PAKISTAN JOURNAL OF UROLOGY
ISSN: 3005-7582 (Online) : ISSN: 3005-7574 (Print)
Open Access

ORIGINAL ARTICLE

PRIORITIZING ULTRASOUND SCROTUM WITH VENOUS AND ARTERIAL DOPPLER AS PRIMARY MODALITY IN CASES OF OLIGOASTHENOSPERMIA

Hina Anwar[1], Mahad Umer[2], Syeda Memoona[3], Sabahat Makhdoom[4], Maria Ather[5], Mahnoor Habib Roghani[6]

[1-6]-Department of Urology and Radiology SARF Hospital Islamabad.

ABSTRACT

Background: Oligoasthenospermia, marked by low sperm count and reduced motility, accounts for a significant portion of male infertility cases globally.

Objective: To investigate the prevalence of oligoasthenospermia and its association with varicocele among male patients in Islamabad.

Study Design: A cross-sectional study

Duration and place of study: This Study conducted at SARF Hospital from (March to September 2024).

Methods: 60 male patients age 20–32 years with primary and secondary subfertility. The study analyzed sperm concentration, motility, and varicocele, adhering to inclusion/exclusion criteria, with informed consent, ethical approval, and data confidentiality ensured throughout the research. Data was analyzed using SPSS 23.0.

Results: Results revealed that 86.7% of participants had primary subfertility, with a mean sperm concentration of 1.13 million/mL, significantly lower than the 5.917 million/mL observed in secondary subfertility cases. Varicocele was present in 85% of the sample, predominantly left-sided (73.3%), with a significant proportion classified as Grade 3 (61.7%). Correlation analysis indicated a weak, non-significant relationship (r = 0.205) between sperm concentration and varicocele presence, suggesting that while varicocele is common, its impact on sperm quality may vary.

Conclusion: The study underscores the need for comprehensive evaluations of male infertility, integrating advanced imaging techniques like Doppler ultrasound to better understand the anatomical factors influencing spermatogenesis. Enhanced diagnostic approaches could lead to tailored interventions, potentially improving reproductive outcomes for affected individuals. Addressing the identified limitations and research gaps is crucial for advancing male reproductive health and clinical practices.

Keywords: Oligoasthenospermia, Varicocele, Male Infertility, Sperm Motility, Doppler Ultrasound

How to Cite this Article : Anwar H, Umer M, Memoona S, Makhdoom S, Ather M, Roghani MH. Prioritizing ultrasound scrotum with venous and arterial Doppler as primary modality in cases of oligoasthenospermia**.**
Pak J Urol. 2025;3(1):1–6.

Corresponding Author: Hina Anwar

Urologist at SARF hospital Islamabad

ORCID ID : https://orcid.org/0000-0001-5909-912X

Email: hinaanwar48@gmail.com

Contact: +92-3330457576

ARTICLE TRACKING

Received: 11- JAN -2025
Revision: 22-MARCH-2025
Accepted: 28-JANE-2025
Published: 10-JULY-07- 2025
DOI:https://doi.org/10.69885/pju.v3i1.93

INTRODUCTION

Oligoasthenospermia, characterized by a low sperm count and reduced sperm motility, is a prevalent male reproductive disorder that significantly impacts fertility rates globally. The World Health Organization estimates that male infertility contributes to approximately 50% of infertility cases in couples seeking assistance **[1]**. The multifactorial nature of oligoasthenospermia encompasses a variety of potential etiologies, including hormonal imbalances, genetic factors, lifestyle influences, and anatomical abnormalities such as varicocele **[2]**. Among these factors, varicocele has garnered particular attention due to its high prevalence in men with infertility, affecting up to 40% of such individuals **[3]**. The physiological mechanisms through which varicocele influences spermatogenesis include increased testicular temperature and disrupted blood flow, underscoring the importance of effective diagnostic tools to identify and manage this condition **[4]**.Despite advances in reproductive medicine, there remains a critical gap in the literature concerning the comprehensive evaluation of oligoasthenospermia, particularly regarding the integration of advanced imaging techniques. Traditional diagnostic approaches have primarily focused on semen analysis, often overlooking the anatomical and vascular factors that may be pivotal in understanding male infertility **[5]**. While scrotal ultrasound is commonly employed to identify varicocele, the use of Doppler ultrasound to assess both arterial and venous blood flow dynamics is still underutilized. This is particularly concerning given that abnormalities in blood flow may contribute to impaired testicular function, yet few studies have systematically investigated this relationship**[6]**. Furthermore, existing research has not adequately addressed how comprehensive imaging assessments can lead to more tailored interventions for men suffering from oligoasthenospermia. This gap highlights a pressing need for studies that explore the potential of Doppler ultrasound as a primary diagnostic tool, aiming to bridge the divide between anatomical assessment and clinical practice.Addressing this research gap carries significant implications for improving the management of male infertility. The integration of Doppler ultrasound into the diagnostic process could enable clinicians to identify both primary (such as testicular size) and secondary (such as varicocele) causes of oligoasthenospermia more effectively. This comprehensive evaluation may facilitate timely and appropriate interventions, including surgical options like varicocele repair or minimally invasive procedures such as embolization **[7]**. Research indicates that interventions addressing varicocele can result in notable improvements in semen parameters and overall fertility potential**[8]**. Moreover, understanding the vascular contributions to testicular health could inform personalized treatment protocols, ultimately enhancing reproductive outcomes for couples facing infertility challenges. By prioritizing the use of Doppler ultrasound in clinical practice, we can refine our approach to diagnosing and treating oligoasthenospermia, thereby advancing the field of male reproductive health and improving the quality of care provided to affected individuals.

Methodology:

This cross-sectional study was conducted at SARF Hospital in Islamabad over a six-month period, from March 2024 to September 2024, on male patients aged 20 to 32 years with primary and secondary subfertility. A sample size of 60 participants was calculated using the OpenEpi sample calculator.Inclusion criteria encompassed both primary and secondary subfertility cases, specifically targeting men with sperm concentrations below 15 million per milliliter and progressive motility under 32%, adhering to the oligoasthenospermia criteria established by the European Urology Association (EUA) guidelines for semen analysis. To ensure the integrity of the study, several exclusion criteria were applied: Patients with erectile dysfunction or premature ejaculation were excluded, along with those diagnosed with right varicocele or bilateral varicocele, unless ruled out by an ultrasound of the kidneys and ureters to eliminate the presence of a right renal mass. Additionally, individuals with a sperm concentration below 7 million per milliliter were

not included due to the need for karyotyping to assess potential Y chromosome microdeletions. Written informed consent was obtained from all participants prior to their involvement, and ethical oversight was provided through **Institutional Review Board (IRB) approval from SARF Hospital (Reference no: 228/A0/641).** Data analysis was performed using SPSS version 23.0, employing descriptive tests and correlation analyses to explore relationships between the sperm concentration and varicocele presence. Patient data confidentiality was strictly maintained throughout the research process to protect participants' privacy and ensure ethical compliance

Results:

The results indicate that the mean sperm concentration for primary subfertility is 1.13 million/mL (SD = 0.343), while for secondary subfertility, it is significantly higher at 5.917 million/mL (SD = 4.0809). This data underscores the notable difference in sperm production between the two groups.Distribution of key variables related to subfertility and varicocele among the study participants outlined in table 1. Out of the 60 men assessed, 52 (86.7%) were diagnosed with primary subfertility, while 8 (13.3%) had secondary subfertility, indicating a strong prevalence of primary cases in this population. When examining the presence of varicocele, 51 participants (85.0%) reported having it, whereas 9 (15.0%) did not. The majority of varicocele cases were left-sided, comprising 44 participants (73.3%), with 5 (8.3%) having bilateral varicocele without a right renal mass and 2 (3.3%) with bilateral varicocele and no renal mass. Additionally, 9 participants (15.0%) were found to have no varicocele at all. In terms of varicocele grading, 37 participants (61.7%) were classified as Grade 3, highlighting a significant severity within this group. Meanwhile, 9 participants (15.0%) were categorized as Grade 2 or having no varicocele, and 5 (8.3%) were classified as Grade 4. These results emphasize not only the high prevalence of primary subfertility and varicocele among the participants but also the varying degrees of severity, suggesting a need for tailored management strategies in this population.

Variables	Frequency (n)	Percentage (%)
Subfertility		
Primary	52	86.7
Secondary	8	13.3
Varicocele presences		
Yes	51	85.0
No	9	15.0
Varicocele site		
Left sided or left	44	73.3
B/L with no right renal mass	5	8.3
B/l with no renal mass	2	3.3
None	9	15.0
Varicocele grade		
None	9	15.0
Grade 2	9	15.0
Grade 3	37	61.7
Grade 4	5	8.3

Table 1: Distribution of Subfertility and Varicocele Characteristics Among Study Participants Correlation analysis was performed to examine the relationship between sperm concentration (measured in million/mL) and the presence of varicocele among the study participants. The results

indicate a correlation coefficient of 0.205, which suggests a weak positive relationship between sperm concentration and varicocele presence. However, this correlation is not statistically significant (NS), indicating that the presence of varicocele does not have a meaningful impact on sperm concentration in this sample. Table 2-ns: non-significant.

Variable	Sperm Concentration (million/ml)	Varicocele Presence
Sperm Concentration (million/ml)	1.000	0.205 (ns)
Varicocele Presence	0.205 (ns)	1.000

Table 2: Result of Correlation analysis Between Sperm Concentration and Varicocele Presence

Discussion

the prevalence of oligoasthenospermia and the associated anatomical and vascular factors among male patients with subfertility. Notably, 86.7% of the participants were diagnosed with primary subfertility, with a significant proportion (85.0%) exhibiting varicocele. The mean sperm concentration for primary subfertility was markedly low at 1.13 million/mL, compared to 5.917 million/mL for secondary subfertility**[9-10].** These findings underscore the urgent need for comprehensive evaluations of male infertility, particularly focusing on anatomical abnormalities such as varicocele, which may contribute to poor sperm production and overall fertility potential. The high prevalence of varicocele among participants aligns with previous studies that have reported varicocele rates of 30-40% in men with infertility**[11]**.The relationship between varicocele and oligoasthenospermia has been well- documented in the literature. Varicocele can lead to elevated testicular temperatures and disrupt venous drainage, ultimately impairing spermatogenesis**[12-13]**. In our study, the weak positive correlation between sperm concentration and the presence of varicocele (0.205) was statistically insignificant, suggesting that while varicocele is prevalent, it may not uniformly impact sperm quality across all individuals. This is consistent with findings from Krishna et al. (2020), which indicate that while varicocele can affect semen parameters, the severity of its impact varies significantly among individuals**[14]**. Additionally, other factors such as hormonal imbalances and lifestyle choices may play pivotal roles in determining sperm quality and must be considered in future assessments**[15-18]**.Despite the valuable contributions of this study, several limitations warrant consideration. The cross-sectional design restricts the ability to establish causal relationships between varicocele and sperm concentration, as unexplored**[19,20,21]**.Furthermore,the exclusion criteria, particularly the omission of patients with very low sperm counts (below 7 million/mL), could limit the generalizability of findings to the broader male infertility population. Future research should aim to include larger cohorts with varied demographics and consider longitudinal studies that track changes in sperm parameters over time**[22]**. Additionally, integrating advanced imaging modalities, such as Doppler ultrasound, into routine assessments may yield deeper insights into the vascular contributions to spermatogenesis, ultimately informing targeted interventions for those affected by oligoasthenospermia**[23]**.

Conclusion:

This study highlights the significant prevalence of primary subfertility and varicocele among men seeking fertility evaluations. By advocating for a more

comprehensive approach that includes anatomical assessments and advanced imaging techniques, we can improve diagnostic accuracy and tailor interventions to enhance reproductive outcomes. Addressing the identified research gaps and limitations will be essential in advancing our understanding of male infertility and fostering improved clinical practices.

ACKNOWLWDGEMENT:
The authors would like to acknowledge the Medical Affairs Department of Getz Pharma for their technical support and assistance in the publication process.

Disclaimer: Nil

Conflict of Interest:Nil

Funding Disclosure: Nil

Authors Contributions

Concept & Design of Study: **Hina Anwar[1], Mahad Umer[2]**

Drafting:**Syeda Memoona[3], Sabahat Makhdoom[4]**

Data Analysis:**Maria Ather[5], Mahnoor Habib Roghani[6]**

Critical Review: **Hina Anwar[1], Mahad Umer[2]**

Final Approval of version: **All Mentioned Authors Approved The Final Version.**

REFERENCES:

1.Alahmar AT. Coenzyme Q10 improves sperm motility and antioxidant status in infertile men with idiopathic oligoasthenospermia. Clinical and experimental reproductive medicine. 2022;49(4):277-84.
2.An Q, Zhang K, Fu L, Guo Y, Zhang C, Ge Z, et al. The impact of exogenous testosterone supplementation on spermatogenesis in a rat model of oligoasthenospermia. International journal of clinical and experimental pathology. 2020;13(6):1287-99.
3.Cai J, Song L, Hu Z, Gao X, Wang Y, Chen Y, et al. Astragalin alleviates oligoasthenospermia via promoting nuclear translocation of Nrf2 and reducing ferroptosis of testis. Heliyon. 2024;10(19):e38778.
4.Ding J, Lu B, Liu L, Zhong Z, Wang N, Li B, et al. Guilu-Erxian-Glue alleviates Tripterygium wilfordii polyglycoside-induced oligoasthenospermia in rats by resisting ferroptosis via the Keap1/Nrf2/GPX4 signaling pathway. Pharmaceutical biology. 2023;61(1):213-27.
5.Dong J, Tong X, Xu J, Pan M, Wang L, Xu F, et al. Metformin improves obesity-related oligoasthenospermia via regulating the expression of HSL in testis in mice. European journal of pharmacology. 2024;968:176388.
6.Dong P, Xia L, Hu L, Yang K, Wang H, Ye P. Runjing Decoction alleviated cyclophosphamide-induced oligoasthenospermia rats by inhibiting cell apoptosis via RXFP1/AKT/FOXO1 pathway. Andrologia. 2021;53(11):e14216.
7.Guo L, Guo A, Lan X, Tian S, Sun F, Su Y, et al. Oligoasthenospermia is correlated with increased preeclampsia incidence in subfertile couples undergoing in vitro fertilization and embryo transfer: a secondary analysis of a randomized clinical trial. F&S science. 2024;5(4):386-94.
8.Li B, Ma J, Zhu L, Yan Y, Wu Y, Zheng C, et al. Metabolomic profiling and alleviation of oxidative stress of Huangjing Zanyu capsule treating oligoasthenospermia. Translational andrology and urology. 2022;11(5):659-74.
9.Li Q, Shen Y, Zhao LJ, Wang JB, Huang X. Mutations in CFTR genes are associated with oligoasthenospermia in infertile men undergoing IVF. Andrologia. 2022;54(3):e14355.
10. Liu HJ, Deng MY, Zhu YY, Wu DL, Tong XH, Li L, et al. Establishment of an oligoasthenospermia mouse model based on TAp73 gene suppression. Animal models and experimental medicine. 2021;4(4):351-8.
11. Ma JC, Wang Q, Li BY, Fang YN, Zhang ZL, Dong Y, et al. [Case series analysis of

Professor Wang Qi's prescriptions for oligoasthenospermia]. Zhonghua nan ke xue = National journal of andrology. 2021;27(2):155-60.

12. Ma L, Li B, Ma J, Wu C, Li N, Zhou K, et al. Novel discovery of schisandrin A regulating the interplay of autophagy and apoptosis in oligoasthenospermia by targeting SCF/c-kit and TRPV1 via biosensors. Acta pharmaceutica Sinica B. 2023;13(6):2765-77.

13. Sheng W, Xu W, Hu H, Xiao D, He Q. Effects of tortoise-shell glue on rat oligoasthenospermia model. Chinese medical journal. 2022;135(6):732-4.

14. Tian Z, Liu J, Zeng M, Zeng Q. Tong Jing Yi Hao Formula Alleviates Ornidazole-Induced Oligoasthenospermia in Rats by Suppressing ROS/MAPK/HIF-1 Pathway. Archivos espanoles de urologia. 2023;76(8):596-604.

15. Wang C, Wang W, Dong J, Li X, Ye T, Zeng F, et al. Isatin improves oligoasthenospermia caused by busulfan by regulating GSH/GPX4 axis to inhibit ferroptosis. Frontiers in pharmacology. 2024;15:1489956.

16. Wang C, Ye T, Bao J, Dong J, Wang W, Li C, et al. 5- methylcytidine effectively improves spermatogenesis recovery in busulfan-induced oligoasthenospermia mice. European journal of pharmacology. 2024;967:176405.

17. Wang D, Lu H, Bin B, Lin S, Wang J. Quantitative proteomics reveal the protective effects of Qiang Jing decoction against oligoasthenospermia via modulating spermatogenesis related-proteins. Translational andrology and urology. 2024;13(10):2268-79.

18. Wang Z, Zhou Z, Zhang L, Li X, Li M, Pan Y, et al. Efficacy and safety of nonpharmacological strategies for the treatment of oligoasthenospermia: a systematic review and Bayesian network meta-analysis. European journal of medical research. 2023;28(1):6.

19. Wu D, Wang T, Liu H, Xu F, Xie S, Tong X, et al. Wuzi-Yanzong-Wan prevents oligoasthenospermia due to TAp73 suppression by affecting cellular junction remodeling in testicular tissue in mice. Journal of ethnopharmacology. 2023;302(Pt A):115867.

20. Xu J, Yang Q, Chen W, Jiang Y, Shen Z, Wang H, et al. Comparing the clinical and singleton neonatal outcomes in male infertility patients with Oligoasthenospermia, OA, or NOA following fresh ICSI-ET using different sources of sperm. Frontiers in endocrinology. 2023;14:1186257.

21. Zhang J, Li X, Wang R, Feng X, Wang S, Wang H, et al. DNA methylation patterns in patients with asthenospermia and oligoasthenospermia. BMC genomics. 2024;25(1):602.

22. Zhang T, Wang X, Wang Z, Xu Z, Chen L, Miao M, et al. A Diagnostic Model to Improve the Predictability of Natural Pregnancy Potential in Patients with Oligoasthenospermia. Medical science monitor : international medical journal of experimental and clinical research. 2020;26:e922316.

23. Zhao M, Yan B, Gao QH, Guo J. [Biological basis of oligoasthenospermia based on the theory of "kidney governing reproduction"]. Zhonghua nan ke xue = National journal of andrology. 2022;28(11):1038-43.