



RESEARCH ARTICLE

ADVANCES IN THE MANAGEMENT OF MALE INFERTILITY: A COMPREHENSIVE APPROACH TO DIAGNOSIS AND TREATMENT IN ANDROLOGY

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ABSTRACT

Background: Male infertility is a significant cause of reproductive health issues globally, affecting approximately 15% of couples. The increasing prevalence of male infertility necessitates advanced diagnostic tools and therapeutic approaches to improve treatment outcomes. **Objective:** This study aims to evaluate the latest advancements in the diagnostic and therapeutic management of male infertility, focusing on novel treatments, surgical interventions, and the role of assisted reproductive technologies (ART) in improving fertility outcomes. **Methods:** A retrospective analysis of 200 male patients with infertility was conducted between 2020 and 2024 at a single academic institution. Patients underwent comprehensive evaluation, including semen analysis, hormone profiling, genetic testing, and testicular biopsy. Treatment protocols included medical management, surgical intervention, and ART such as intrauterine insemination (IUI) and in vitro fertilization (IVF). **Results:** The overall success rate of ART was 48%, with a significantly higher success rate in patients with azoospermia undergoing testicular sperm extraction (TESE) followed by intracytoplasmic sperm injection (ICSI). Additionally, the introduction of hormonal therapies (FSH and LH supplementation) led to a 32% improvement in semen parameters in oligospermic patients. Surgical interventions, including varicocelectomy, improved semen quality in 40% of patients. **Conclusion:** The combination of advanced diagnostic strategies and innovative treatment modalities has significantly improved the management of male infertility. Personalized treatment plans that incorporate ART, hormonal therapy, and surgical options offer the best outcomes for patients with various causes of infertility.

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INTRODUCTION

Male infertility is a multifactorial condition that can be attributed to various causes, including genetic factors, hormonal imbalances, varicocele, and obstructive azoospermia. Despite the increasing awareness and availability of treatments, the management of male infertility remains complex and challenging. This manuscript reviews the current state of diagnostic approaches and the most effective therapeutic strategies in andrology, with a focus on emerging technologies and personalized treatment options.

MATERIALS AND METHODS

Study Design: This was a retrospective cohort study conducted at a tertiary care center over a period of 4 years. A total of 200 men with infertility were included in the study. Data was collected from medical records, and patients were categorized based on semen analysis, hormonal assessments, and clinical findings.

Inclusion Criteria:

Males aged 18-45 years. Diagnosed with primary or secondary infertility. Patients who underwent ART, varicocelectomy, or hormonal treatment.

Exclusion Criteria: Severe systemic conditions such as diabetes or cardiovascular diseases. Patients with previously diagnosed chromosomal abnormalities.

Diagnostic Approaches: Comprehensive male infertility workup was performed, including:

Semen analysis according to World Health Organization (WHO) guidelines. Serum testosterone, FSH, LH, and prolactin levels. Genetic testing for Y chromosome microdeletions and karyotype abnormalities. Testicular biopsy for men with azoospermia or oligospermia.

Treatment Modalities: Medical Management: Hormonal therapies (FSH and LH) for men with hypogonadotropic

hypogonadism. Surgical Interventions: Varicocelectomy for men with varicocele, TESE for patients with azoospermia. Assisted Reproductive Technologies (ART): IUI, IVF, and ICSI for patients with severe male factor infertility.

RESULTS

Patient Demographics: Age range: 20-45 years, with a median age of 33 years. The most common causes of infertility were oligospermia (45%), azoospermia (25%), and varicocele (15%).

Diagnostic Findings: Hormonal abnormalities were detected in 30% of patients, with elevated FSH and low testosterone levels in patients with primary testicular failure. Y chromosome microdeletions were identified in 10% of men with azoospermia. Genetic testing revealed significant abnormalities in 12% of patients with unexplained infertility.

Treatment Outcomes: Hormonal Therapy: 32% improvement in semen parameters in patients receiving FSH and LH therapy. Surgical Interventions: 40% improvement in semen quality in patients undergoing varicocelectomy.

ART Success Rates: IUI resulted in a pregnancy rate of 18%, while IVF/ICSI showed a 48% success rate, significantly higher in patients with surgically extracted sperm (TESE).

DISCUSSION

Advances in Diagnosis: The role of genetic testing has become increasingly critical in diagnosing male infertility. Identifying microdeletions in the Y chromosome or other genetic abnormalities can provide more targeted treatments and counseling for couples. Furthermore, hormonal profiling has become essential in assessing patients with primary testicular failure, allowing for personalized treatment plans.

Innovative Treatment Strategies: The combination of hormonal therapy and surgical interventions has shown promising results in improving semen quality in previously untreated patients. Surgical options, particularly varicocelectomy, continue to be an effective treatment for men with varicocele-related infertility.

The advancement in ART, including ICSI and TESE, has revolutionized the treatment of azoospermia, providing hope for couples who otherwise have no chance of natural conception.

Limitations: The limitations of this study include its retrospective design and the absence of long-term follow-up data to assess the sustainability of ART outcomes. Furthermore, while we focused on the improvement of semen parameters and success rates of ART, the psychological impact on patients undergoing treatment is an area that warrants further exploration.

CONCLUSION

The management of male infertility has significantly advanced through the integration of innovative diagnostic tools, hormonal treatments, and surgical interventions. The use of ART has expanded the possibilities for men with severe infertility issues, providing them with a realistic chance of achieving parenthood. Future research should focus on refining these treatments, addressing genetic and psychological factors, and developing more efficient personalized approaches to male infertility.

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