Male Infertility Diagnosis and Treatment in the Era of In Vitro Fertilization and Intracytoplasmic Sperm Injection

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KEYWORDS

• Male • Fertility • IVF • ICSI • Men's health

KEY POINTS

- Evaluation of male factor infertility is often being overlooked.
- Improvement in male factors can improve overall health and pregnancy and live birth rates for both natural and assisted reproduction.
- All couples undergoing a fertility evaluation should have a comprehensive male assessment.

INTRODUCTION

Each year more than seven million couples worldwide seek evaluation for the inability to conceive a child, a problem that affects approximately 15% of couples.[1,2] Among these couples, a male factor contributing to infertility is present in up to half, and one-third of these cases can be attributed to a male factor alone. However, 27% of these men are never evaluated and examined as the potential cause for infertility.[1,3] Both the American Urologic Association and the American Society for Reproductive Medicine recommend the routine and concurrent evaluation of the man in an infertile relationship because many of these couples are offered assisted reproductive technologies (ARTs) without any evaluation of the male partner.[2]

Since the advent of ARTs leading to the birth of Louise Brown, the first child born using in vitro fertilization (IVF), in 1978, the utilization of this procedure has exploded. More than 7 million ART cycles were performed between 2004 and 2013, resulting in

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more than 1.5 million live births.[4] With this dramatic increase in use of ARTs, techniques aimed to increase successful outcomes have also been developed, progressing from conventional incubation of sperm with oocytes to the now widely used intracytoplasmic sperm injection (ICSI). The refinement of this technique has not only increased the options available to infertile couples with severe male factor but also has improved success rates. Current ART live birth rates range from 55% to 90%, depending on number of cycles completed, use of donor versus autologous oocyte, age of autologous donor, and use fresh versus thawed embryos.[5] These techniques require very few sperm (10–20 sperm cells) and even severely oligospermic men can successfully provide enough sperm to be used.[6] Many of these men may not be offered a full evaluation because they are able to provide an adequate sample to be used for ART. However, a large body of literature shows that treatment of underlying causes of male infertility, such as varicocele, can significantly increase natural pregnancy rates, as well as success rates with ARTs.[7] In addition, male infertility is associated with other comorbid conditions, such as diabetes mellitus, cardiovascular disease, genitourinary malignancy, and genetic abnormalities.[8–11] As many as 6% of men undergoing a fertility evaluation may have a previously undiagnosed medical condition and recent studies have shown an increased mortality among those men with decreased fertility potential.[8,12]

ARTs are also not without their own risks, which can include high cost, compounded with each cycle, and the possibility of multiple gestations and promulgation of genetic defects. High costs for ARTs can often be prohibitive, particularly if multiple cycles are needed to achieve a live birth. The cost of per single IVF cycle is approximately $12,400 and the cost per delivery is approximately $56,000.[13] These costs do not include those associated with multiple births and subsequent childcare or hospitalization costs. Additional risks include an increased chance of birth defects because many of the techniques bypass the natural barriers to abnormal genetic replication.[14,15]

More than ever, the full evaluation and treatment of the male partner remains a key component in the care of an infertile couple. Attempting ARTs with poor quality or quantity of sperm can lead to decreased success rates and increased cost and morbidity. Many infertile men may have a reversible medical condition and would benefit from comprehensive evaluation. Optimizing the male factor evaluation represents a fundamental step in the management of the infertile couple.

EVALUATION

History

The initial evaluation of the male partner of an infertile couple should start with a careful history and physical examination, with particular focus on sexual and pregnancy history, current therapies, childhood diseases, and current medical or surgical issues. Male erectile dysfunction is a common and treatable comorbidity of primary or secondary infertility and should be treated whenever possible. Any history of diseases associated with the testicles, such as testicular torsion, trauma, tumors, varicoceles, or cryptorchidism, should be elucidated. It is well known that even if unilateral, these processes can often have a bilateral effect on the testes and impair fertility.[16] Detailed history of prior medical and surgical issues, such as injuries to the pelvis or retroperitoneum, can affect any of the nerves, blood vessels, and structures vital to the production and transportation of sperm. Prior surgeries, such as a transurethral resection of the prostate, can result in retrograde ejaculation or obstruction of the ejaculatory ducts and decreased sperm counts. Herniorrhaphy, particularly with mesh, can also potentially affect fertility if the vas deferens or the blood supply to