

Office-Based Sperm Retrieval for Treatment of Infertility

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KEYWORDS

- Office-based • Epididymal sperm aspiration • Testicular sperm extraction
- Testicular sperm aspiration • Microdissection

KEY POINTS

- Sperm retrieval is indicated in men with obstructive azoospermia, nonobstructive azoospermia, and in some cases of severe oligospermia.
- For analgesia and anesthesia, local anesthetic infiltration, spermatic cord regional block, or conscious sedation may be used for office-based procedures. Proper personnel training and facility accreditation are needed to use conscious sedation.
- Appropriate discussion before any procedure, including possibility of repeat procedures, must be held, and if indicated, referral to genetic counseling should be provided.
- Success rates of different procedures for nonobstructive azoospermia depend on histopathology, cause, and procedural approach.
- Complication rates of sperm retrieval procedures are low, but rare clinically apparent side effects may be seen.
- Sperm cryopreservation capability is an important component of sperm retrieval procedures.

INTRODUCTION

Minimally invasive sperm retrieval procedures have become increasingly relevant in the last 2 decades as intracytoplasmic sperm injection (ICSI), a technique allowing conceptions from minimal sperm recovery, has revolutionized success rates of assisted reproductive technology (ART). ICSI was described by Palermo and colleagues¹ in 1992, who reported successful pregnancies in 4 couples with severe male infertility using this technique. The success of ICSI has been shown to be better than conventional in vitro fertilization (IVF) in terms of fertilization rates. Bungum and colleagues² studied fertilization rates in couples with

unexplained infertility who had failed intrauterine insemination. The fertilization rate after ICSI was significantly higher than conventional IVF, at 68% and 46%, respectively. In a randomized study,³ fertilization rate per oocyte after IVF was 41%, whereas the rate after ICSI was 50%. Before development of ICSI, infertility caused by certain male factors, such as nonobstructive azoospermia (NOA), was difficult to treat and had low success rates. However, ICSI has the ability to surpass some of the most challenging cases of impaired spermatogenesis.

Along with development of more efficient ways of sperm implantation came the need to retrieve sperm successfully. Advanced, more refined and

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less invasive sperm retrieval techniques have been developed to provide viable sperm for these difficult cases. Anatomically, the main areas for sperm retrieval are the testis, vas deferens, and epididymis. Choice of target for sperm retrieval depends on the cause of infertility and the likelihood of retrieving viable sperm. For example, the epididymis may be aspirated percutaneously in a man with congenital bilateral absence of vas deferens. Surgical sperm retrieval techniques produce quantities of sperm that are insufficient for intrauterine insemination but may be adequate for multiple trials of ICSI.

For cost-effectiveness and efficiency, office-based procedures are becoming increasingly pertinent. A myriad of surgical techniques to retrieve sperm exist, but not all of them may be used in an office-based setting. Successful office-based procedures require adequate training of surgeons as well as staff. The advantages of performing procedures in an office setting include avoidance of general anesthesia, cost benefit, time efficiency, and quicker patient recovery. The goal of this article is to review office-based sperm retrieval procedures for ART. The indications for sperm retrieval from each anatomic target, preoperative considerations and preparation, surgical details, success rates, factors that play a role in success, and complication rates of each procedure are reviewed.

INDICATIONS FOR SPERM RETRIEVAL

Sperm retrieval is often necessary for azoospermia and severe oligospermia with unfavorable viability. Azoospermia is defined as the absence of spermatozoa in the ejaculate, and severe oligospermia is the presence of fewer than 5 million spermatozoa per milliliter of the ejaculate. Azoospermia is classified into obstructive and nonobstructive. Azoospermia is present in 1% of all men, but 15% of infertile men.⁴ In 1 study,⁵ obstruction caused 40% of azoospermic cases. In obstructive azoospermia (OA), the production of spermatozoa from the testes is normal. However, there is either extrinsic or intrinsic blockage or absence of epididymis, vas deferens, or ejaculatory ducts.

Vasal obstruction may result from previous vasectomy, fibrotic reaction from inguinal hernia repair with mesh, radical prostatectomy, and cystic fibrosis. For men with OA caused by vasal abnormalities, sperm may be retrieved from the vas deferens proximal to the site of obstruction. This procedure is almost always performed in the setting of microsurgical reconstructive surgery, when vasal fluid may be collected and cryopreserved in association with planned vasovasostomy

or vasoepididymostomy. Vasal fluid aspiration may rarely be performed as a separate procedure without reconstruction. Vasal sperm have undergone full maturation as they have traveled through the epididymis.

The epididymis is a more common site used for sperm retrieval. Indications include OA caused by congenital bilateral absence of the vas deferens (CBAVD) or vas deferens occlusion in a setting in which patients are not candidates for or do not desire microsurgical reconstruction. Extraction from the epididymis may be performed percutaneously as well as microsurgically.

Indications for testicular sperm retrieval include NOA, OA with failed reconstructive surgery or epididymal aspiration, and in cases of increased sperm DNA fragmentation and previous unsuccessful IVF/ICSI with ejaculated or epididymal sperm. Testicular sperm extraction may be performed percutaneously, open, or microsurgically.

ANESTHESIA FOR OFFICE-BASED SPERM RETRIEVAL

Office-based procedures require adequate training of all involved personnel, as well as preparedness for emergency situations. Local or regional anesthesia, or conscious sedation, may be used in an office setting. Percutaneous procedures may require only local or regional anesthesia, whereas multifocal, bilateral, or open procedures may need conscious sedation. Patient and physician preference influence final choice of anesthetic.

Local anesthesia involves injecting the skin and subcutaneous tissue with anesthetic medications. It is easy to use, avoids side effects of general anesthesia, and provides adequate local analgesia. Local anesthetics block sodium channels to inhibit the action potential of a neuronal impulse. They can be divided into amide and ester classes. The most commonly used amide is lidocaine, whereas a commonly used ester is tetracaine. If a patient is allergic to lidocaine, an ester class analgesic may be used. Different concentrations of these medications exist, and the lowest concentration needed to provide adequate analgesia should be used. Side effects are a result of intravascular injection and high dose, and include tinnitus, perioral numbness, confusion, seizures, and even cardiovascular collapse.

A spermatic cord block provides regional anesthesia. The block is made by holding the spermatic cord between the thumb and the index finger at the inguinoscrotal junction and injecting 0.5% to 1% lidocaine at 3 different angles around the cord. In addition to a cord block, one must inject the skin at the incision site, because scrotal skin

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