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CASUISTRY

# Significant worsening sperm parameters are associated to testicular hypotrophy in patients with a high grade varicocele☆

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**KEYWORDS**
Varicocele;
Testicular volume;
Semen parameters;
Infertility

## Abstract

*Objective:* To investigate the relationship between testicular volume and semen parameter sin patients with unilateral high grade left varicocele.

*Material and methods:* One hundred eighty seven patients who had left high grade varicocele aged 19-to-25 years were included in this study. All patients underwent a standard evaluation, including medical history and physical examination. The percentage testicular volume difference between the right and left testicles was calculated. The patients were divided into the following three groups; Group 1 ($n = 72$) testicular volume difference <10%, testicular volume difference 10–20% Group 2 ($n = 74$) and testicular volume difference >20% Group 3 ($n = 41$).

*Results:* The mean age and BMI of the patients were 21.5 years and 23.1 kg/m$^2$, respectively ($p = 0.596$, $p = 0.943$). The semen parameters and testicular volumes of the three groups were compared. The total motile sperm count, percentage of motile sperm, percentage of normal morphology sperm were found to be lower in Group 3 ($p = 0.011$, $p = 0.012$, $p = 0.029$ respectively). The mean testicular volumes for the left and the right testis were found to be 15.2 cm$^3$ and 17.7 cm$^3$ ($p < 0.001$), respectively. No significant difference was found in the right testicular volumes between groups (17.4, 17.7 and 18.1 cm$^3$, $p = 0.573$).

*Conclusions:* A high grade left testicular varicocele is associated with ipsilateral testicular hypotrophy and parallel to worsened sperm parameters.



**PALABRAS CLAVE**
Varicocele;
Volumen testicular;
Parámetros seminales;
Infertilidad

## Los parámetros espermáticos significativos que empeoran están asociados con la hipotrofia testicular en pacientes con varicocele de alto grado

## Resumen

*Objetivo:* Investigar la relación entre el volumen testicular y los parámetros seminales en pacientes con varicocele izquierdo de alto grado unilateral.

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*Material y métodos:* Ciento ochenta y siete pacientes que tenían varicocele izquierdo de alto grado de entre 19 y 25 años fueron incluidos en este estudio. Todos los pacientes se sometieron a una evaluación estándar, incluyendo historia clínica y examen físico. Se calculó la diferencia de porcentaje de volumen testicular entre los testículos derecho e izquierdo. Los pacientes fueron divididos en los siguientes 3 grupos: grupo 1 ($n = 72$) diferencia de volumen testicular <10%; diferencia de volumen testicular 10–20% grupo 2 ($n = 74$); y diferencia de volumen testicular >20% grupo 3 ($n = 41$).
*Resultados:* La media de edad y el IMC de los pacientes fueron de 21,5 años y 23,1 kg/m$^2$, respectivamente ($p = 0,596$, $p = 0,943$). Se compararon los parámetros seminales y los volúmenes testiculares de los 3 grupos. Se descubrió que el recuento total de espermatozoides móviles, porcentaje de espermatozoides móviles y porcentaje de espermatozoides de morfología normal eran menores en el grupo 3 ($p = 0,011$, $p = 0,012$, $p = 0,029$, respectivamente). Se encontró que los volúmenes testiculares medios para el testículo izquierdo y derecho eran 15,2 cm$^3$ y 17,7 cm$^3$ ($p < 0,001$), respectivamente. No se encontraron diferencias significativas en los volúmenes testiculares derechos entre los grupos (17,4, 17,7 y 18,1 cm$^3$; $p = 0,573$).
*Conclusiones:* Un varicocele testicular izquierdo de alto grado se asocia con hipotrofia testicular ipsilateral y paralela a los parámetros del esperma empeorado.


## Clinical problem with description of the series

Varicocele is the most important cause of male infertility since it can impair semen production and quality; however, the negative effects of varicocele are preventable with appropriate treatment.[1] The most common indication for the repair of prophylactic varicocele in adolescents is the development of testicular hypotrophy, because this may progress to impaired fertility in adulthood by affecting testicular growth, and causing volume loss and deterioration of semen parameters.[2] In our series, we investigated the relationship between testicular volume and semen parameters in patients in the early adult period with unilateral high grade left clinical varicocele.

A total of 187 men between the ages of 19–25 with a high grade left varicocele were included. All the patients were fulfilling their national service requirement. The evaluation of the patients consisted of their medical history, physical examination, height and weight measurements. Exclusion criteria were determined as having a pathology that influences testicular volume, such as an infection (e.g. mumps orchitis), trauma, cryptorchidism, or previous testicular surgery or a low grade (e 1 or 2) varicocele. The study was approved by the Institutional Review Board (ANEAH=2009/143) and all subjects provided proper informed consent. Varicocele was diagnosed by bimanual palpation and observation of the scrotum under similar environmental conditions, and all physical examination were performed during the participants period of military service by the same examiner (O.G.). A visible varicocele without palpation while patient is in standing position was considered as Grade 3 or high grade varicocele. The testicular volumes were measured by scrotal ultrasonography (USG) with a 7.5-MHz linear transducer (Sonolayer™ SSA-250A, Toshiba Corporation, Tokyo, Japan) by the same radiologist (B.U.) using a formula (length × width × height × 0.71).

The percentage of the difference in the testicular volume (%) between the right and left testicles was calculated using a formula (right testicular volume − left testicular volume) × 100/right testicular volume), and patients were classified into three groups; 1 ($n = 72$) with testicular volume difference under 10%, group 2 ($n = 74$) with testicular volume difference between 10% and 20%, and group 3 ($n = 41$) with testicular volume difference over 20%. Semen samples were collected from patients by masturbation after 3–7 days of sexual abstinence, and analyses included sperm count, linear and non-linear motility, total motile sperm count according to the World Health Organization 2010 recommendations, and normal sperm morphology according to the Kruger's criteria.[3] Semen parameters and testicular volumes in three groups were compared using one-way ANOVA and Kruskal–Wallis test.

The mean age of the patients was 21.5 years (21.5, 21.4 and 21.7 years in groups 1, 2 and 3 respectively, $p = 0.596$). The mean testicular volumes for the left and right testes were found to be 15.2 cm$^3$ (95% CI, 14.8–15.7) and 17.7 cm$^3$ (95% CI, 17.2–18.2) ($p < 0.001$), respectively. The left testicular volume was found to be lower in group 3 (16.5, 15.3 and 12.9 cm$^3$, $p < 0.001$) while no significant difference was found in the right testicular volumes between the groups (17.4, 17.7 and 18.1 cm$^3$, $p = 0.573$) (Table 1).

The sperm count, linear progressive motile sperm, nonlinear progressive motile sperm, total motile sperm count, and percentage of normal morphology parameters were significantly decreased in group 3 ($p > 0.05$, Table 1). As the testicular discrepancy increases, the sperm count per milliliter and total motile sperm count decreases ($p = 0.011$ and $p = 0.023$, respectively). In addition to sperm motility, sperm morphology was found to be lower in Group 3 than in the other groups ($p = 0.001$). The sperm morphology was similar in Groups 1 and 2 (97.2% vs. 94.6%, $p = 0.424$).

## Comments

Varicocele can be defined as dilatation of testicular vein and pampiniform plexus in spermatic cord since untreated lesions may affect testicular growth and function over time. Varicocele is the most common preventable cause of male infertility.[4] The prevalence of the disease clearly increases