Fertility Aspects for Spinal Cord Injured Males  
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A number of techniques exist to assist reproduction for men with spinal cord injuries. Intrauterine insemination, intratubal insemination, in vitro fertilization, gamete intrafallopian transfer, zygote intrafallopian transfer, and micro-manipulation are among the methods of choice, depending on the individual situation. The method selected depends on sperm quality and quantity, particularly sperm motility, and the health of the receiving female. Many private and government-operated centers in the United States and Canada are capable of providing these facilities to achieve impregnation.

Ejaculatory Dysfunction in Spinal Cord Injury

Historically, men with spinal cord injury have been considered virtually sterile because of ejaculatory dysfunction commonly resulting from their injury. However, the evolution of assisted reproductive technologies (ARTS) has improved the ability to retrieve and use viable spermatozoa.

Assisted ejaculatory techniques have overcome the problem of sperm transport and have allowed both the assessment of sperm quality and the establishment of pregnancies through artificial insemination. While less than 10 percent of men with complete spinal cord injury experience ejaculation in intercourse, vibratory stimulation of the penis triggers a predictable series of body reactions in most men with lesions above the thoracic eleventh vertebral level. These reactions are very similar to the physical manifestations of the sexual response in men with an intact nervous system. Between half and three quarters of men with lesions above the thoracic eleventh spinal cord level can ejaculate. Their spermatozoa count is within the normal range, but the percentage of motile spermatozoa is low. Typically, the reactions leading to ejaculation take between 30 seconds and 3 minutes and are characterized by rhythmic abdominal and leg spasms, lowered and then elevated pulse rate, elevation of blood pressure and, after the culmination of these experiences, relaxation, tiredness and a general feeling of well-being.

Medication is available to prevent autonomic dysreflexia, which is an elevation of blood pressure and severe headaches. For electroejaculation (EEJ), a physician-usually a urologist-inserts a probe into the man's rectum and electrically stimulates the nerve controlling ejaculation (men with incomplete injuries may require anesthesia, as the stimulus is low current). During this stimulation, a nurse or physician will milk the penis to collect the ejaculate (if it is antegrade). If it is retrograde (a condition in which the semen goes back into the bladder), the sperm must be collected from the bladder by infusing a neutralizing solution into the bladder (Ringer's lactate). Then a process...
called decanterising is used to settle the sperm in the bottom of the container, to separate it from the solution and the urine.

Total time in the treatment room for a man is approximately 45 minutes, and the cost without anesthesia is approximately $400. Complications such as burns or sores are rare, but possible. Dysreflexia is easily controlled by medication.

According to Marie McCalren (1991), with recent advances in equipment and technique, doctors are reporting over 90 percent success rates in getting an ejaculate using electroejaculation in men who are over six months post-injury. Soon after injury, sperm production shuts down, and then will gradually pick up again within six months or more after injury.

Once the sperm is retrieved, it is examined to see if it is whole and well formed. If the sperm appears underdeveloped or fragmented, then the male candidate is not considered fertile at that time, and nothing further can be done. Several rechecks should be performed, as a urinary tract infection or poor general health can skew the results at any particular time.

If the sperm is whole and viable, the sperm can then be artificially inseminated into the receiving female, who must be at her ovulation stage. A hormone kit (LH) is used to track her time of ovulation. When the sperm has been retrieved, artificial insemination can be done at a urologist's or gynecologist's office.

Typical costs for artificial insemination include, in addition to the male urological exam:
Ringer's solution: $3
Physical for the female~ $150
LH kit- $90
Ultrasound: $75 to $150
Artificial insemination- approximately: $220 to $350

The procedure to retrieve live sperm, including electroejaculation and sperm decantering, is approximately $1,000 per visit. The average spinal cord-injured male typically goes through two preliminary procedures and four to six actual procedures for pregnancy to occur. The preliminary procedures are to check for viable sperm, and the actual procedure are for insemination or in vitro fertilization.

**Assisted Reproductive Technologies (ARTS)**
A variety of methods have been applied to the problem of uniting sperm and ovum. The existence of several methods of artificial fertilization allows the choice of an approach that best suites the needs of each patient.

**Intrauterine Insemination (IUI)**
All couples in which the man has viable sperm are candidates for IUI once the
semen is obtained and assessed for sperm quality and quantity, the washed and concentrated specimen is used for artificial insemination. The receiving female is evaluated by a reproductive gynecologist, and ovulation is prospectively determined.

Typically, the receiving female is placed on ovulation-induction medications and followed with serial transvaginal ultrasounds of the developing follicles. Just prior to the time of suspected ovulation, the hormone human chorionic gonadotropin (HCG) is given to induce ovulation.

On the day of ovulation, a freshly ejaculated specimen is obtained, prepared and placed in a small intrauterine insemination catheter. The concentrated sample is then directly injected high into the uterus. It takes an average of two to three cycles to achieve a pregnancy in this manner. Advantages of this method are that it does not involve a surgical procedure for the female and it is significantly less costly than other methods.

**Intratubal Insemination (ITI)**

ITI is useful in women with one or more follicles (eggs) on the same side. (Generally speaking if there are eggs on both sides, IUI is the procedure of choice.) Once the sperm has been prepared, the specimen is placed in a specially designed catheter and introduced directly into the fallopian tube. Since fertilization normally takes place in the fallopian tube, the sperm is placed as close to the ovum as possible, increasing the chances of a pregnancy.

**In Vitro Fertilization-Embryo Transfer (IVF)**

The IVF procedure, typically known as the test tube baby procedure, initially involves cycling the receiving female with ovulation-induction medications. In IUI and ITI procedures, the goal is to make no more than three to four eggs per cycle, thus reducing the chances of a multiple pregnancy. For IVF, the goal is to make as many nicely mature, unfragmented eggs as possible. To this end, the woman is put on ovulation-induction medication. Before ovulation occurs, the eggs are aspirated, or removed, and the sperm and eggs are then combined in a dish and assessed approximately 24 hours later to see if fertilization has occurred.

If it has, no more than four embryos are transferred to the mother's uterus. If there are additional fertilized embryos, they are frozen for future transfer, should the couple eventually desire another child or if the initial transfer fails to go on to a term pregnancy.

**Gamete Intrafallopian Transfer (GIFT)**

The GIFT procedure differs from IVF in that instead of placing the sperm and eggs in a dish, the two gametes are combined in a catheter and immediately placed laparoscopically into the fallopian tubes. This is basically a high-tech variation of the ITI procedure and allows direct assessment of the sperm and
eggs. The formation of an embryo cannot be determined unless a pregnancy occurs.

**Zygote Intrafallopian Transfer (ZIFT)**
In the zygote intrafallopian transfer (ZIFT) procedure, the egg and sperm are combined in a dish, and fertilization is allowed to occur. Once it has occurred, more than four embryos are transferred into the fallopian tubes.

**Micromanipulation**
Micromanipulation is the most recent state-of-the-art method of assisted reproduction; it is useful for male-factor infertility. The most common method used is partial zona dissection (PZD). This involves microscopic piercing of the covering of the egg—the zona pellucida—with a fine needle after the eggs have been retrieved via ultrasound-assisted aspiration. The eggs are then incubated with the man’s sperm.

This technique provides assistance for sperm by assuring an entrance mechanism for the sperm. The technology is typically used in combination with the ZIFT procedure. As the technology becomes more readily available, this procedure will become more widespread.

Not all these methods are appropriate for every couple. The method selected depends on sperm quality and quantity, particularly sperm motility. Cost can be a deterrent to the in vitro procedures. All three procedures involving in vitro transfer cost between $5,000 and $10,000 per procedure.

The other important factor to determine is, of course, the general health and fertility of the receiving female. A full reproductive evaluation needs to be done prior to undertaking these procedures to rule out problems such as endometriosis, hormone imbalances, ovulatory dysfunction and previous tubal pregnancies.

**Works cited:**