinx. *The Patient's Perspective. JFIV Reprod Med Genet*. 2016;4:177.
11. Hong X, Ding WB, Yuan RF, Ding JY, Jin J. Effect of interventional embolization treatment for hydrosalpinx on the outcome of in vitro fertilization and embryo transfer. *Medicine*. 2018 Nov;97(48).
12. Van Voorhis BJ, Mejia RB, Schlaff WD, Hurst BS, Hurst CB, Schlaff CW, Mejia PR. Is removal of hydrosalpinges prior to in vitro fertilization the standard of care?
13. Hurst BS, Tucker KE, Awoniyi CA, Schlaff WD. Hydrosalpinx treated with extended doxycycline does not compromise the success of in vitro fertilization. *Fertility and sterility*. 2001 May 1;75(5):1017-9.
14. Cai HL, Pan LY, Wang SF, Tian Y, Zheng XZ, Yang Y, Li K. Discussion on operative skills in the embolization of hydrosalpinx by hysteroscopic placement of a microcoil. *Medicine*. 2019 Mar;98(11).
15. Van Voorhis BJ, Sparks AE, Syrop CH, Stovall DW. Ultrasound-guided aspiration of hydrosalpinges is associated with improved pregnancy and implantation rates after in-vitro fertilization cycles. *Human reproduction (Oxford, England)*. 1998 Mar 1;13(3):736-9.
16. D'Arpe S, Franceschetti S, Caccetta J, Pietrangeli D, Muzii L, Panici PB. Management of hydrosalpinx before IVF: a literature review. *Journal of Obstetrics and Gynaecology*. 2015 Aug 18;35(6):547-50.
17. Dreyer K, Lier MC, Emanuel MH, Twisk JW, Mol BW, Schats R, Hompes PG, Mijatovic V. Hysteroscopic proximal tubal occlusion versus laparoscopic salpingectomy as a treatment for hydrosalpinges prior to IVF or ICSI: an RCT. *Human Reproduction*. 2016 Sep 1;31(9):2005-16.