Acta Scientific Women's Health (ISSN: 2582-3205)

Volume 4 Issue 2 February 2022

Research Article

Impact of Endometrium Receptivity on Blastocyst Transfer

Agnes Immanuel[1], Sarat Battina[2] and Reeta Janet Jessy[3]*

[1]Senior Embryologist, Indigo Women Center, India

[2]Director of Reproductive Medicine, Indigo Women Center, India

[3]M.sc Zoology, India

***Corresponding Author:** Reeta Janet Jessy, M.sc Zoology, India.

Received: January 21, 2022

Published: January 27, 2022

Abstract

IVF treatments highly motivate infertility patients to achieve pregnancy. The decades ago worldwide the researchers performed day 2 or day 3 transfers in order to increase the pregnancy success rate. The embryologists selected randomly the 3-4embryos on the basis of cleavage. So it often easily leads to multiple pregnancy (triplet or quadruplet) and it reaches at high risk of life threatening premature newborn.

Slowly the researchers were moved on extending culture from day 3 to day 5, blastocyst stage to avoid the risk of multiple pregnancy. Then it was recognised as the survival of good quality embryos percentage is higher to the fifth or sixth day of post insemination. Likely, the selection of one or two good embryos is based on the formation of blastocyst. Ultimately it leads to higher pregnancy rate. To optimise the success rate the grading and selection of embryos are eventually needed. The advantage of blastocyst transfer includes better synchronisation between endometrium lining and the blastocyst.

The endometrium is the inner line of the uterus. Every month of the female menstrual cycle the endometrium size will be changing their thickness. The progesterone and oestrogen plays a major role for the endometrium thickness. The growth and shedding of the endometrium through menstruation cycle the pregnancy does not occur. The ultrasound monitoring is necessary for the measurement of the endometrium line. The endometrium thickness is necessary and this acts as host of the embryo. The aim of this study was to compare between the conventional blastocyst transfer and blastocyst transfer after ERA biopsy.

Keywords: Infertility; Pregnancy; Endometrium

Extended culture

The human embryonic development starts from fertilised oocytes called a zygote. After 30-40 hrs of post insemination the zygote undergoes mitotic division and starts to cleave into two cells. On day 2, the embryo has reached 4-6cells (blastomere). On the third day it reaches 6-8 cell stages. Up to this stage the embryonic development under the control of maternal genes in the oocytes. After 8 cell stages, their own embryonic genes help to develop the embryo. Further extended culture helps the embryo to go for 16 to 32 cells(blastomere)and looks like mulberry, called morula. Until this stage the embryo size is the same and are totipotential. On day 5 the fluid-filled cavity forms in the center (blastocele) of blastomere. This blastocoel fluid increases, eventually the embryo has expanded and increased in size and the blastomere starts differentiation . The outer layer of embryo, called trophectoderm and the cells inside the morula aggregate and group together form the inner cell mass (ICM). This whole complex is called blastocyst. The artificial embryo culture media for IVF purposes was simple in composition and it could only support up to blastocyst development in the petri dish and kept in incubator is maintained with 6% CO_2 at 37°C. Approximately 35-45% of good quality day 3 embryos without fragmentation only reach the blastocyst stage using such advanced culture methods. so the selection of embryos are fewer and substantially it reduces the high risk of multiple pregnancy.

Indication of the patient

In the early 90's the blastocyst transfer was successfully performed. so the concept of blastocyst transfer is not new in ART procedure. But it's really very important who all needed and what were the indications for the blastocyst transfer. The blastocyst transfer offered the couple for the following few points.

- Repeated implantation failure
- To avoid multiple pregnancy and premature baby
- Embryo development potential had to be assessed
- Lower ovarian responder which yields fewer oocytes
- Maternal age >35 years
- Selection of embryos those who avoided freezing.

Apart from this the blastocyst development depends on the culture medium characteristics, the laboratory condition, the oocyte quality, sperm morphology. In some ART centre's to avoid extended culture due to unpredictable rate of blastocyst development.

Embryo quality

In order to get pregnant with a high quality of developmental blastocyst to be transferred to the uterine cavity. Naturally the embryo does not enter the uterine cavity until it reaches the expanded blastocyst. The quality of embryo depends upon the division, cell numbers, fragmentation, blastomere size, compaction, and blastocyst formation. The implantation potential should be correlated with the quality of embryos.

Cleavage stage embryos start from 2-16 cells and compacted (morula). The normal developing embryos cell division occurs every 18-20 hrs. Either too slow or too fast is related to metabolic/chromosomal disorder of the embryo. Obviously it leads to implantation failure.

The morphological assessment of blastocyst has been a very useful indication of implantation. It includes the inner cell mass (ICM), trophectoderm (TE), and blastocoel. So the embryo needs energy sources, types of amino acids, and oxygen concentration to develop the good quality blastocyst. The embryos at various stages need various types of environment conditions. So the sequential media helps the embryo to grow blastocyst stage at 37°C in a 6% CO_2 environment. Like natural cycle the extended blastocyst transfer on day 5 helps the increasing the implantation rate.

Endometrium assessment

Endometrium is the innermost lining of the uterus. It is composed of cell-rich connecting tissue surrounded by endometrial glands. It is differentiated by two layers called superficial functional layer and deeper basal layer. Naturally, in each menstrual cycle the shedding of blood due to the superficial layer and reconstructed by basal layer. During reproductive time the endometrium has been changing the thickness, morphology, and vascularity changes.

The evolution of endometrium can be done by both TAS and TVS. TVS is ideal for assessing the endometrial thickness. The preparation for embryo transfer protocols decrease the cost and implantation rates are higher than fresh transfer. The main purpose is preparing the endometrium line to be favourable for embryo embedding. Different types of protocol have been used for preparing endometrium. The ET is performing like a natural cycle or inducing ovulation during the course of the cycle. Secondly, the artificial preparation of the endometrium by the administration of oestrogen and progesterone. From 9th day of the cycle the patient has to monitor their endometrium. Once it reaches the triple line with above 9 mm - 12 mm is favourable for embryo transfer.

Endometrium receptivity

The synchronisation between embryo and endometrium is a very complex process. Naturally, the window period of each woman has a unique, between 3rd to 6th day of mid luteal phase. The endometrium receptivity is the window period for embryo implantation, embedding, and development into new individuals. In some inflammatory or anatomic conditions, the window period is narrowed or relocated to impossible normal implantation, leading to infertility or loss of pregnancy.

Materials and Methods

Endometrial receptivity array is advanced technology to know the approximate window period of endometrium. It is recommended for repeated implantation failure with good embryo quality. ERA is a genetic analysis that take sample from the women's endometrial lining to analyse which day would perform the embryo transfer. The sample will be sent to the genetic department to analyse and give three following possible results.

- **Pre-receptive:** This indicates that the endometrium is not quite ready to receive the embryo and transfer at this time may not be ideal.
- **Receptive:** This indicates that the moment the endometrial biopsy was taken was an optimal time to transfer the embryo for implantation.
- **Post-receptive:** This indicates that the endometrium had reached the stage for optimal embryo implantation but has now gone past it.

Results

A total of 475 patients had Intra Cytoplasmic Cycle (ICSI) with antagonist protocol. The age of the patients is between 32 to 44 yrs. 97 patients had undergone either frozen blastocyst transfer with ERA biopsy or without ERA biopsy.

The statistical analysis among two different embryo transfers were analysed by using chi square test and applied to compare. P < 0.05 was considered as significant (Table 1).

Blastocyst transfer was done with AA grade is higher than blastocyst transfer was done after ERA biopsy. BB grade embryo transfer was done after ERA biopsy shows higher pregnancy rate. From the table the P value is 0.04702. Consider the P value the results shows significant (normal < 0.05) (Table 2,3).

The miscarriage rate also lesser in ET done after ERA biopsy is 0.006 < 0.05. So it is significant.

Variables	Total patients	Aa grade	Bb grade	Cancelled
ET done without biopsy	66(68.04%)	48 (72.7%)	16 (24.2%)	2 (3.03%)
ET done with biopsy	31 (31.9%)	12 (38.7%)	13 (41.9%)	6 (19.3%)

Table 1: It shows total number of patients and Grading of embryos. Some of the patients were cancelled due to lower grades or stop development.

Variables	Positive	Negative
ET done without biopsy	63.2% (0.56)	36.36% (0.95)
ET done with ERA biopsy	29.03% (0.67)	51.06% (1.8)

Table 2: Implantation rate after blastocyst transfer.

Variables	Total positive	Miscarriage
ET done without biopsy	63.2% (0.0016)	50% (0.035)
ET done with ERA biopsy	29.03% (3.16)	33.33% (4.33)

Table 3: Miscarriage rate in both variables.

Conclusion

Endometrial receptivity is a major role for implantation. For some patients on day 5 blastocyst transfer have negative impact. So the exact window period of patients will be more reliable for blastocyst transfer. From the above studies it shows the blastocyst transfer after ERA biopsy is significant. We need more data to analyse for further studies [1-9].

Bibliography

1. Dorostghoal M., *et al*. "Over expression of endometrial oestrogen receptor-alpha in the window of implantation in women with unexplained infertility". *International Journal of Fertility and Sterility* 12 (2018): 37-42.
2. Lessey BA., *et al*. "Estrogen receptor-alpha (ER-alpha) and defects in uterine receptivity in women". *Reproductive Biology and Endocrinology* 4 (2006): S9.
3. Lee DK., *et al*. "Suppression of ERalpha activity by COUP-TFII is essential for successful implantation and decidualization". *Molecular Endocrinology* 24 (2010): 930-940.
4. Zhang P., *et al*. "Transcriptome profiling of human pre-implantation development". *PLoS ONE* 4 (2009): e7844.
5. Sasaki H. "Position- and polarity-dependent Hippo signalling regulates cell fates in preimplantation mouse embryos". *Seminars in Cell and Developmental Biology* (2015): 47-48, 80-87.
6. Rayon T., *et al*. "Notch and hippo converge on Cdx2 to specify the trophectoderm lineage in the mouse blastocyst". *Developmental Cell* 30 (2014): 410-422.
7. Tesarik J., *et al*. "Paternal effects acting during the first cell cycle of human preimplantation development after ICSI". *Human Reproduction* 17 (2002): 184-189.
8. Tsirigotis M. "Blastocyst stage transfer: pitfalls and benefits". *Human Reproduction* 13 (1998): 3285-3289.
9. Vanderzwalmen P., *et al*. "Sperm morphology and IVF pregnancy rate: comparison between Percoll gradient centrifugation and swim-up procedures". *Human Reproduction* 6 (1991): 581-588.