Etiology-specific outcomes of intracytoplasmic sperm injection in azoospermic patients

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Objective: To assess fertilization, pregnancy, and miscarriage rates after intracytoplasmic sperm injection (ICSI) with epididymal or testicular spermatozoa from different types of azoospermia.
Design: Retrospective study.
Setting: Academic medical center and private fertility center.
Patient(s): Two hundred twelve patients underwent 257 ICSI cycles.
Intervention(s): Cycles of ICSI were divided into four groups according to the etiology of azoospermia: A (nonobstruction), B (postvasectomy), C (congenital obstruction), and D (obstruction due to infection). Testicular sperm aspiration and percutaneous epididymal sperm aspiration were the sperm retrieval methods used for ICSI.
Main Outcome Measure(s): Fertilization, pregnancy, and miscarriage rates.
Result(s): Normal fertilization rates were higher in groups C (67.7%) and B (64.1%) compared with groups A (47.3%) and D (58.9%). Although lower pregnancy rates were seen in group A, no statistical differences were detected among groups. However, the miscarriage rate was higher in group A (45.6%) compared with groups B (25.25%), C (24%), and D (22.58%).
Conclusion(s): Although no differences were detected in the pregnancy rates across groups, fertilization and implantation rates were higher in patients with congenital obstruction of the seminal path. The pregnancy rate was higher and the miscarriage rate lower when epididymal sperm was used compared with testicular sperm. (Fertil Steril® 2005;83:606–11. ©2005 by American Society for Reproductive Medicine.)

Key Words: Azoospermia, ICSI, congenital, spermatozoa, testicle, epididymis

Intracytoplasmic sperm injection (ICSI) with surgical sperm retrieval is a useful treatment for patients with severe male factor infertility, including azoospermia (1). This new therapy, involving surgical retrieval of spermatozoa combined with assisted reproduction, has given new hope to those patients previously considered hopelessly infertile.

Treatment options for patients with seminal tract obstruction are either microsurgical obstruction repair or sperm retrieval associated with ICSI. Despite recent advances in assisted reproductive techniques (ART), microsurgical reanastomosis of the seminal tract, when possible, remains the treatment of choice for infertile couples with obstructed azoospermia because it results in high patency and equal or better pregnancy rates with natural intercourse than that achieved with ART (2). However, surgically unreconstructable obstruction of the male genital tract is a relatively common etiology of azoospermia among infertile men (3). Patients with obstructed azoospermia due to congenital bilateral absence of the vas deferens or those who have suffered failure of reconstructive surgery have historically been considered infertile; with ICSI, however, they can achieve pregnancy (1, 3–5).

Intracytoplasmic sperm injection also could be considered an effective fertility treatment for patients with nonobstructed azoospermia (1, 4–8). For patients with nonobstructed azoospermia, the testicles are the only source of sperm cells (9–13). Several published studies have assessed fertilization and pregnancy rates for ICSI with spermatozoa retrieved from the epididymis and testicles in patients with obstructed azoospermia and from testicles in patients with nonobstructed azoospermia (1, 3–8).

Various factors might influence the outcome of ICSI in azoospermic patients (5, 14, 15). These include parameters linked to the male partner, such as serum follicle-stimulating hormone (FSH) and testicular histology, that might reflect the quality of the surgically retrieved sperm cells (14, 15). Because

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of the contradictions in the published reports, which might be due partly to factors unrelated to sperm, the impact of the source of spermatozoa (testicular vs. epididymal) and the etiology of the azoospermia (obstructed vs. nonobstructed) on sperm reproductive capacity is not well established. In a retrospective series, we demonstrated that pregnancy rates were significantly lower in patients with nonobstructed azoospermia compared with patients with obstructed azoospermia (1). Although patients with obstructed azoospermia had higher pregnancy rates than patients with nonobstructed azoospermia, data regarding ICSI cycle outcomes among the different types of seminal tract obstruction, namely postsurgical (postvasectomy), acquired (inflammation-related cause), or congenital, are unknown.

The aim of this study was to assess fertilization, pregnancy, and miscarriage rates after ICSI and compare the results for [1] surgically induced (postvasectomy), congenital, acquired (infection-related causes), and nonobstructed azoospermia, and [2] epididymal vs. testicular spermatozoa in azoospermic patients.

MATERIALS AND METHODS

Data Collection

All patients included in this study provided written informed consent. Institutional review board approval was not obtained because testicular sperm aspiration (TESA)-ICSI procedures are routinely performed in patients with azoospermia.

This study was a retrospective analysis of men undergoing assisted reproductive treatment for azoospermia. Two hundred twelve consecutive patients with azoospermia were included, in whom a total of 257 ICSI cycles were performed in 48 months. The diagnosis of nonobstructed azoospermia was made through a testis biopsy showing spermatogenesis failure. Intracytoplasmic sperm injection was performed in patients with obstructed azoospermia and surgically irreparable obstruction, congenital absence of the vas deferens, previous vasectomy reversal failure, or in patients who did not want to have a vasectomy reversal.

Vasectomy patients have exhibited <14 years of duration of obstruction (16). Patients with epididymal obstruction were counseled that epididymal damage might occur with the percutaneous epididymal sperm aspiration (PESA) procedure, decreasing the likelihood of a successful vasectomy reversal in the future if requested.

For nonobstructed patients, TESA was indicated. In patients with obstructed azoospermia without sperm retrieved with the PESA, TESA was performed.

Of these 257 cycles, 102 were performed in 84 patients with nonobstructed azoospermia and 155 in 128 patients with obstructed azoospermia. Afterward, these patients were again divided according to the etiology of azoospermia: nonobstructed (group A, n = 84 patients, 102 cycles), surgical obstruction/postvasectomy (group B, n = 84 patients, 99 cycles), congenital obstruction (group C, n = 20 patients, 25 cycles), and acquired obstruction/postinfection (group D, n = 24 patients, 31 cycles). The sperm retrieval methods used were TESA and PESA; PESA was performed in 85 cycles (64 patients), TESA was performed in 154 cycles (130 patients), and PESA + TESA was performed in 18 cycles (18 patients).

Basal serum FSH was <10 IU/mL and female age was <39 years in all cases. Before assisted reproduction, all men were evaluated to determine the etiology of azoospermia. Detailed history, physical examinations, and hormone evaluations were performed to detect any treatable causes of azoospermia.

For men with treatable abnormalities that might cause nonobstructed azoospermia (hormonal abnormalities, gonadotoxic exposures, or varicocele), treatment or removal of gonadotoxic influences was allowed. Nonobstructed azoospermic patients with abnormal results from karyotype examination of peripheral leukocytes were excluded from the study owing to the high incidence of chromosomal abnormalities in the male gamete. At least two centrifuged semen samples were carefully examined.

A repeat semen analysis was performed on the day of sperm retrieval for all men, except those with congenital bilateral absence of the vas deferens. Patients were informed about the ICSI technique with epididymal and testicular spermatozoa and the possible complications from surgical procedures, such as infection, hematoma, and impaired blood flow.

PESA Procedure

On the day of ovum retrieval, PESA was performed. All procedures were performed in our outpatient procedure room under local anesthesia. Cord block anesthesia was administered by injecting 1% lidocaine (2 mL) without adrenalin in the pampiniform plexus.

The superior pole of the testicle was presented to the surgeon, who stabilized the epididymis carefully between the thumb and index finger. A 27-gauge needle was then introduced into the proximal part of the epididymis, and a delicate suction was performed with a 1-mL syringe filled with human tubal fluid medium. The sample was replaced to the dish and was assessed for the presence of sperm under light microscopy (magnification ×200).

The epididymis was gently massaged to knead fluid into the tubing. Postoperatively, pressure was held on the aspiration site for 5 minutes in the operating room. A fluff compression dressing and scrotal supporter were then applied and left in place for 24 hours.

TESA Procedure

The testicle was immobilized by the surgeon, who grasped the testicle with the epididymis and cord between his fingers while pulling the scrotum skin taut. The surgeon was then