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Original Research Article

Ultrasound guidance versus classical method for intrauterine insemination

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ABSTRACT

Background: There are a wide range of treatment options available for unexplained infertility, such as expectant management, superovulation, intrauterine insemination (IUI) and *In vitro* fertilization (IVF). So, the objective was to compare clinical pregnancy rates in IUI with transabdominal ultrasound guidance (US-IUI) versus the "blind method" IUI.
Methods: This was a randomized controlled trial done at Basrah Maternity and Child Hospital/IVF Center during the period between 01 January 2020 till 01 March 2023. 130 couples with unexplained infertility were included. All couples underwent infertility assessment in day 2 or day 3 basal serum follicle-stimulating hormone (FSH) levels and serum luteinizing hormone (LH) levels. Patients were divided randomly into 2 groups; 1ST group (70 women) underwent IUI with transabdominal ultrasound guidance while the 2nd group (60 women) undergoing IUI without ultrasound guidance.
Results: The mean age of the patients was 30.6 ± 4.0 years (range 25-40). Of the 267 cycles, 145 were carried out as US-guided and 122 were performed using the blind procedure. The overall pregnancy rate was 17%; one pregnancy were multiple pregnancies and 1 ended in abortion. There was no significant difference between the US-guided and blinded IUI groups regarding the multiple-pregnancy rate, abortion rate. The pregnancy rates were 23.4% and 13.9% respectively and the difference was statistically significant (p=0.049). In the US-guided group, 9.7% of the cases were difficult. In the blinded group, 26.2% were difficult.
Conclusions: The conventional blind method for intrauterine catheter insemination is recommended for patients undergoing IUI treatment.

Keywords: Infertility, Intrauterine insemination, Pregnancy, Ultrasound

INTRODUCTION

Infertility is a condition where an individual or their partner is unable to establish a clinical pregnancy after 12 months of regular, unprotected sexual intercourse.[1] Infertility affects a significant proportion of reproductive-aged women, with an estimated one in 7 couples affected in the western world and one in 4 couples in developing countries. In certain regions of the world, such as South Asia, sub-Saharan Africa, the Middle East, North Africa, Central and Eastern Europe, Central Asia, the rates of infertility may even reach up to 30%.[2]

Between 1990 and 2017, the age-standardized prevalence rate of female infertility increased by 14.9% globally, while the age-standardized prevalence rate of male infertility increased by 8.2% during the same period with the highest prevalence rate of infertility seen in individuals of 35-39 age group, while the 15-19 age group had the lowest.[3]

In Iraq, there are limited data about infertility prevalence. In a study published in 2019, male factors were the exclusive reason for infertility in 17% of cases, while in another 30%, they were combined with female factors, accounting for approximately half (47%) of all cases of infertility.[4]

Causes of infertility for both genders are hypogonadotropic hypogonadism, hyperprolactinemia, infection (*Chlamydia trachomatis* and *Neisseria gonorrhea*), sepsis or severe renal disease, diabetes, life style, stress, obesity and smoking.[5] Female causes include premature ovarian insufficiency, polycystic ovary syndrome, endometriosis, uterine fibroids and endometrial polyps and disorders of tubal function. Male causes involve testicular dysfunction, ejaculatory dysfunction or obstruction to the delivery of sperm. Unexplained infertility was defined as infertility for couples with no definite reason.

The uncertainty associated with this diagnosis is reflected in the wide range of treatment options available for unexplained infertility, such as expectant management, superovulation, intrauterine insemination (IUI) and In vitro fertilization (IVF).[6] The latter 2 options are the main treatments available for unexplained infertility.[7] IUI is relatively safe and is not associated with serious complications; however, certain risks may occur such as infection and vaginal bleeding due to placement of the catheter inside the uterus.

METHODS

This is case control prospective study which was conducted in infertility center of Basrah Maternity and Child Hospital during the period between 01 January 2020 till 01 March 2023. Women of 25-40 years old with body mass index of <35kg/m^2 were included. They were randomly divided into 2 groups; 1st group were undergoing IUI with transabdominal ultrasound guidance and the 2nd group were women who underwent IUI without ultrasound guidance. The study was ethically approved by the Ethical Committee of the Arabic Board for Medical Specialization.

A total of 130 couples with unexplained infertility were involved in the study. All patients received 3-6 cycles of gonadothropins and undergoing IUI.

Inclusion criteria

Patients with at least one patent tube in histerosalpingography or laparoscopy and husbands with normal sperm parameters according to World Health Organization classification were included.

Exclusion criteria

The exclusion criteria included women with myomas, endometriosis and uterine anomalies. Patients with a basal follicle-stimulating hormone (FSH) level >12 mIU/ml, a maternal age >40 years, polycystic ovarian syndrome or a coexisting chronic disease such as hyper- or hypothyroidism, diabetes mellitus or any history of previous reproductive surgery.

Serum follicle-stimulating hormone (FSH) levels and serum luteinizing hormone (LH) levels were done on day 2 or day 3 for all couples. A hysterosalpingogram was done to access tubal patency. All patients started ovulation stimulation on day 2 or day 3 of the menstrual cycle. Basal FSH, LH and estradiol (E2) were measured on the 3rd day of the cycle. The initial dose of FSH injections (75-150 IU) was determined based on the patient's age, antral follicle count and any previous IUI cycle response if available. Patients were not asked for a full bladder. If a patient preferred the full bladder position, US-guided IUI was administered for the patient. If the patient preferred the empty bladder position, the blind procedure was used. The double gradient method was used for semen preparation. The sperm sample was collected by masturbation after 2–5 days of abstinence.

The US-IUI group: In the US-IUI group, the intrauterine catheter was introduced through the cervical canal while the assistant visualized the cervix and the uterus using a transabdominal ultrasound scan for the US-IUI group.

The Blind method-IUI group: In the BM-IUI group, the catheter was introduced into the cervical canal and maneuvered gently till the resistance of the internal cervical opening was felt to enter the uterine cavity for the BM-IUI group.

Vaginal luteal phase support with micronized progesterone (200 mg, at 12-hour intervals) was started on the day of IUI for both groups and continued for 3 weeks. Pregnancy was confirmed via an ultrasound scan after 3 weeks. The process was considered easy when the introduction of catheter was done in the first event. While the difficult IUI if the provider was failed in the first event.

Statistical analysis

Differences between the US-IUI and BM-IUI groups were carried out by using the independent *t*-test. P values; <0.05 were considered to indicate statistical significance.

RESULTS

Patients characteristics and details of the IUI treatment cycle are summarized in Table 1. The mean age of the patients was 30.6±4.0 years (range 25-40). Of the 267 cycles, 145 were carried out as US-guided and 122 were performed using the blind procedure. There were no statistically significant differences between the groups in terms of FSH, LH and E2 on day 3, age, BMI, duration of infertility, patent tube status, follicle count at hCG day, total motile sperm count, total hMG usage and hMG induction duration (Table 1).

Table 1: Distribution of demographic characteristics and details of IUI treatment cycles.

	US-guided IUI	Blinded IUI	P value
Age, years	31.2±4.6	30.2±4.6	0.08
BMI	25.4±3.8	26.4±3.8	0.62
Day 3 FSH, mIU/ml	7.3±2.3	6.9±2.3	0.13
Day 3 LH, mIU/ml	5.8±2.5	6.3±3.0	0.13
Day 3 E2, pg/ml	53.1±34.7	47.5±25.3	0.14
Number of cycles	145	122	
Duration of infertility, years	3±2	4±5	0.73
Follicle count at hCG day (>16 mm)	2.5±1.0	2.6±1.1	0.64
Total motile sperm count (million)	67.38±73.98	61.44±72.19	0.50

Table 2: Parameters of induction of ovulation.

	US-guide group	Blind- group	P value
Dosage of FSH (IU) median	150 (75-225)	125 (75-300)	0.5
No. of days of stimulation	9.5 (8.0-12.0)	8.0 (8.0-12.0)	0.3
Endometrial lining on trigger day	10.7 (7.3-10.3)	10.9 (7.2-10.0)	0.5

There was also no significant difference between the groups in the total number of days of stimulation (p=0.516) and uterine endometrial lining (p=0.145) (Table 2).

The overall pregnancy rate was 23.4% and 13.9%, respectively, and the difference was statistically non-significant. Multiple pregnancy was in one case and abortion in 2 cases. There was no significant difference between the US-guided and blinded IUI groups regarding, abortion rate and the number of follicles ≥16 mm (Table 3).

In the US-guided group, 9.7% of the cases were difficult. In the blinded group, 26.2% were difficult. The difference was statistically significant (p<0.01). There was no significant difference in the average duration of intrauterine procedure in both groups 45 (20-60) second in first group VS 43 (18-60) second in blind group.

Table 3: Outcomes of US-guided and blinded IUI.

	US-guided IUI	Blinded IUI	p value
Number of cycles	145	122	
Number of follicles ≥16 mm	2.5±1.0	2.5±1.1	0.64
Difficult IUI	10 (9.7)	19 (26.2)	<0.001
Pregnancy rate	17 (23.4)	12 (13.9)	0.49
Multiple pregnancy rate	1	0	0.09
Abortion rate	1	1	0.7

DISCUSSION

IUI is a widespread method to achieve pregnancy but has received a minimum attention for its prognosis. However, IUI carried out under ultrasound guidance may lead to high pregnancy rate. In addition, it would decrease cervical and endometrial damage.[8] Also, results are affected by female and male situations.[9,10] US guidance does reduce the frequency of 'difficult' insemination, which may lead to increased pregnancy rates.[10]

The number of difficult inseminations in which we had to use a tenaculum was higher in the blinded group than in the US-guided group. In this study, 73 couples with 231 IUI cycles were investigated. No tenaculum was used during catheterization and in both groups. We have noticed that no difference between the groups in relation to pregnancy rates. So, we have concluded that US-guided IUI did not induce better results than blind IUI. All subjects in our blinded IUI group had an empty bladder. A full bladder may improve the pathway between cervix and uterus and localization of the embryo in a suitable site from uterine fundus.[11]

The mechanism of cervical and uterine manipulations during insemination process catheterization can lead to contractions and endometrial trauma.[12,13] It has been observed that ultrasound-guided IUI increased the pregnancy rates and difficult IUI.[14] In our study, experienced providers performed the ultrasound and the insemination procedure, and we had similar results in both groups. These results are in agreement with a study done in 2015.[15,16]

This study confirmed previous results that US-guided is related to higher pregnancy rates, but without knowing mechanism.[17,18] Intrauterine manipulations may induce uterine contractions and expulsion of semen.[19,20] Uterine contractions may occur as a result of reaching the fundus during intrauterine manipulations.[21]

The number of difficult inseminations in which we had to use a tenaculum was higher in the blinded group than in the US-guided group. In contrast to Ramón's study, our

results showed that US guidance during IUI improved pregnancy rates.[19]

CONCLUSION

The conventional blind method for intrauterine catheter insemination is recommended for patients undergoing IUI treatment. The use of ultrasound during the insemination procedure increased the need for trained personnel to perform ultrasonography.

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Ethical approval: The study was approved by the Institutional Ethics Committee of the Arabic Board for Medical Specialization

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