

## Original Article

## Comparison of Efficacy of Open Testicular Biopsy and Sperm Extraction (TESE) versus Testicular Sperm Aspiration (TESA) in terms of Sperm Retrieval Rate (SRR) in patients of Non-Obstructive Azoospermia (NOA)

Adnan Rehman, Fawad Nasrullah, Ahmad Kamal, Bilal Arshad, Junaid Anwar, Shahzaman

Mayo Hospital, Lahore Pakistan

### Abstract

**Objective:** Objective of our study was to compare the yield of TESE versus TESA in terms of SRR in patients of NOA.

**Methods:** This randomized clinical trial was conducted in Department of Urology, Mayo Hospital Lahore. Patients diagnosed with NOA were selected and written informed consent was obtained. Baseline demographic and clinical information was recorded. Patients were then randomly allocated to two groups. Group A patients underwent TESE while TESA was performed in Group B patients. SRR of both groups were assessed and compared.

**Results:** Mean age of patients undergoing TESE and TESA was  $29.73 \pm 4.57$  and  $27.73 \pm 4.88$  years respectively ( $p = 0.766$ ). Mean BMI of patients in undergoing TESE was  $21.93 \pm 1.24$  kg/m<sup>2</sup> while mean BMI of patients undergoing TESA was  $22.46 \pm 1.49$  kg/m<sup>2</sup> ( $p = 0.783$ ). SRR of TESE was 66.6% while SRR of TESA was 40.0% ( $p = 0.038$ ).

**Conclusion:** TESE was found to be more effective sperm retrieval technique in patients of NOA.

**Key Words:** Non-obstructive Azoospermia, TESA, TESE.

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**Corresponding Author:** Dr. Adnan Rehman, **Email:** adnanrehman419@gmail.com

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### Introduction

Azoospermia is absence of spermatozoa in the ejaculate and is a common cause of male infertility.<sup>1</sup> NOA occurs due to issues with spermatogenesis, while OA is caused by blockages in the testicular and genital ductular system.<sup>2</sup> Pre-testicular NOA or secondary hypogonadism occurs due to hormonal abnormalities that fail to effectively stimulate the testes to produce sperm, often resulting from hypothalamic-pituitary disorders.<sup>3</sup> Testicular azoospermia, or primary hypogonadism, is characterized by intrinsic defects in the testes that lead to impaired spermatogenesis.<sup>4</sup> For men with NOA, the primary treatment option available is testicular sperm retrieval.<sup>5</sup> The preferred technique for sperm extraction should prioritize minimal invasiveness while safeguarding testicular function. Additionally, it should ensure the retrieval of a sufficient number of spermatozoa for ICSI, thus not compromising the chances of successful fertilization.<sup>6</sup>

TESE has been conventionally used for sperm retrieval.<sup>7,8</sup> The optimal number of biopsies to be taken during TESE remains a matter of debate and more than one biopsy is often recommended. TESE generally results in a higher SRR compared to TESA and often yields surplus spermatozoa suitable for preservation. SRR of up to 43% have been reported in previous studies.<sup>9</sup> However, it's important to note that TESE may carry the risk of losing testicular tissue and compromising the blood supply to the testes. TESA has recently emerged as an alternative to TESE for sperm retrieval. The primary advantages of TESA technique lie in its simplicity, low cost, and minimal invasiveness, often resulting in reduced post-operative pain compared to multiple TESE procedures performed under local anesthesia.<sup>10,11</sup> Additionally, FNA has been suggested to potentially enhance the likelihood of locating active sites of spermatogenesis within the testes due to its ability to reach deeper testicular regions. Present evidence is far less in local and international literature which compares TESE and TESA.

Hence this study is being carried out to find evidence in our setting and support literature for utility in the wider perspective.

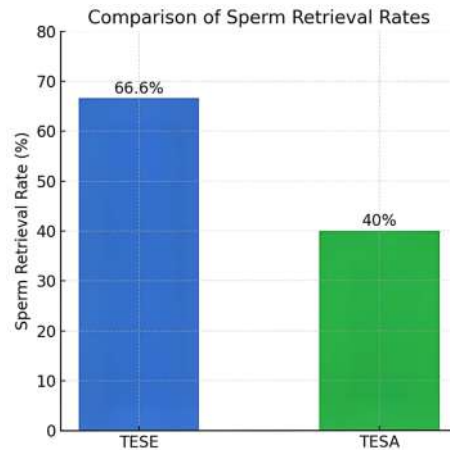
**Methods**

This randomized clinical trial was conducted in Department of Urology, Mayo Hospital Lahore, for duration of 6 months. The sample size of 60 patients (30 in each group) was calculated by taking margin of error (d)=5%, Confidence level (C.I)=95% and anticipated SRR of TESE as 43% and TESA as 11%.<sup>9</sup>Non-probability consecutive sampling technique was used for sample selection. Inclusion criteria were male patients aged 18 years or above presenting with azoospermia in at least 02 semen analysis and having normal volume ejaculate >1.5ml, normal Testicular ultrasonogram, normal to high FSH (1.5 to 12.4 mIU/mL) and LH levels (1.8 to 8.6 IU/L) and documented infertility (Primary & Secondary). Patients with comorbidities like diabetes or CKD, those with history of malignancy or radio/chemotherapy and those taking any other hormonal therapy were excluded from the study. Patients were randomly allocated to two groups using lottery method and underwent sperm extraction through one of the above-mentioned techniques. In TESE, the tunica albuginea was incised transversely at three points in each testis. The testis was delicately compressed, and the protruding tissue weighing around 50-100mg was removed, preserved and sent for analysis. In TESA, 18 Gauge butterfly needle attached to 20cc syringe was inserted into each testis and redirected into 6 different positions. Aspirate was preserved and sent for analysis under inverted microscope. Sperm retrieval was defined in terms of successful retrieval of one or more viable sperms. The data was analyzed using SPSS version-30.0 The normality of the continuous data was tested by Shapiro-Wilk’s test. Mean ±SD / median with IQR as appropriate was calculated for age and BMI. Frequency and percentage were calculated for history of smoking and sperm retrieval rate. Chi Square test was used to compare sperm retrieval rates of both groups with p = ≤0.05 considered significant.

**Results**

Mean age of patients undergoing TESE and TESA was 29.73 ± 4.57 and 27.73 ± 4.88 years respectively (p=0.766). Mean BMI of patients in undergoing TESE was 21.93 ± 1.24 kg/m<sup>2</sup> while mean BMI of patients undergoing TESA was 22.46 ± 1.49 kg/m<sup>2</sup> (p = 0.783). Mean duration of infertility in TESE group was 5.6 ± 2.8 years while mean duration of infertility in patients undergoing TESA was 6.3 ± 3.4 years (p = 0.388). Mean testicular volume in TESE group was 15.2 ± 7.4 ml while mean testicular volume in patients undergoing TESA was 14.5 ± 5.1 ml (p = 0.671). SRR of TESE was 66.6% while SRR of TESA was 40.0% (p = 0.038).

Baseline Characteristics		
	TESE	TESA
Age (years)	29.73 ± 4.57	27.73± 4.88
Body Mass Index (kg/m <sup>2</sup> )	21.93 ± 1.24	22.46±1.49
Duration of Infertility (years)	5.6 ± 2.8	6.3 ± 3.4
Testicular Volume (ml)	15.2 ± 7.4	14.5 ± 5.1



**Discussion**

In patients of NOA, there is minimal, if any spermatogenesis which is restricted to seminiferous tubules. Testes are primary target for retrieval of sperms followed by intracytoplasmic sperm injection (ICSI) as sperms retrieved from testes are unable to fertilize oocyte via conventional IVF. The objective of our study was to compare the SRR of TESE and TESA. Findings of our study were somewhat similar to previously conducted studies. Mean age of patients in our study was 29.73 ± 4.57 years in Group A and 27.73 ± 4.88 years in Group B (p = 0.766). In a study conducted by Friedler et al, mean age of patients was 32.7 years while in a study conducted by Ghaffar et al, mean age of patients was 30.83 years.<sup>9,12</sup> The SRR in our study was 66.6% with TESE and 40% with TESA. Friedler et al, reported that SRR with TESE was 43% and with TESA it was 11% while Ghaffar et al, reported that SRR with TESE was 47.19% and with TESA it was 37.07%.<sup>9,12</sup> In another study conducted by Nowroozi et al, SRR of TESE and TESA was reported to be 50.9% and 41.8% respectively.<sup>13</sup> Higher SRR in our study of both techniques shows that both had better efficacy in our study population, than previously reported in literature with TESE showing significantly improved surgical outcomes. These findings are also consistent with those of Hauser et al, who reported that TESE was significantly more effective sperm retrieval technique than TESA in their study.<sup>14</sup> The higher sperm retrieval yield of TESE is due to targeted sampling of seminiferous tubules with active spermatogenesis while TESA relies on blind aspiration of seminiferous tubules using fine needle and SRR of

40% shows limitations of TESA. This makes TESE a preferred sperm retrieval technique particularly in those patients with prior history of TESA. Selection of appropriate sperm retrieval technique has direct impact on outcomes of assisted reproductive technologies, reducing the requirement of multiple surgical attempts. TESA, though, is a minimally invasive procedure with reduced risk of post-procedural complications like hematoma or testicular tissue loss. Therefore, appropriate selection of technique and thorough preoperative counseling improves outcomes and reduces patient anxiety. Our findings will help urologists in clinical decision making. TESE may be preferred in patients where maximization of sperm retrieval is crucial while TESA may be opted for in patients where sperm retrieval may be attempted with minimally invasive option keeping patient's comfort in mind and counseling him regarding need for repeat sessions of TESA.

Our study was a prospective randomized study with direct comparison of both techniques in same sample population. However, small sample size and single center design were limitations and long-term outcomes of both techniques like pregnancy rates and complications were also not assessed. Future multi-center studies may explore the long-term outcomes of TESE and TESA including pregnancy rates and complications to confirm findings of our study.

### Conclusion:

Findings of our study are consistent with local and international studies available on the topic. While TESE is associated with significantly better SRRs, TESA is minimally invasive and therefore, is a preferred option in patients not willing for surgery. Limitations of our study are that this was a single-center study conducted on a small sample size over a limited period which may limit generalizability of findings.

**Ethical Approval:** The IRB/EC approved this study via letter no. 774/RC/KEMU dated November 20, 2024.

**Conflict of Interest:** None

**Funding Source:** None

### Authors' Contribution

**AR:** Conception.

**FN, AK, BA:** Design of the work.

**JA, SZ:** Data acquisition, analysis, or interpretation.

**AR, FN, AK, BA:** Draft the work.

**JA, SZ:** Review critically for important intellectual content.

All authors approve the version to be published.

All authors agree to be accountable for all aspects of the work.

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