

Overview of reconstructive and sperm retrieval surgeries in male subfertility

Siddharth Jain¹, Shipra Gupta², Surveen Ghumman²

¹Department of Urology, AIIMS

²Department of IVF & Reproductive Medicine, Max Hospitals, New Delhi, India

Abstract

Male subfertility is an important clinical entity. It entails direct medical, financial, and psychological impact on the couple. A standardization of protocol in its management is yet to be achieved. Detailed workup of the males presenting with subfertility is necessary to elucidate the etiology and prognosticate the disease. Microsurgical reconstruction holds an important place in the management of obstructive disease of male genital tract. With the advent of microsurgical sperm retrieval techniques, couples have a chance to become the biological parents in the cases of nonobstructive azoospermia. All available treatment options should be given to patients to help them achieve a long-term possibility of spontaneous conceptions.

Keywords: Azoospermia, MESA, micro-tese, PESA, subfertility, varicocele, vasectomy

Address for correspondence: Dr. Shipra Gupta, Department of IVF & Reproductive Medicine, 3rd floor, Max Multispeciality Centre, N110 Panchsheel Park, New Delhi, India.
E-mail: dr.shipragupta85@gmail.com

INTRODUCTION

Men with subfertility have become a common presentation in urology clinics. About 60–80 million couples worldwide suffer from infertility as per World Health Organization (WHO). Of these, male factors are responsible in at least 20% of the cases and are contributory in another 27%.^[1] Studies conducted in Indian population revealed that 23% of the patients have male factor infertility.^[2] There is a declining trend of sperm parameters over decades and thorough workup of the males with subfertility can give us insights and evidences for interventions. The lack of laboratory standardization in the assessment of semen parameters and idiopathic nature of male infertility in almost 50% of the cases are the challenges in development of a standardized management protocol. Advancement in microsurgical techniques for sperm

retrieval, cryopreservation of gametes, and assisted reproductive techniques has enabled couples to have their own biological child. However, infertility is not just a medical problem but also has profound psychosocial impact.^[3] The financial burden of repeated *in vitro* fertilization (IVF)/Intracytoplasmic sperm injection (ICSI) cycles, which are not usually covered under health insurance, is of paramount importance. The coordination of urologists, infertility expert, and embryologist is needed to develop a multispecialty multimodal systematic management protocol. Surgically correctable and potentially reversible causes should be addressed in a way that gives the couple not only the chance of spontaneous pregnancy but also improves sperm retrieval rate and sperm quality. Counseling on all the available treatment options for the comprehensive management of male factor infertility can improve the long-term potential of couple for having spontaneous pregnancy and marital harmony.

Access this article online

Quick Response Code:



Website:
www.fertilityscienceresearch.org

DOI:
10.4103/fsr.fsr_13_17

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work noncommercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Jain S, Gupta S, Ghumman S. Overview of reconstructive and sperm retrieval surgeries in male subfertility. *Fertil Sci Res* 2016;3:63-5.

VARICOCELE REPAIR AND ITS IMPLICATIONS

About 35% of infertile men present with varicocele. The current recommendations are that varicocele should be treated if men have clinically palpable varicocele with abnormal semen parameters.^[4-6] The surgical treatment of subclinical varicocele (detected on ultrasound Doppler) has no reliable evidence to support that it is beneficial. Bilateral varicocele can be corrected in the same setting. Semen parameters are improved within 5 months in 65% of the men.^[6] There is 1.9 times increase in the chances of live birth, and decrease in miscarriage rate by 2.3 times is seen after varicocele repair.^[7] The recovery of spermatogenesis and chances of sperm retrieval for ICSI are improved with the repair of clinical varicocele in infertile men with nonobstructive azoospermia (NOA).^[8,9]

The predictors of poor fertility outcome after varicocelectomy are reduced testicular volume, elevated serum follicle stimulating hormone (FSH) levels, decreased serum testosterone, and the presence of Y chromosome microdeletions.^[10,11] Patients with atrophic testes and history of cryptorchidism, testicular trauma, orchitis, or systemic or hormonal dysfunction may have coincidental varicocele and surgery will not improve their fertility outcome.^[12] Currently, the surgical techniques of choice such as microscopic inguinal varicocelectomy or subinguinal varicocelectomy are popular because of higher success rate and fewer complications as compared to laparoscopic varicocelectomy and radiologic embolization.

FERTILITY ENHANCING SURGERIES IN OBSTRUCTIVE DISEASES OF THE MALE GENITAL TRACT

Obstructive lesions are seen in patients with history of genital infections, inguinal or scrotal surgeries, and previous vasectomy. Genitourinary tuberculosis and filariasis are associated with extensive destruction and fibrosis. Surgical skills including accurate mucosa-to-mucosa approximation, a water-tight tension-free anastomosis, preservation of the vasal blood, and an adequate microscopic atraumatic technique enhance the success rates. The presence of vasal fluid with motile sperm intraoperatively is a favorable prognostic factor. Time elapsed between the surgical reconstruction and obstructive event has implications.

Microscopic vasoepididymostomy is performed in cases with obstructed epididymis. The transurethral resection of

ejaculatory duct is treatment for ejaculatory duct obstruction. Degree of obstruction, etiology of obstruction, and quality of seminal vesical fluid aspirate predicts success rate. Microsurgical vasectomy reversal can achieve the return of sperm in ejaculate in 70–90% of cases and 30% may achieve spontaneous pregnancy.^[7] In a patient with a history of failed recanalization also, repeated attempt has a success of 79% in patency and pregnancy rate of 31%.^[7] Intraoperative sperm extraction can also be performed for cryopreservation during reconstructive surgeries.

SPERM RETRIEVAL TECHNIQUES

The methods of sperm retrieval and cryopreservation have given hope to a majority of patients of azoospermia. Percutaneous epididymal sperm aspiration (PESA) and microsurgical epididymal sperm aspiration (MESA) are used to retrieve sperm in patients with obstructive azoospermia (OA). Testicular sperm aspiration (TESA) can be used in patients with OA or NOA. Testicular sperm extraction (TESE) using open biopsies or micro-TESE is indicated in patients with NOA. In patients with OA, sperm retrieval rates from epididymis or testis are approximately 100%. There is no difference in outcomes between the use of epididymal or testicular sperm.^[13]

In NOA, successful sperm retrieval is approximately 50%, except in the cases of complete AZFa and/or AZFb deletions on Y chromosome. The use of microsurgery during TESE improves the efficacy.^[14] In micro-TESE, the testicular extraction of sperm is under magnification with use of an operating microscope. The seminiferous tubules which have sperms are more dilated and opaque and those which do not have sperm are thin and fibrotic. These are identified under the operating microscope and dissected out. Since selective and limited removal of tubules is done, unnecessary trauma and removal of testicular tissue is not done in an already compromised testis. Testing for Y chromosome microdeletion before surgery helps to avoid unnecessary surgery in cases with AZFa and AZFb microdeletions. Testicular histology is a predictor of chances of retrieving sperm in men with NOA. Hypospermatogenesis has better prognosis than sertoli cell syndrome.^[15]

In both OA and NOA, the sperm retrieval technique itself does not seem to impact IVF/ICSI success rates. Each surgery has its own merits; for example,

PESA does not require incision, it is repeatable, reproducible, easier, and can be performed under local anesthesia, whereas in microsurgical aspiration MESA larger number of sperms can be retrieved and have fewer chances of hematoma formation.^[16] TESA and PESA have similar results in terms of sperm retrieval and pregnancy rates in patients with OA.^[13] In the cases of NOA, the efficiency of TESA is found to be lower than micro-TESE. Micro-TESE is relatively safer than conventional TESE. For certain groups of patients such as Klinefelter syndrome, micro-TESE remains the only option. The pregnancy rates of ICSI in NOA are significantly lower than OA.^[17]

MICROSURGICAL RECONSTRUCTION VERSUS SPERM RETRIEVAL IN THE ERA OF ICSI?

The choice between microsurgical reconstruction and sperm retrieval must be based on clinical parameters such as the cause of azoospermia, coexisting factors in the female partner, cost of treatment, and age of couple. Therefore, a comprehensive understanding of the factors that can affect outcomes, overall cost, and the morbidity associated with each treatment modality is required.

CONCLUSION

Infertility is not only a medical problem but also has significant psychosocial effects. A multidisciplinary systematic approach to the treatment of infertile couple is the need of the hour. A number of male infertility issues could be surgically addressed with long-term improvements and chance of future spontaneous pregnancies. For the remaining issue, advances in sperm retrieval techniques hold the hope. The experience and expertise of urologist improve the outcomes.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. World Health Organization. Towards more objectivity in diagnosis and management of male infertility. *Int J Androl* 1987;7:1-53.
2. Zargar AH, Wani AI, Masoodi SR, Laway BA, Salahuddin M. Epidemiologic and etiologic aspects of primary infertility in the Kashmir region of India. *Fertil Steril* 1997;68:637-43.
3. Arya ST, Dibb B. The experience of infertility treatment: The male perspective. *Hum Fertil (Camb)* 2016;19:242-8.
4. The Male Infertility Best Practice Policy Committee of the American Urological Association, Practice Committee of the American Society for Reproductive Medicine. Report on varicocele and infertility. *Fertil Steril* 2004;82:S142-5.
5. Jungwirth A, Giwercman A, Tournaye H, Diemer T, Kopa Z, Dohle G, *et al.* European Association of Urology guidelines on Male Infertility: the 2012 update. *Eur Urol* 2012;62:324-32.
6. Colpi GM, Carmignani L, Nerva F, Piediferro G, Castiglioni F, Grugnetti C, *et al.* Surgical treatment of varicocele by a subinguinal approach combined with antegrade intraoperative sclerotherapy of venous vessels. *BJU Int* 2006;97:142-5.
7. Esteves SC, Miyaoka R, Agarwal A. Surgical treatment of male infertility in the era of intracytoplasmic sperm injection – New insights. *Clinics (Sao Paulo)* 2011;66:1463-77.
8. Schlegel PN, Kaufmann J. Role of varicocelectomy in men with nonobstructive azoospermia. *Fertil Steril* 2004;81:1585-8.
9. Inci K, Hascicek M, Kara O, Dikmen AV, Gurgan T, Ergen A. Sperm retrieval and intracytoplasmic sperm injection in men with nonobstructive azoospermia, and treated and untreated varicocele. *J Urol* 2009;182:1500-5.
10. Kondo Y, Ishikawa T, Yamaguchi K, Fujisawa M. Predictors of improved seminal characteristics by varicocele repair. *Andrologia* 2009;41:20-30.
11. Cocuzza M, Cocuzza MA, Bragais FM, Agarwal A. The role of varicocele repair in the new era of assisted reproductive technology. *Clinics (Sao Paulo)* 2008;63:395-404.
12. Esteves SC. Editorial comment. *J Urol* 2010;183:2315.
13. Nicopoullos JD, Gilling-Smith C, Almeida PA, Norman-Taylor J, Grace I, Ramsay JW. Use of surgical sperm retrieval in azoospermic men: A meta-analysis. *Fertil Steril* 2004;82:691-701.
14. Donoso P, Tournaye H, Devroey P. Which is the best sperm retrieval technique for non-obstructive azoospermia? A systematic review. *Hum Reprod Update* 2007;13:539-49.
15. Esteves SC, Verza S, Prudencio C, Seol B. Sperm retrieval rates (SRR) in nonobstructive azoospermia (NOA) are related to testicular histopathology results but not to the etiology of azoospermia. *Fertil Steril* 2010;94(Suppl):S132.
16. Male Infertility Best Practice Policy Committee of the American Urological Association, Practice Committee of the American Society for Reproductive Medicine. Report on the management of infertility due to obstructive azoospermia. *Fertil Steril* 2008;90(Suppl 3):S121-4.
17. Prudencio C, Seol B, Esteves SC. Reproductive potential of azoospermic men undergoing intracytoplasmic sperm injection is dependent on the type of azoospermia. *Fertil Steril* 2010;94(Suppl):S232-33.