Sonographic Evaluation of Male Testicular Volume amongst Patients with Fertility Challenges: A Cross-Sectional Retrospective Study

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Abstract

Background: This study evaluated the association between sonographic testicular volume and semen parameters in men presenting with fertility challenges.

Methods: A retrospective cross-sectional analysis included 50 records of men aged 18–55 years attending the University of Nigeria Teaching Hospital between January 2017 and December 2022. Records included scrotal ultrasound and semen analysis. Descriptive statistics and Pearson correlations were used, with a significance threshold of 0.05.

Results: The reported mean age was 37.42 ± 8.63 years. Reported mean testicular volumes were 11.03 cm³ on the right and 10.65 cm³ on the left. Left testicular volume was positively correlated with sluggish sperm motility ($r = 0.301$, $p = 0.034$) and sperm count ($r = 0.317$, $p = 0.025$). The reported correlations with active and dead sperm motility were not statistically significant, and none of the reported right-sided correlations reached statistical significance.

Conclusion: In this retrospective sample of men with fertility challenges, left testicular volume showed modest positive associations with sperm count and sluggish sperm motility. These associations do not establish causation or the diagnostic accuracy of testicular volume for infertility.

Keywords: Infertility, Asthenozoospermia, Azoospermia, Oligospermia, Varicocele, Enugu, Nigeria.

Introduction

Male infertility is a significant health issue affecting approximately 15% of couples worldwide [1]. Testicular volume has been suggested as a potential predictor of fertility issues in men, but no study has correlated testicular volume amongst men with infertility challenges in our environment [2]. This study aimed to describe sonographic testicular volume and its association with semen parameters within the included records of men presenting with fertility challenges.

While couples frequently express fear about infertility, the majority of tests and examinations over the years have been centered around women [1, 2]. Although men are not given much attention, Infertility has been proven to also affect men [3]. According to a multicenter World Health Organization study conducted between 1982 and 1985, 20% of infertility cases involved male predominance, 38% involved female predominance, 27% involved abnormalities in both partners, and 15% involved no obvious reason for infertility [4]. Pre-testicular reasons for male infertility include hormonal, genetic, testicular, and post-testicular factors such as blockage [4, 5]. If infertility is suspected, it is crucial to examine the testis [6]. The testes have an oval form, are 12.5–19 mL in volume, and are each around 4-5 cm long, 2-3 cm (about 1.18 in) wide, and 3 cm thick [5, 7]. The most frequently used radiological test for male infertility is ultrasound (Figure 1), although MRI may be used occasionally [8].

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Patients and Methods

This study was carried out in the University of Nigeria Teaching Hospital (UNTH), and a cross-sectional retrospective study design was used. Data of 50 patients that presented with infertility at the University of Nigeria Teaching Hospital (UNTH) and performed scrotal ultrasound between January 2017 and December 2022 were taken from the hospital records.

The inclusion criteria include medical records containing ultrasound reports and semen analysis from January 2017 to December 2022, of male patients between the age of 18 and 55 years with fertility challenges which may be due to Asthenozoospermia, Azoospermia, Oligospermia, or Varicocele. Medical records of men with fertility challenges who have a history of previous testicular surgery or trauma were excluded. Approval for the study was granted by the hospital research and ethics board.

Data Collection

A well-structured data extraction form was used to collect data from the medical records. A total of 50 data samples were collected between 2017 and 2022. The information gathered was extracted and analyzed. The forms contain the patient demographics, clinical history and testicular volume measurements.

Data Analysis

The study parameters were summarized using the mean and standard deviation. Pearson correlation was used to examine associations between testicular volume and semen parameters, with statistical significance defined as $p < 0.05$. Microsoft Excel and the Statistical Package for the Social Sciences (SPSS), version 25, were used for the analyses.

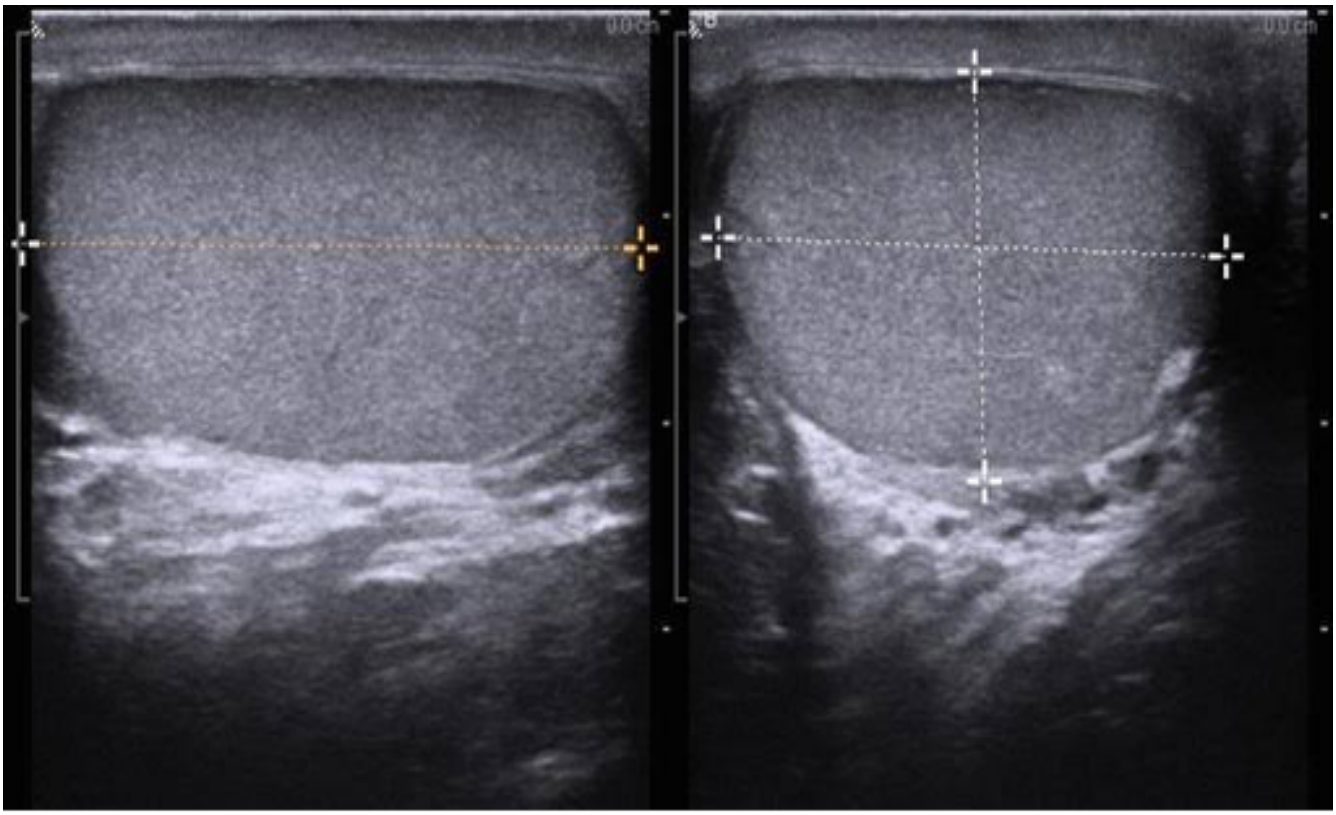


Figure 1. Ultrasound measurement of testicular volume.

Results

Demographics

A total of 58 patient reports presenting with fertility challenges were evaluated from the Department of Records at the University of Nigeria Teaching Hospital, Ituku Ozalla (UNTH). Only 50 reports were included in this study because the remaining reports had missing ultrasound data or semen analysis. The patients were aged 18–55 years, with a reported mean age of 37.42 ± 8.63 years. The 31–35-year and 36–40-year groups each included 13 patients (26%).

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Testicular Volume

Reported mean volumes by condition are shown in Chart 1. In asthenozoospermia, the mean volumes were 9.76 cm³ on the right and 8.23 cm³ on the left; in oligospermia, 11.63 cm³ and 11.53 cm³; and in azoospermia, 9.45 cm³ and 9.13 cm³. Bilateral varicocele was associated with mean volumes of 12.18 cm³ on the right and 12.23 cm³ on the left. Unilateral varicocele had reported mean volumes of 12.15 cm³ on both sides. The reported overall mean volumes were 11.03 cm³ on the right and 10.65 cm³ on the left (Table 1).

Table 1. Reported testicular volume in the study sample.

Side	Mean ± SD (cm³)
Right	11.03 ± 1.33
Left	10.65 ± 1.85

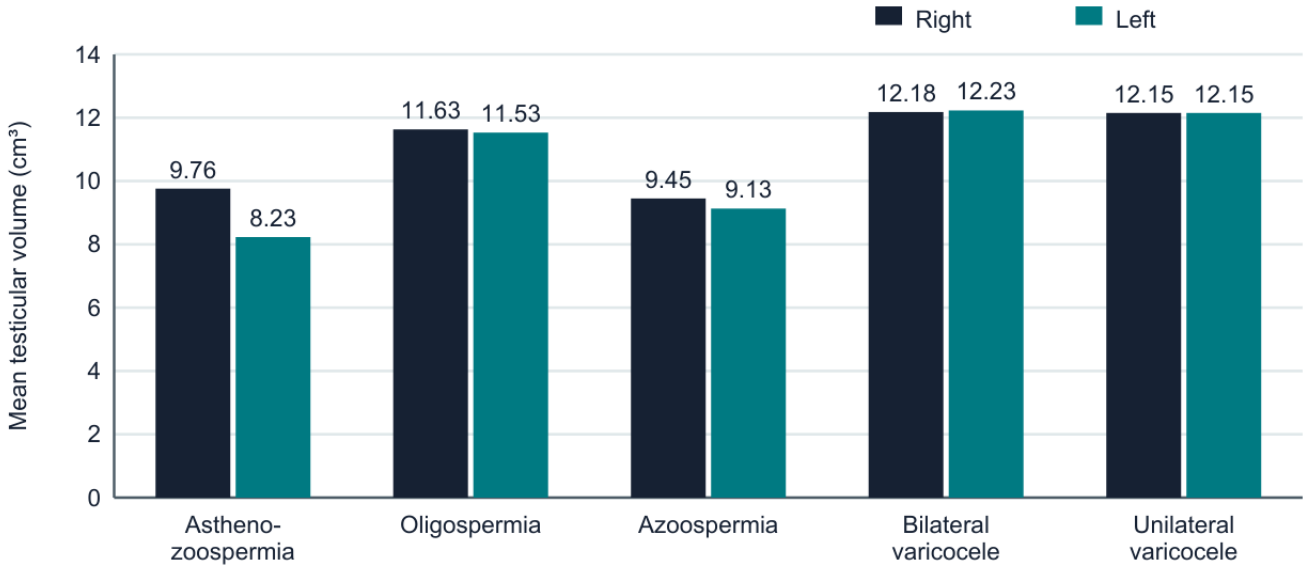


Chart 1. Reported mean testicular volumes across testicular conditions.

Associations with Semen Parameters

Left testicular volume was positively correlated with sluggish sperm motility (r = 0.301, p = 0.034) and sperm count (r = 0.317, p = 0.025). Correlations with active and dead sperm motility were not statistically significant. None of the reported right-sided correlations reached statistical significance (Table 2). These are associations within the study sample.

Table 2. Correlations between testicular volume and semen parameters.

Semen parameter	Right r	Right p	Left r	Left p
Active sperm motility	0.119	0.411	0.092	0.523
Sluggish sperm motility	0.151	0.295	0.301*	0.034
Dead sperm motility	0.106	0.464	0.031	0.828
Sperm count (×10^6 cells/mL)	0.165	0.252	0.317*	0.025

* p < 0.05. r: Pearson correlation coefficient.

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Discussion

The sample comprised men aged 18–55 years, with a reported mean age of 37.42 ± 8.63 years. The 31–35-year and 36–40-year groups each accounted for 26% of the sample. Reported volumes varied among the testicular conditions described in Chart 1.

Testicular volume in men with infertility has also been examined by Bellurkar et al. [9] and Manuel, Ugboma and Nwankwo [10]. These reports provide literature context for the present findings. The present results describe the included study sample.

Tijani et al. [11] compared fertile and subfertile West African men. That comparison is considered here as literature context and is separate from the within-sample analyses reported in this study.

The positive correlations observed for left testicular volume and sperm count and sluggish sperm motility were modest. Van Batavia et al. [12] reported an association between total motile sperm count and total testicular volume in adolescent boys with varicocele ($r = 0.35$, $p = 0.01$). The populations and semen measures differ, so the findings should not be treated as equivalent. Sluggish sperm motility is not interpreted here as evidence of improved sperm quality or treatment response.

Recommendations

Sonographic testicular volume may be considered alongside semen analysis and other clinical findings. This study does not establish a threshold for diagnosis or a treatment strategy based on testicular volume alone.

Areas for Further Research

Evaluation of the reports of patients with infertility challenges as the clinical indication attending the department and the mechanisms underlying the relationship between testicular volume and fertility should be studied.

Conclusion

In this retrospective sample of 50 men with fertility challenges, the reported mean testicular volumes were 11.03 cm^3 on the right and 10.65 cm^3 on the left. Left testicular volume showed modest positive correlations with sperm count and sluggish sperm motility. The findings describe associations within the study sample and do not establish causation, diagnostic accuracy or a difference from an independently evaluated fertile control group.

Declarations

The authors state that written informed consent was obtained and patient anonymity was maintained. This study submitted to Swiss J. Rad. Nucl. Med. has been conducted in accordance with the Declaration of Helsinki and according to requirements of all applicable local and international standards. All authors contributed to the conception and design of the manuscript, participated in drafting and revising the content critically for important intellectual input, and approved the final version for publication. Each author agrees to be accountable for all aspects of the work, ensuring its accuracy and integrity.

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Conflict of Interest

The authors declare that there were no conflicts of interest within the meaning of the recommendations of the International Committee of Medical Journal Editors when the article was written.

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