ULTRASOUND-GUIDED EMBRYO TRANSFER TECHNIQUES

By Gerard S. Letterie, MD
Centre for Fertility and Reproductive Endocrinology
VIRGINIA MASON MEDICAL CENTER, SEATTLE, WASHINGTON

TECHNIQUES OF TRANSFER

The cardinal tenet of any embryo transfer is the atraumatic, gentle placement of high quality embryos within the endometrial cavity. These goals are best achieved with an ultrasound-guided transfer using a soft-tipped, echogenic catheter to assure accurate placement of the embryos, avoiding any contact of the catheter tip against the endometrial lining and uterine fundus, and thereby avoiding any uterine contractions.

Ultrasound-guided embryo transfer is performed as follows. Ultrasound monitoring may be performed using transabdominal and transvesical imaging with a 3.5 MHz linear array probe. The bladder should be filled with the intention to both enhance imaging of the uterus and endometrial lining and to straighten any uterine flexion that may be present. Scout imaging of the pelvis is then carried out transvesically and the uterus and fundal region of the endometrium is brought into focus. This scanning may be performed by any assistant or nursing personnel available and does not require an ultra-sonographer or clinician. A bivalved speculum is then inserted into the vagina and the vaginal vault carefully swabbed with sterile culture media to clear the area of any mucus or debris. The endocervical canal is gently prepped by both swabbing it with cotton tipped applicators soaked in the media, and by vigorously irrigating the canal using a 10cc ringed syringe attached to a flexible catheter (the guide catheter of the coaxial system is ideal for this). Reflux of the culture media into the endometrial cavity during this phase of irrigation may be observed during ultrasound imaging. This reflux has not been shown to adversely impact outcomes.

After the irrigation process, the vaginal vault is carefully dried of any remaining mucus or media that may have collected. The coaxial system, loaded with the embryos in the transfer catheter, is then brought into the field. Both transfer and guide catheter may be advanced as a unit. The guide catheter should serve to stabilize the softer and more flexible transfer catheter. The transfer catheter should be kept well within the rigid guide catheter to reduce any unintended movement of the transfer catheter tip. Care should be taken not to advance the guide catheter into the depth of the endometrial cavity, as its rigid structure may disrupt the endometrial lining. The guide catheter is advanced just beyond the external os, a distance of approximately one to two centimeters into the cervical canal.

Under direct transabdominal ultrasound guidance, the transfer catheter is then advanced through the endocervical canal into the lower uterine segment. Immediate identification of the catheter tip is essential to minimize motion of the catheter and avoid any impact on the endometrium. The echo-dense tip of the transfer catheter will facilitate this aspect. In difficult cases, identification of the catheter tip may be facilitated by movement of the ultrasound probe a few degrees in the longitudinal and transverse planes. Alternatively, small changes in the brightness, contrast and gain of the ultrasound unit may enhance identification of the catheter tip. Movement of the scanner is more advantageous than to and fro movement of the catheter for identification, as any excessive motion of the catheter may disrupt the endometrium.

The transfer catheter may then be advanced to a distance of 2.0 cm from the uterine fundus. This measurement may be easily verified by using the calipers prior to injection of the embryos. After transfer, the catheter is held in place for 45 to 60 seconds to permit the embryos to settle away from the catheter tip. The transfer and guide catheters are then slowly withdrawn as a unit and inspected for any retained embryos.

In difficult cases, when an apparent obstruction is encountered, it may be necessary to bring the guide catheter into the field independent of the transfer catheter and to advance only the guide catheter through the endocervical canal. This maneuver permits tailoring the curve of the guide catheter to the specific cervical anatomy. The transfer

catheter loaded with the embryos may then be brought independently into the field after the guide catheter is securely and safely placed in the canal. In this circumstance, the guide catheter provides a guidance and shelter for the safe passage of the embryos. This approach will avoid any possible damage to the embryos due to a difficult passage through the endocervical canal. In addition, when the passage of the guide catheter is difficult, only the transfer catheter should be removed after transfer of the embryos and inspected for any retained embryos. The guide catheter should be in place, should any retained embryos be detected. This maneuver will avoid a second difficult passage, should there be retained embryos.

In occasional cases, the transfer catheter of this system, due to its soft and flexible nature, will pass through the guide catheter and endocervical canal with difficulty. Resistance may be encountered as the transfer catheter is advanced through the curvature of the guide catheter. The transfer catheter may bend back on itself due to its extremely pliable nature. In this circumstance, a modified transfer catheter that incorporates a fine wire guide into the proximal two-thirds of the transfer catheter and maintains the soft, pliable nature of the distal one-third is available. This modification lends rigidity to the transfer catheter and prevents the transfer catheter from bending back on itself but maintains the extremely soft character of the catheter tip entering the uterine cavity.

In cases of cervical stenosis, there are three options. Stabilizing the cervix with a fine-toothed tenaculum and gently dilating the cervix with small Pratt dilators may be useful. In select circumstances, a rigid guide may be placed in the guide catheter to maintain curvature and lend more rigidity to the system. In extreme cases, placement of a thin laminaria one month prior to the IVF cycle may be useful. These techniques are considered a last resort and used only in extreme and difficult circumstances. These clinical circumstances may be anticipated and planned for through a careful trial or mock embryo transfer well in advance of the IVF cycle.

CONCLUSIONS

Ultrasound-guided embryo transfer using soft-tipped, echogenic catheter systems fulfills the goals of precise, atraumatic embryo transfer. This approach will result in minimal disruption of the endometrial lining, a standardized technique for centers with several clinicians performing the transfers and according to several recent studies, improved pregnancy rates.


Figure 1


Figure 2


Figure 3

Figure 1:
The transfer catheter should be kept well within the rigid guide catheter to reduce any unintended movement of the transfer catheter tip. Care should be taken not to advance the guide catheter into the depth of the endometrial cavity, as its rigid structure may disrupt the endometrial lining.

The guide catheter is advanced just beyond the external os, a distance of approximately one centimeter into the cervical canal.

Figure 2 & 3:
Schematic representations of embryo transfer in the longitudinal and coronal views depicting the endometrial cavity, catheter and catheter tip.