

# The management of infertility due to obstructive azoospermia

*Practice Committee of the American Society for Reproductive Medicine in collaboration with the Society for Male Reproduction and Urology*

The American Society for Reproductive Medicine, Birmingham, Alabama

The purpose of this Educational Bulletin is to review the treatment options for couples with infertility due to obstructive azoospermia. (Fertil Steril® 2008;90:S121–4. ©2008 by American Society for Reproductive Medicine.)

The prevalence of azoospermia, defined as complete absence of sperm from the ejaculate, is less than 1% among all men and approximately 10% to 15% among infertile men. Although azoospermia has many causes, approximately 40% of cases result from obstruction in the ductal system (1). Obstructive azoospermia results most commonly from previous vasectomy but also may be caused by epididymal, vasal, or ejaculatory duct pathology relating to genitourinary infection, iatrogenic injury during scrotal or inguinal surgical procedures, and congenital anomalies.

The clinical management of obstructive azoospermia depends on its cause and also must take into account any coexisting infertility factors in the female partner. Consequently, both partners should be evaluated thoroughly before making a specific treatment recommendation. The methods for evaluation of the azoospermic male and the infertile female are the subject of separate Practice Committee reports (2, 3). The purpose of this document is to review the treatment options for couples with infertility due to obstructive azoospermia.

## TREATMENT OPTIONS FOR OBSTRUCTIVE AZOOSPERMIA

Men with obstructive azoospermia may father children in one of two ways: [1] surgical correction of the obstruction, which may allow the couple to conceive naturally, or [2] retrieval of sperm directly from the epididymis or testis, followed by in vitro fertilization (IVF) or intracytoplasmic sperm injection (ICSI).

## SURGICAL TREATMENT

The surgical management of obstructive azoospermia varies with the site of obstruction. Obstructions in the vas deferens and epididymis are treated by microsurgical reconstruction. Ejaculatory duct obstruction is treated by transurethral resection of the ejaculatory ducts (TURED).

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## Microsurgical Reconstruction of the Vas Deferens and Epididymis

In experienced hands, microsurgical vasectomy reversal is highly successful. Sperm return to the ejaculate after surgery in 70% to 95% of patients, and 30% to 75% of couples can be expected to achieve pregnancy without assisted reproductive technologies (ART). The likelihood that sperm will return to the semen and the likelihood of pregnancy after microsurgical vasectomy reversal are inversely related to the duration of time since vasectomy (4). Other factors that affect success rates include [1] the gross appearance of vasal fluid at the time of surgery, [2] the presence or absence of sperm in the vasal fluid and their quality, [3] the length of the remaining segment adjacent to the epididymis, [4] the age of the female partner, and [5] the experience of the microsurgeon.

Microsurgical vasoepididymostomy is the surgical treatment for epididymal obstructions that may be congenital, idiopathic, or related to previous infection or vasectomy. Between 20% and 40% of couples may be expected to conceive naturally after vasoepididymostomy. Best results are achieved by surgeons who have the necessary microsurgical training and ongoing experience with the procedure. Ideally, vasectomy reversal procedures should be performed by surgeons who have the capability to perform both vasovasostomy and vasoepididymostomy because, in many cases, the latter may be necessary.

In rare cases, the site of obstruction is in the inguinal portion of the vas deferens. Obstruction at this level usually is caused by an injury to the vas during inguinal hernia repair; this possibility should be considered in men who have had previous inguinal surgery. When the ends of the vas can be located and approximated without tension, some such obstructions can be corrected by vasovasostomy within the inguinal canal (5). To avoid the need for additional surgery should attempts at reconstruction fail, sperm may be retrieved during surgery and cryopreserved for later IVF/ICSI.

## Transurethral Resection of the Ejaculatory Ducts (TURED)

Ejaculatory duct obstruction is uncommon but can be treated successfully by TURED where the duct enters the distal

<b>TABLE 1</b>	
<b>Common methods of sperm retrieval.</b>	
<b>Method</b>	<b>Acronym</b>
Microsurgical epididymal sperm aspiration	MESA
Percutaneous epididymal sperm aspiration	PESA
Testicular sperm extraction	TESE
Percutaneous testicular sperm aspiration	TESA

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prostatic urethra near the veru montanum. After TURED, sperm return to the ejaculate in approximately 50% to 75% of men; approximately 20% of couples achieve pregnancy. Complications of TURED occur in approximately 20% of men, including hematuria, hematospermia, urinary tract infection, epididymitis, and a watery ejaculate due to reflux of urine (6).

## **SPERM RETRIEVAL TECHNIQUES AND IVF/ICSI**

### **Sperm Retrieval Techniques**

Common methods of sperm retrieval are listed in Table 1. Other methods that are used less frequently include vasal sperm aspiration (7) and seminal vesicle sperm aspiration guided by transrectal ultrasonography (8). The choice of method depends primarily on the experience and preferences of the surgeon and the embryologist involved in the patient's care. The technique of sperm retrieval and the source of sperm (testis, epididymis, vas or seminal vesicle) have no significant effect on pregnancy rates achieved with IVF/ICSI (9). All methods generally provide sufficient numbers of viable sperm for ICSI and often also for cryopreservation. As long as viable sperm can be retrieved, neither the duration of obstruction (10, 11) nor the motility of the sperm affects the outcomes achieved with IVF/ICSI (12).

Sperm retrieval may be performed some time before or on the same day that oocytes are retrieved from the female partner. Although most laboratories may prefer to use freshly harvested testicular or epididymal sperm rather than cryopreserved sperm, there is no substantial evidence to indicate that fresh sperm yield superior results (13). For logistical and financial reasons, it often is preferable or more practical to harvest and cryopreserve sperm well in advance of oocyte retrieval (14, 15). The duration of time from cryopreservation to IVF/ICSI does not appear to affect fertilization rates (16) or pregnancy rates (17).

### **Risks Associated with Sperm Retrieval**

Postoperative complications of sperm retrieval techniques generally are minor and include persistent pain, swelling, in-

fection, and hematoma (18). Ultrasonographic evidence of tissue damage can be observed shortly after testicular sperm extraction, but the changes are transient (19, 20). Repeated epididymal (21, 22) and testicular sperm aspiration procedures (22, 23) can be performed successfully and yield consistent pregnancy rates after IVF/ICSI. To allow for adequate healing and the resumption of spermatogenesis, the minimum recommended interval between sperm retrieval procedures is 3 to 6 months (19, 22, 24). After vasectomy, testicular histologic changes such as fibrosis and decreased numbers of spermatids develop and worsen with longer durations of obstruction; pregnancy rates also may decline (25, 26). Concerns that ICSI using sperm retrieved from men with obstructive azoospermia might be associated with increased risk for birth defects have not been realized (24, 27).

### **ICSI**

In almost all cases in which sperm are retrieved directly from the testes or epididymides of men with obstructive azoospermia, ICSI must be used to achieve fertilization because sperm retrieval techniques in such men rarely yield sufficient numbers of motile sperm to permit intrauterine insemination (IUI) or standard IVF (28, 29). When surgically retrieved epididymal or testicular sperm are used for ICSI, fertilization rates range between 45% and 75% per injected oocyte (30–36); clinical pregnancy rates range from 26% to 57% and delivery rates range from 18% to as high as 54% (32–36). In most centers, clinical pregnancy rates between 30% and 40% and delivery rates between 25% and 30% can be expected.

Centers treating men with obstructive azoospermia must have the capability to perform ICSI. Sperm retrieval is best performed by surgeons who have training in the procedures because potential postoperative complications include bleeding and infection, which may require further surgical intervention.

### **Risks Associated with IVF/ICSI**

All couples who may be considering IVF/ICSI should be informed of the associated risks, which include ovarian hyperstimulation syndrome (37), complications of oocyte retrieval, and the risks and consequences of conceiving a multiple pregnancy (38). In the United States, approximately 15.5% to 32.3% of pregnancies resulting from IVF/ICSI are twin gestations and 0.6% to 2.0% are triplet or higher order gestations; rates are highest among women under age 35 and progressively lower for women in older age groups (39). Multiple births are associated with increased infant morbidity and mortality, primarily related to prematurity (40). Even singleton births resulting from IVF and ICSI are associated with increased risks for perinatal and maternal complications (40, 41). Whereas some have observed an increased incidence of major congenital malformations (comprising mostly surgically correctable genitourinary anomalies) among children resulting from ICSI compared with children conceived naturally (42, 43), others have not (41).

## CHOICE OF TREATMENT

Both microsurgical reconstruction and sperm retrieval combined with IVF/ICSI, can be effective treatments for infertility due to obstructive azoospermia. A choice between the two must be based on the needs and preferences of the individual couple.

Microsurgical vasovasostomy (44) and vasoepididymostomy (45, 46) may be more cost effective than sperm retrieval and IVF/ICSI, particularly for couples who hope to conceive more than a single pregnancy, because a successful reconstruction allows the couple to conceive naturally with further intervention. Even a repeated attempt at microsurgical reconstruction may be less costly than sperm retrieval and IVF/ICSI (47). However, in certain circumstances, sperm retrieval and IVF/ICSI may be the better choice of treatment.

When vasovasostomy is required to reverse a previous vasectomy, the time elapsed since vasectomy must be considered carefully because pregnancy rates are lower after longer durations of vasal obstruction. When vasectomy was performed 15 or more years before, only 30% to 40% of couples achieve pregnancy after surgical reconstruction (4). Sperm retrieval and IVF/ICSI also may be preferable to surgery for couples having coexisting female infertility factors. When the female partner has significant tubal disease or a previous tubal sterilization procedure and both partners would require reconstructive microsurgery, sperm retrieval and IVF/ICSI is the obvious choice.

The age of the female partner is another important consideration because fertility in women declines progressively with advancing age, particularly after age 35, and is quite limited after age 40 (48). The average time to pregnancy after a successful microsurgical vasectomy reversal is 12 months (4). Consequently, sperm retrieval and IVF/ICSI may be the better option when the female partner is older and the window of opportunity to conceive is short. However, even with ART, fewer than 20% of women may be expected to achieve a successful pregnancy after age 40 (39). When the female partner is over age 35, results of an ovarian reserve test can help in treatment planning. Ultimately, the results achieved with microsurgical reconstruction must be compared directly with those achieved with ART in the individual center. Ideally, the final choice of treatment will be made by a well-informed couple, in consultation with the reproductive specialists caring for both partners.

## SUMMARY AND RECOMMENDATIONS

- Infertility due to obstructive azoospermia may be treated effectively by surgical reconstruction or by retrieval of sperm from the epididymis or testis, followed by IVF/ICSI.
- When obstructive azoospermia results from a vasectomy performed less than 15 years before and there are no coexisting female infertility factors, microsurgical reconstruction of the reproductive tract generally is preferred over sperm retrieval and IVF/ICSI.

- When azoospermia results from epididymal obstruction, the choice between microsurgical reconstruction and sperm retrieval/ICSI should be individualized.
- Vasoepididymostomy should be performed only by those having the requisite training and experience in reproductive microsurgery.
- Sperm retrieval and IVF/ICSI generally is the best choice of treatment for obstructive azoospermia when [1] the female partner is over age 37, [2] there are coexisting female infertility factors that require IVF, and [3] the likelihood for success with sperm retrieval/ICSI is greater than with surgical treatment.

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