Ultrasound- guided Embryo Transfer: Does it Increase the Pregnancy Rate?

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ABSTRACT

Objective: To find out whether embryo transfer under ultrasound guidance increases pregnancy rate in women undergoing In Vitro Fertilization (IVF) at two hospitals of the Royal Medical Services.

Methods: we reviewed of the records of 200 consecutive patients who had embryo transfer(ET) under ultrasound guidance(group A) and group (B) was formed from 200 consecutive patients who had embryo transfer(ET) without ultrasound guidance who was a control group for group (A) matched for demographic characteristics.

Results: The pregnancy and implantation rate were 45% and 28.1% in group A while was 26% and 19.8% in the clinical touch group.

Conclusion: our study showed a significant increase in the pregnancy rate after using the ultrasound guided embryo transfer method.

Key words: clinical, embryo transfer, IVF, ultrasound guided.

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Introduction

Since the birth of Louise brown in 1978- the first test tube baby,[1] In vitro fertilization (IVF) programs have improved in terms of implantation and pregnancy rates as a result of several factors, including more specific individualized ovulation induction protocols forboth high and low responders, as well as, tremendous efforts to improve laboratory conditions [2] and culture media [3] to ensure better embryo quality. Implantation of an embryo is a complex process that is not completely understood.[4,5] In the context of assisted reproductive techniques (ART), it depends mainly on embryo quality and endometrial receptivity, but other factors, such as the embryo transfer (ET) technique, may also affect implantation.[6] In searching for answers to increase the pregnancy rate some investigators reported that ultrasound-guided embryo transfer improvesthe clinical pregnancy and implantation rate.[7,8] Ultrasound guided embryo transfer was introduced as the standard method for embryo transfer for patients undergoing IVF/ICSI (intracytoplasmic injection) at IVF centers at the Royal Medical Services in Jordan including King Hussein Medical Centre and Prince Ali Hospital. The aim of this study was to investigate the role of ultrasound guided embryo transfer in improving pregnancy rate in IVF/ ICSI cycles and its clinical significance.

Methods

Medical records of our hundred patients were reviewed in the study, all of them had IVF/ICSI in two hospitals (the king Hussein medical Centre and from Prince Ali hospital) during the years 2012 – 2014. We reviewed of the records of 200 consecutive patients who had embryo transfer (ET) under ultrasound guidance (group A) and group (B) was formed from 200 consecutive patients who had embryo transfer (ET) without ultrasound guidance Both groups were matched for age, weight, duration of infertility, causes of infertility, ovulation induction protocol, FSH (follicular stimulating hormone), AFC (antral follicle count), number of embryos transferred and the type of catheter used (wallas). 200 patients from each hospital, one hundred before using ultrasound and the same number after using it. The culture media was the same.All the cycles were fresh cycles.All embryos were transferred at day 3. All the catheters of embryo transfer were loaded in the same way.

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Embryo transfer procedure was the same for all patients. They were placed in the lithotomy position (with full bladder) in a private room. A sterile metal speculum (bivalve) was placed to expose the cervix. The cervical mucus was cleared using ringer solution. The external os washed with media.
It was done by senior doctors

Statistical Analysis

Data are expressed as means _ SEM or percentages as required. Statistically significant differences were determined Student's *t*-test, as appropriate. Statistical calculations were performed.A value of *P*.05 was considered to be statistically significant.

Results

As shown in Table I, both groups of were comparable in terms of age (ultrasound: 33.8 years vs. in the clinical touch group 33.7 years, P valueNS), body mass index (BMI) (ultrasound: 37.8 years vs the clinical touch group 28.1, P value NS),mean baseline FSH (IU/l) (ultrasound:6.8 ± 1.9 vs.6.4 ± 1.6 in the clinical touch groupP value NS),cause of infertility (tubal, male factor, unexplained infertility:25.0%,69.2%,13.3%vs.30.0%,66.7%,14.2 %in the clinical touch grouprespectfully,P value NS),antral Follicular count(ultrasound:7.3± 1.9vs.6.9± 1.7in the clinical touch groupP value NS), sperm concentration of IVF couples(10^6 /ml)(ultrasound:79.9 ± 46.5 vs.62.1 ± 36.1in the clinical touch groupP value NS),sperm motility of IVF couples(ultrasound:54.5 ± 9.7%vs.59.9 ± 9.7 in the clinical touch groupP value NS), Antagonist protocol %(ultrasound:21vs.23in the clinical touch groupP value NS),No. of embryos fertilized(ultrasound:8.0 ± 4.3 vs.8.3 ± 5.2 in the clinical touch groupP value NS),fertilization rate (%) (Ultrasound: 73.7 ± 17.5 vs72.1 ± 17.8 in the clinical touch groupP value NS), number of embryos transferred (ultrasound: 3.1 ± 0.6 vs.3.2 ± 0.5 in the clinical touch groupP value NS), and %. With moderate/severe OHSS (ultrasound:4.2vs.3.3in the clinical touch groupP value NS) The pregnancy and implantation rate were higher in group (A) (ultrasoundguidedtransfer) when compared to clinical touchgroup (B),45% and 28.1% compared to26% and 19.8%respectively. There was no statistical difference in regard to multiple and ectopic pregnancy rate in both groups.

Tables I: Basic Biostatics Data for two Groups

Variable	**Group A**	**Group B**	***P* Value**
Mean age (years)	33.8 ± 3.5	33.7 ± 3.2	NS
BMI	27.8± 2.9	28.1± 3.1	NS
Mean baseline FSH (IU/l) ± SD	6.8 ± 1.9	6.4 ± 1.6	NS
%. with tubal factor infertility	(25.0)	(30.0)	NS
%. with male factor infertility	(69.2)	(66.7)	NS
%. with unexplained infertility	(13.3)	(14.2)	NS
% First timer IVF	(67.5)	(66.7)	NS
Antral Follicular count	7.3± 1.9	6.9± 1.7	NS
Sperm concentration of IVF couples (10^6 /ml ±ST)	79.9 ± 46.5	62.1 ± 36.1	NS
Sperm motility of IVF couples (mean % ± SD)	54.5 ± 9.7	59.9 ± 9.7	0.016

Antagonist protocol %	21	23	NS
No. of embryos fertilized	8.0 ± 4.3	8.3 ± 5.2	NS
Fertilization rate (%)	73.7 ± 17.5	72.1 ± 17.8	NS
No. of embryos transferred	3.1 ± 0.6	3.2 ± 0.5	NS
%. with moderate/severe OHSS 5	(4.2)	(3.3)	NS

Table II: IVF outcome in both Groups

Variables	**Group A**	**Group B**	**P value**
Implantation rate	28.1	19.8	0.02
Clinical Pregnancy rate	45	26	0.001
Multiple pregnancy rate	21	19	NS
Ectopic pregnancy	5.1	4.7	NS

Discussion

Strickler *et al*. [9] (1985) and Leong *et al*. [10] (1986) were first to raise the possibility that ultrasound guidance may improvepregnancy rate. The case for ultrasound guidance is further supported in a study by Prapas *et al*. [11] (1995), who found that the pregnancy rate was (36.06 % versus 22.6%) in the ultrasound control group. Moreover, its use can confirm that the catheter tip is beyond the internal os of the cervix and placement of the embryos is at the desired level in the endometrial cavity [12] (Lorusso 2005). This can be especially helpful in women where the uterine anatomy may be distorted by fibroids or septae [13] (Hurley 1991). For these reasons, ultrasound guided embryo transfers have been rated as "easier" and "cleaner" by clinicians [14] (Prapas 2001). Disadvantages are the need for a second operator, a longer time to execute and the inconvenience of filling the patient's bladder (Martins 2004).[14] Another possible drawback, is in some cases, moving the catheter to improve identification is required, a motion that is not needed in transfers performed by "clinical touch". This maneuver may potentially disrupt the endometrium, thus reducing the benefits provided by ultrasound (Garcia-Velasco 2002) [15] Some clinicians transfer the embryos at a fixed distance from the external os (6cm).However, this may not take into account variation in cervical length or uterine size. Thus, the "clinical touch" method may be challenged as a potential cause of cycle failure as a result of initiation of uterine contractility that may lead to immediate or delayed expulsion of the embryo/s, and the inability to accurately identify the ideal location for deposition of embryos, especially in patients with acute utero-cervical angulations, cervical stenosis or anatomical distortion of the cervical canal and uterus.In the other hand, Al-Shawaf *et al*.[16] (1993), in a prospectivestudy involving 44 women in the ultrasound group and 27women in the non-ultrasound group, found that ultrasound didnot affect the pregnancy outcome (29.0 versus 30.3%).

Cochrane database 2007 reviewed and up date in 2007 and 2016(17) in total, data for meta-analyses were available in 21 trials (n = 6218 women), of which only four reported live births. Ultrasound Guided Embryo Transfer was associated with an increased chance of a live birth/ongoing pregnancy compared with Clinical Touch Embryo Transfer (OR 1.47, 95% CI 1.30 to 1.65; 13 trials; n = 5859 women; I (2) = 74%; low-quality evidence). Sensitivity analysis by including only trials with low risk of selection bias or by using a random-effects model did not alter the effect. They estimate that for women with a chance of a live birth/ongoing pregnancy of 23% usingClinical Touch Embryo

Transfer, this would increase to between 28% and 33% using Ultrasound Guided Embryo Transfer.
A meta-analysis by Buckett et al [18] concluded that Ultrasound-guided embryo transfer significantly increases the chance of clinical pregnancy and significantly increases the embryo implantation rate. Our results showed significant improvement in both implantation and pregnancy rate since the introduction of ultrasound guided embryo transfer; these results are consistent with previous studies which showed such improvement. In addition to its effect on improving pregnancy rate, ultrasound guided embryo transfer enhance the chance to detect uterine abnormalities like intra- cavity fluids or abnormal endometrial thickness. It also aids in the assessment of ovarian size and the presence of intra-abdominal fluids.Therefore, we recommend using ultrasound guided as the default method for all embryo transfers. One possible drawback in our study is being a retrospective study with a small size number of patient. Further studies should confirm whether patients who have embryo transfer under ultrasound guidance has better pregnancy rate than patients who have embryo transfer (ET) without ultrasound guidance.

Conclusion

In a nutshell, our study showed asignificant increase in the pregnancy rate after using the ultrasound guided embryo transfer method.It is well accepted that we are confirming the placement of the catheter in its right place because sometimes the catheter while insertion it can curl toward the cervix without knowing in the clinical touch method ,especially with junior doctors. It is more satisfactory to ladies who are viewing the catheter in the uterus. Also, it decreases the rate of traumatic transfer.

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