

Comparative Study between two Types of Embryo Transfer Catheters (A Randomized Controlled Trial)

Thesis

*Submitted for Partial Fulfillment of the M.D. Degree in
Obstetrics and Gynecology*

By

Mohab Ahmed Fouad El-Rabat

M. B., B.Ch, 2010 Ain Shams University

Msc. Obstetrics and Gynecology 2015- Ain Shams University

Assistant Lecturer of Obstetrics and Gynecology – Ain Shams University

Supervised by

Prof. Hassan Awwad Bayoumi

Professor of Obstetrics and Gynecology

Faculty of Medicine, Ain Shams University

Dr. Mostafa Fouad Gomaa

Assistant Professor of Obstetrics and Gynecology

Faculty of Medicine, Ain Shams University

Dr. Gihan El-Sayed El-Hawwary

Lecturer of Obstetrics and Gynecology

Faculty of Medicine, Ain Shams University

Dr. Ahmed Abdel Shafy El-Shahawy

Lecturer of Obstetrics and Gynecology

Faculty of Medicine, Ain Shams University

Faculty of Medicine

Ain Shams University

2018

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظیم

صدقة الله العظیم

سورة البقرة الآية: ٣٢

Acknowledgment

*First and foremost, I feel always indebted to **ALLAH**, the Most Kind and Most Merciful.*

*I'd like to express my respectful thanks and profound gratitude to **Prof. Hassan Awad Bayoumi**, Professor of Obstetrics and Gynecology, Faculty of Medicine- Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

*I am also delighted to express my deepest gratitude and thanks to **Dr. Mostafa Fouad Goma**, Assistant Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

*I am deeply thankful to **Dr. Gihan El-Sayed El-Hawwary & Dr. Ahmed Abdel Shafy El-Shahawy**, Lecturers of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for their great help, active participation and guidance.*

*Also, I am thankful to **Dr. Ahmed Awadallah**, Lecturer of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his great help in providing the patients who participated in this study.*

*I would like to express my hearty thanks to all **my family** for their support till this work was completed.*

List of Contents

Title	Page No.
List of Tables	i
List of Figures	iii
List of Abbreviations.....	v
Protocol	
Introduction.....	1
Aim of the Work	4
Review of Literature	
📖 Embryo Transfer Technique	5
📖 Difficult Embryo Transfer	22
📖 Types of Catheters.....	41
Patients and Methods	52
Results	64
Discussion.....	83
Summary	92
Conclusions and Recommendations	94
References	96
Arabic Summary	

List of Tables

Table No.	Title	Page No.
Table (1):	Randomization of difficult embryo transfer cases	63
Table (2):	Basal characteristics among Wallace and Prince (without mandrel) groups.....	65
Table (3):	Stimulation and fertilization among Wallace and Prince (without mandrel) catheters groups	66
Table (4):	Embryo transfer difficulty and patients' discomfort among Wallace and Prince (without mandrel) groups.....	67
Table (5):	Transfer characteristics among succeeded Wallace and Prince (without mandrel) groups.....	69
Table (6):	Pregnancy outcomes among Wallace and Prince (without mandrel) groups.....	70
Table (7):	Basal characteristics among Labotech and Prince (with mandrel) groups.....	72
Table (8):	Stimulation and fertilization among Labotech and Prince (with mandrel) groups.....	73
Table (9):	Transfer difficulty and patients' discomfort among Labotech and Prince (with mandrel) groups.....	74
Table (10):	Transfer characteristics among Labotech and Prince (with mandrel) groups.....	75
Table (11):	Pregnancy outcomes among Labotech and Prince (with mandrel) groups.....	76
Table (12):	Comparison regarding variables affecting live birth in Wallace group.....	78
Table (13):	Comparison regarding variables affecting live birth in prince without mandrel group	79

List of Tables (Cont...)

Table No.	Title	Page No.
Table (14):	Comparison regarding variables affecting live birth in Labotech group	80
Table (15):	Comparison regarding variables affecting live birth in Prince with mandrel group	81
Table (16):	Logistic regression to find out factors affecting live birth	82

List of Figures

Fig. No.	Title	Page No.
Figure (1):	Embryo transfer technique.....	6
Figure (2):	Embryo transfer.....	22
Figure (3):	IVF-ICST cycle.	24
Figure (4):	Embryo transfers day 3 vs day 5.....	25
Figure (5):	Hysteroscopic examination.....	27
Figure (6):	Cervical stenosis.	31
Figure (7):	Sonographic examination demonstrating uterine contractions per minute.....	37
Figure (8):	Uterine contractions in correlation with days after HCG trigger administration.....	38
Figure (9):	Evaluation sheet of uterine position.	40
Figure (10):	Frydman catheter.....	41
Figure (11):	Edwards–Wallace catheter.....	42
Figure (12):	Cook Soft-Pass catheter.	42
Figure (13):	Cook Soft-Trans catheter.....	43
Figure (14):	Cook Sydney IVF catheter.....	43
Figure (15):	Gynetics Delphin catheter.....	44
Figure (16):	SOMATEX catheter.	46
Figure (17):	Tom Cat catheter.....	47
Figure (18):	Set TDT catheter.	48
Figure (19):	Rocket Embryon catheter.	48
Figure (20):	Gynetics Emtrac-A catheter.....	49
Figure (21):	Labotect catheter.....	50
Figure (22):	Prince PM TRANS SET catheter.....	51

List of Figures (Cont...)

Fig. No.	Title	Page No.
Figure (23):	Flow chart of the studied cases.	64
Figure (24):	Embryo transfer failure among Wallace and Prince (without mandrel) groups.	67
Figure (25):	Discomfort during embryo transfer among Wallace and Prince (without mandrel) groups.	68
Figure (26):	Embryo transfer counts among succeeded Wallace and Prince (without mandrel) groups.	69
Figure (27):	Pregnancy outcomes among Wallace and Prince (without mandrel) groups.	71
Figure (28):	Patients' discomfort among Labotech and Prince (with mandrel) groups.	74
Figure (29):	Embryo transfer counts among Labotech and Prince (with mandrel) groups.	75
Figure (30):	Pregnancy outcomes among Labotech and Prince (with mandrel) groups.	76

List of Abbreviations

<i>Abb.</i>	<i>Full term</i>
<i>ART</i>	<i>Assisted Reproductive Technology</i>
<i>BMI</i>	<i>Body Mass Index</i>
<i>CI</i>	<i>Confidence Interval</i>
<i>DOR</i>	<i>Diminished Ovarian Reserve</i>
<i>E2</i>	<i>Estradiol</i>
<i>FR</i>	<i>French Size</i>
<i>HCG</i>	<i>Human Chorionic Gonadotropin</i>
<i>LEEP</i>	<i>Loop Electrocautery Excision Procedure</i>
<i>MAC</i>	<i>Monitored Anesthesia Care</i>
<i>OD</i>	<i>Ovarian Dysfunction</i>
<i>POR</i>	<i>Poor Ovarian Reserve</i>
<i>PR</i>	<i>Pregnancy Rate</i>
<i>RCT</i>	<i>Randomized Controlled Trial</i>
<i>RR</i>	<i>Relative Risk</i>
<i>SPSS</i>	<i>Statistical Package for Social Sciences</i>
<i>TDT</i>	<i>Tight Difficult Transfer</i>

ABSTRACT

Background: embryo transfer is a crucial step in IVF-embryo transfer treatment cycles, but it is probably the 'most inefficient. Ovarian stimulation, oocytes retrieval, fertilization and embryo culture have been extensively studied and are performed under tight control, while improvements in embryo transfer are less often considered. There are many factors, in addition to the embryo quality, that have been shown to influence the success of embryo transfer, such as the technique used, the experience of the operator, and the difficulty of the procedure.

Aim of the Work: to compare the efficacy of the embryo transfer catheters: Wallace® and Prince® in an IVF program of a tertiary referral university center.

Patients and Methods: a randomized controlled research trial conducted at private IVF unit and the unit of Reproductive Medicine of Ain Shams University. Study subjects have been recruited from an IVF management cycle. The research study has been conducted from January 2016 till September 2019.

Results: the current research study investigated four types of embryonic catheters Wallace, Prince with and without mandrel and Labotech most of the research study findings didn't reveal any statistical significant differences by statistical analysis in which basic features and ovarian stimulation features didn't differ between research groups categorized according to the type of catheter implemented.

Conclusion: another issue that should be considered in future research is the integration of uterine volume, cervical position, uterine axis as factors affecting the choice of the type of catheter that could aid in proper performance of this meticulous art of embryonic transfer besides differences in experience and practice performed by the reproductive clinician should be put in consideration. Future research studies should consider multicentric fashion of research with great consideration of age, BMI, ethnicity, infections (causing cervical edema) as factors affecting the anatomic integrity and position therefore affecting the ease of the embryonic transfer process.

Keywords: Embryo Transfer Catheters - Diminished Ovarian Reserve - Ovarian Dysfunction

Comparative Study between two Types of Embryo Transfer Catheters

(A Randomized controlled trial)

A protocol of thesis

Submitted for partial fulfillment of the M.D. Degree in Obstetrics and Gynecology

By:

Mohab Ahmed Fouad El-Rabat

M. B., B.Ch, 2010 Ain Shams University

Msc. Obstetrics and Gynecology 2015- Ain Shams University

Assistant Lecturer of Obstetrics and Gynecology – Ain Shams University

Supervised by

Prof. Hassan Awwad Bayoumi

Professor of Obstetrics and Gynecology

Faculty of Medicine, Ain Shams University

Dr. Mostafa Fouad Gomaa

Assistant Professor of Obstetrics and Gynecology

Faculty of Medicine, Ain Shams University

Dr. Gihan El-Sayed El-Hawwary

Lecturer of Obstetrics and Gynecology

Faculty of Medicine, Ain Shams University

Dr. Ahmed Abdel Shafy El-Shahawy

Lecturer of Obstetrics and Gynecology

Faculty of Medicine, Ain Shams University

Faculty of Medicine

Ain Shams University

2016

Introduction

Embryo transfer is a crucial step in IVF-embryo transfer treatment cycles, but it is probably the most inefficient (*Buckett, 2006*).

Ovarian stimulation, oocytes retrieval, fertilization and embryo culture have been extensively studied and are performed under tight control, while improvements in embryo transfer are less often considered. There are many factors, in addition to the embryo quality, that have been shown to influence the success of embryo transfer, such as the technique used, the experience of the operator, and the difficulty of the procedure (*McIlveen et al., 2005*).

Several studies have shown increases in clinical pregnancy rate (PR) resulting from improvements in the various aspects of embryo transfer, including cervical cleaning, a full bladder, dummy transfer, pretreatment cervical dilatation in difficult cases, and ultrasound guidance (*Buckett, 2006*).

It has also been suggested that catheter' choice influences pregnancy rates (*Meriano et al., 2000*), and several surveys in the UK and Australia have shown that embryo transfer catheters rank high as an important independent factor in the- success of an IVF program (*Abou-Setta et al., 2005*).

A systematic review has suggested that, the ideal embryo transfer catheter should avoid any trauma to the endocervix and/or

the endometrium as it is introduced into the uterine cavity (*Abou-Setta et al., 2005*).

In the search for the ideal catheter, many large retrospective studies (*Burke et al., 2000; Choe et al., 2001; Wood et al., 2002*).

Sallam et al., (2003) have looked into the catheter type used, and have reported higher PR with soft catheters such as the Cook (Cook Medical, USA), and the Wallace (Marlow Technologies, USA) compared with firm ones such as TDT (Laboratoire. CCD, France), Frydman (Laboratoire CCD), Tomcat (Kendell-Health care, USA), Tefcat (Kendell Healthcare, MA, USA), and Rocket (Rocket Medical, UK) (*Bucket, 2006*). However, there are also several reports of the choice of catheter not influencing PR (*Unman et al., 2000; Karande et al., 2002; De Placido et al., 2002*).

It was, therefore, decided to evaluate the performance of the Wallace, Labotech and Prince catheters in a prospective randomized controlled trial (RCT) using clinical PR as the main outcome measure, in continuing efforts to determine the optimal embryo transfer device.

Embryo transfer can lead to the success or failure of an assisted reproductive technology (ART) cycle (*Hearns-Stokes et al., 2000*).

One factor in ET that has been identified as a variable that can positively or negatively affect pregnancy rate (PR) is the type of transfer catheter used (*Meriano J et al., 2000*). It has been reported that more flexible catheters, such as the Edwards-Wallace, result in

significantly higher PRs than the more rigid Frydman Tight Difficult Transfer (TDT) (Fertility Technologies, Natick, MA) catheters (*Wood et al.,2000*). In 2001, Boone et al. demonstrated a trend toward improved PRs with the Edwards- Wallace (Cooper Surgical, Shelton, CT) catheter compared with the Cook Soft-Pass (Cook Urological, Spencer, IN) catheter (*Boone et al.,2001*). In a -recent article by *McIlveen et al.,the Cook K-Jet* was compared with the und when comparingAWallace. No differenceEdwards-Wallace. No difference in PR was found when comparing the two catheters (*McIlveen et al., 2005*).

Aim of the work

Aim of this study is to compare between two types of embryo transfer catheters in an IVF program of a tertiary referral university center and private IVF center.

1. Research hypothesis:

Null Hypothesis: Prince® Embryo transfer catheter will not affect the Live Birth Rate

2. Research Question:

Will the newly invented Prince® embryo transfer affect the Live Birth rate?

3. Primary outcome:

The main outcome measure in this study is the Live Birth rate.

4. Secondary outcomes:

- (a) Implantation rate.
- (b) Biochemical pregnancy rate.
- (c) Clinical pregnancy rate.
- (d) Miscarriage rate.
- (e) Ongoing pregnancy
- (f) Visibility of the catheter under ultrasound
- (g) Number of retained embryos post transfer
- (h) Whether change of catheter was required
- (i) Patient discomfort during the procedure.