Journal of Reproductive Medicine and Embryology

JRME



# Revival of an efficient patient and operatorfriendly embryo transfer technique: UMbET (ultrasound measurement before embryo transfer)

Hassan Maghraby<sup>1,2\*</sup>, Omnia Mohamed Mahmoud<sup>3</sup>, Esraa Fathy Galal<sup>3</sup>, Heba Hassan Maghraby<sup>2,3</sup>

<sup>1</sup>Obstetrics and Gynecology Department, Faculty of Medicine, Alexandria University, Egypt. <sup>2</sup>Egyptian Foundation of Reproductive Medicine and Embryology (EFRE), Egypt. <sup>3</sup>Dar Alteb Infertility Center, Alexandria, Egypt.



**Prof. Hassan Maghraby, MD**, is a Professor of Obstetrics and Gynecology at Alexandria University 2000-current, a Research Fellow at Pennsylvania University, USA 1988-1990, General director of Alexandria main obstetrics and gynecology Hospital 2010-2012, Director of Alexandria University IVF Center 1992-2010, Chairman of the department of obstetrics and gynecology faculty of medicine 2014 -2015. Past President and current Honorary President of EFRE (Egyptian Foundation Of Reproductive Medicine and Embryology), He has Several national and international publications and scientific activity.

### Abstract

**Background:** Proper embryo transfer technique is an essential step for IVF success. Placement of the inner catheter tip at a specific distance from the tip of the endometrial stripe improved pregnancy rates as reported in several studies. Several methods could be used to achieve this goal including tactile touch, transabdominal abdominal ultrasound guided embryo transfer (TAUGET) or vaginal ultrasound guidance, and ultrasound uterine measurement before embryo transfer (UMbET). TAUGET is currently the gold standard technique, (UMbET) is equally effective, easy to learn, and perform, and saves manpower and cost.

**Objective:** To describe the outcome of UMBET as an exclusive technique for embryo transfer Patients: 128 ICSI cycles.

**Materials and Methods:** All embryo transfers were done using the UMbET technique and the position of the droplet was assessed by vaginal ultrasound after ET.

**Results:** The transfer was easy in 89.1% of cases and the transfer time was  $1.28 \pm 1.33$  minutes. The distance of the droplet from the tip of the endometrium ranged from 0.0 - 1.30 with a mean of  $0.40 \pm 0.37$  cm. The pregnancy rate across all ages was 57.0%.

**Conclusion:** UMbET is an operator and patient-friendly embryo transfer technique that saves time, manpower, and the cost of expensive machines.

Keywords: ICSI success; IVF success; embryo transfer; ultrasound-guided ET; embryo droplet positioning.

JRME® Volume. 1, Issue no. 3, September 2024

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#### Introduction

Transferring embryos back to the uterus is a ratelimiting step in the IVF procedure (1). Many IVF failures are due to improper embryo transfer technique (2). Several variables including the type of catheter used and site of embryo deposition in the uterus are associated with unsuccessful embryo transfers (3). Several studies have shown that embryo transfer pregnancy rates differ depending on the clinician performing the transfer. In many centers, clinicians are allowed to perform embryo transfer using their personal "procedure" rather than a standard technique (4).

An essential step towards a standard ET technique is the placement of the inner catheter tip at a suitable distance from the tip of the endometrial stripe (5). Transabdominal ultrasound guidance embryo transfer (TAUGET) is the gold standard for proper positioning of the inner catheter tip during embryo transfer (6). Disadvantages of TAUGET include the need for a second operator, a longer procedure time, especially in obese patients. and the inconvenience of full bladder and endometrium injury induced by repeated catheter adjustments (7).

Some RCTs contradict the superiority of transabdominal ultrasound guidance (TAUGET) (8, 9) and a meta-analysis also indicated that both US-guided transfer (TAUGET) and clinical touch are equally effective, as the benefit of US is not large and should be balanced against the increased cost and need to change the catheter type (10). In a large RCT ultrasound uterine measurement before embryo transfer (UMbET) produced IVF results comparable to those obtained with transabdominal ultrasound-guided embryo transfer (TAUGET), with the procedure being better tolerated by patients (11). In a recent RCT UMbET resulted in a comparable efficiency to TAUGET in FET cycles (12).

#### Aim

To describe the results of a simple technique of ultrasound uterine measurement before embryo transfer (UMbET) using predetermined ultrasound measures of cervical and endometrial cavity length and then doing a tactile touch transfer without ultrasound.

#### Patients

The study included 128 embryo transfers all performed with UMbET in one center by a single operator.

Stimulation protocols included long agonist and antagonist individualized to patients' criteria. Oocyte retrieval was performed 37 hours after trigger by agonist or hCG in antagonist and agonist respectively. All embryo transfers were performed at day 5 with 2 blastocysts when available.

#### Methods

Vaginal ultrasound was used to measure the cervical length (from internal to external os), and the length of the endometrial stipe (from internal os to tip of endometrium), figure 1. The vagina was washed with povidone-iodine and then thoroughly cleaned with sterile saline. Cervical mucous was gently, but thoroughly, aspirated, and a MOCK transfer was done to ensure easy embryo transfer. The outer catheter was adjusted to the length of the cervix plus 2 mm, internal catheter was marked at the length of the endometrial stripe minus 10-15 mm, figure 2. The embryos were loaded in a droplet between 2 air bubbles using a soft catheter (LOTUS ULTRA Embryo Transfer Catheter, CMC Medical Devices Malaga Spain), handled by the clinician, and the embryos were expelled using steady finger pressure, and the catheter was removed and checked in the laboratory for residual embryos. Speculum was removed and vaginal ultrasound was performed to check the droplet position. Luteal support was done by a combination of intramuscular and vaginal progesterone. The pregnancy test was done 15 days after embryo transfer and 7-10 days later ultrasound to check the presence of a gestational sac.



Figure 1. Measurement of cervical and endometrial stipe length using vaginal ultrasound.



Figure 2. Adjusting the outer and inner catheter length according to ultrasound measurements.

#### Statistical analysis of the data

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using numbers and percentages. Quantitative data were described using range (minimum and maximum), mean, standard deviation, median, and interquartile range (IQR).

#### Results

The study included 128 patients aged 18-45 years (mean 31.29  $\pm$  6.12), AMH 0.06 – 8.22 (mean 2.89  $\pm$  1.89). The mean number of oocytes retrieved was 2.89  $\pm$  1.89, 7.41  $\pm$  4.04 fertilized, and 5.70  $\pm$  3.28 class A embryos Table 1. The transfer time was 1.28  $\pm$  1.33 minutes. The transfer was easy in 89.1% of cases and the distance of the droplet from the tip of the endometrium ranged from 0.0 – 1.30 with a mean of 0.40  $\pm$  0.37 cm, figure 3. The pregnancy rate across all ages was 57.0%, table 2.



Figure 3. Location of the droplet by vaginal ultrasound after embryo transfer using ULMbET.

 Table 1: Biodata and laboratory parameters of the studied cases.

	No. (%)
Age (years)	
Min. – Max.	18.0 - 45.0
Mean ± SD.	31.29 ± 6.12
Median (IQR)	31.50 (27.0 – 36.0)
AMHÌ	, , , , , , , , , , , , , , , , , , ,
Min. – Max.	0.06 - 8.22
Mean ± SD.	2.89 ± 1.89
Median (IQR)	2.65 (1.75 – 3.68)
Oocytes Retrieved	
Min. – Max.	1.0 – 30.0
Mean ± SD.	11.05 ± 6.0
Median (IQR)	10.0 (7.0 – 15.0)
Immature Oocytes	
Min. – Max.	0.0 - 10.0
Mean ± SD.	$1.59 \pm 2.13$
Median (IQR)	1.0 (0.0 – 2.0)
MI	
Min. – Max.	1.0 – 25.0
Mean ± SD.	9.31 ± 5.12
Median (IQR)	8.0 (5.50 – 13.0)
Oocyte Injected	4 9 9 9 9
Min. – Max.	1.0 - 25.0
Mean ± SD.	9.30 ± 5.13
Median (IQR)	8.0 (5.50 – 13.0)
Fertilized	10, 10,0
Min. – Max.	1.0 - 19.0
Mean ± SD.	$7.41 \pm 4.04$
	7.0 (5.0 – 10.0)
Cleaved	10 170
Min. – Max.	1.0 - 17.0
Median (IOD)	$6.94 \pm 3.89$
	7.0 (4.0 – 9.0)
	0.0 16.0
$\frac{1}{1000} + \frac{1}{20}$	0.0 - 10.0
IVIEALI I SD.	$5.70 \pm 5.20$
Median (IQR)	0.0 (0.0 - 0.0)

	No. (%)
Transfer time (Min)	
Mean ± SD.	1.28 ± 1.33
Median (IQR)	1.0 (0.59 – 1.64)
Distance from fundus (cm)	
Min. – Max.	0.0 - 1.30
Mean ± SD.	0.40 ± 0.37
Median (IQR)	0.20 (0.11 – 0.70)
Transfer	
Easy	114 (89.1%)
Difficult	13 (10.2%)
Very difficult	1 (0.8%)
Outcome	
Negative	55 (43.0%)
Positive	73 (57.0%)

## Table 2: Transfer time, location of embryo droplet, and outcome of UMbET.

#### Discussion

Pregnancy rates are influenced by the embryo transfer site, and better results can be achieved when the tip of the catheter is placed in the central area of the endometrial cavity, especially when the distance from the endometrial tip is >10mm (13). Several systematic reviews of RCTs (10, 14) have compared the results of the 'blind' clinical touch transfer technique with those of the transabdominal ultrasound-guided transfer (i.e. TA-UGET), overall reporting some benefit of TA-UGET.

The disadvantages of TAUGET include the need for a second trained operator and difficulty in locating catheter tip in obese patients and in the RVF uterus. Repeated movements of the catheter to locate its tip leading to endometrial injury is another disadvantage of TAUGET. More time is needed to perform TA-UGET and the presence of a full bladder may cause discomfort and stimulate uterine contractions. As an alternative to the standard TAUGET the present case series suggests that ULMbET (11, 15) could be an acceptable efficient operator and patient-friendly embryo transfer technique.

The time required to carry out ULMbET was 0.59 – 1.64 minutes, which was well tolerated by the patients. The clinical pregnancy rate is 57% which adds to the validity of the technique. Although not reported in the current study the learning curve of UMbET is short.

The main limitation of the current study is the design and small sample size, but it is performed with a single operator in one center with a fixed catheter and loading technique.

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