DEBATE

Embryo transfer techniques: what affects the results?

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The technique of embryo transfer (ET) is the last and most crucial step determining the outcome of In-Vitro Fertilization. Great attention and time should be given to the ET procedure. Several factors can optimize the success of this procedure:

First: Careful evaluation of the uterus:

It has been demonstrated that performing a dummy embryo transfer before the IVF cycle significantly improves the pregnancy rate (1). The trial ET can be done before the IVF cycle or immediately before the actual ET (2).

It is important to evaluate the length and direction of the uterine cavity. It is also important to choose the most suitable ET catheter. Dummy ET helps to discover any unanticipated difficulty in entering the uterine cavity resulting from such things as cervical fibroids, anatomical distortion of the cervix from previous surgery, or congenital anomalies and pin-point external os. If difficulty is diagnosed, cervical dilatation before ovarian stimulation is advisable.

Ultrasonography (US) is another valuable way of evaluating the uterine cavity. It gives precise information about the degree of the cervico-uterine angle, and the length of both the cervix and uterine cavity. US is very important for diagnosing fibroids that may be encroaching on the uterine cavity or distorting the cervical canal. It is recommended to revise the US picture before the ET procedure and to consider it as a map or a guide.

Second: Avoiding the initiation of uterine contractility:

The presence of endometrial movements has been recognized by several investigators (3-5). Immediate or delayed expulsion of the embryos has always been of major concern in assisted reproduction (6-9).

Some precautions can be taken to avoid the initiation of uterine contractions. As a general rule, ET should be a simple and painless procedure. Gentle manipulation should be the rule throughout the procedure. Holding the cervix with a volsellum should by completely avoided except in rare cases. It has been demonstrated that the use of tissue forceps to hold the cervix can trigger uterine contractions (10). The use of soft catheters should be the rule except when it can not be introduced. Touching the fundus should be avoided as it was demonstrated that it initiated strong random waves in the fundal area and from the fundus to the cervix (11).

Third: Removing the cervical mucus:

Cervical mucus can cause some obstacles in proper embryo replacement. It can plug the tip of the catheter, causing difficulty in delivering the embryos inside the uterine cavity, especially since such a small volume of culture media is injected with the embryos.

Moreover, the embryos can stick to the cervical mucus around the catheter and be dragged outside during the withdrawal of the catheter. The mucus may also interfere with implantation if pushed or injected into the uterine cavity. It has been demonstrated that removing the cervical mucus before a Methylene Blue dummy transfer
significantly reduced the extrusion of the dye (9). It was also demonstrated that embryos were much more likely to be retained when the ET catheter was contaminated with blood or mucus (12).

**Fourth: Proper placement of the embryos:**

It is absolutely essential to be sure that the catheter has passed the internal cervical os and entered the uterine cavity. Soft catheters can be misleading, as they can curve inside the cervical canal. A simple test that can be done to ensure that the soft catheter has passed the internal os and not simply bent inside the cervical canal is to rotate the catheter 360°. If it recoils, it means that it is curved inside the cervical canal.

One of the most important causes for the prevention of the catheter to pass the internal os is the acute angle between the uterine cavity and the cervical canal. It simply causes a lack of alignment between the catheter (straight) and the utero-cervical canal (curved or angulated). A simple procedure of curving the catheter will overcome this problem. It has been demonstrated that molding the ET catheter according to the utero-cervical angle measured by US increased the implantation and clinical pregnancy rates (13). Straightening the Utero-Cervical angle can be achieved by a full bladder (14). This effect is being achieved indirectly by performing embryo transfer under US guidance. In some cases a more rigid catheter is needed to pass the internal os. In rare cases the cervix has to be held by a volsellum in order to stabilize the uterus. However, it is important to realize that holding the cervix with a volsellum leads to the release of oxytocin (15) and it is painful and should be done under general anaesthesia.

One possible reason for retained embryos is the position of the embryo in the catheter. Small volumes of < 40 (L are preferable, but it is important to aspirate 20 (L of fluid first then the embryos are aspirated second. This will ensure enough volume to push out the embryos. In the mean time, it is recommended once the injection is done to keep the pressure on the plunger of the syringe until withdrawal of the catheter (16). It is also important to withdraw the catheter slowly to prevent the creation of a negative pressure. The use of US guidance for ET was described by various IVF programs (17, 18).

It has been proven useful in women with previously difficult ET (19). It has also been found to be simple and reassuring and significantly improved pregnancy rates by optimizing the placement of the embryos (20-22). However, other studies found no significant difference between US guidance and clinical touch ET (19,23). It depends on the experience of the clinician providing the embryo transfer.

In extremely rare cases it is difficult or even impossible to pass the catheter inside. It could be due to anatomical distortion of the cervix by previous surgery or the presence of fibroids or congenital anomalies. For these cases, stiffer systems may be used (1,2). In rare cases trans-myometrial surgical ET can be performed (24-26).

**Fifth: Minimizing embryo expulsion:**

In a prospective randomized study it has been demonstrated that applying a gentle mechanical pressure on the portiovaginalis of the cervix using the vaginal speculum significantly improved the implantation and clinical pregnancy rates (27). After introducing the ET catheter, the screw of the vaginal speculum was loosened so that the two values of the speculum would collapse on the portiovaginalis, then the embryos were ejected.

In conclusion several precautions should be taken to optimize the ET technique. The most important is to avoid the initiation of uterine contractility. This can be achieved by using soft catheters, gentle manipulation, and avoid touching the fundus. Proper evaluation of the uterine cavity and uterocervical angulation is very important, and can be done by performing dummy ET and US. Removal of cervical mucous is another important factor. Finally one has to be absolutely sure that the catheter passed the internal cervical os.

**REFERENCES**


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Embryo transfer (ET) is arguably the most critical step in assisted reproduction. Despite numerous developments in IVF and ICSI, the implantation rate of replaced embryos remains low and it is estimated that 85% of the embryos replaced fail to implant (1). This low implantation rate has been blamed on diminished implantation capacity of the embryo, diminished endometrial receptivity but a suboptimal embryo transfer technique has also received much of the blame. Various aspects of the technique are thought to affect