

# Estimation of testis volume in patients with varicocele treated by laparoscopic operation

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## Abstract

**Introduction:** Seminal cord varices cause degenerative processes in testicles described as “orchidopathia e varicocele”. One of the coefficients of surgical treatment efficacy could be an increase of the testicle volume after surgical procedure.

**Material and methods:** In 83 patients operated due to left side seminal cord varices the ultrasound examination of scrotum was performed aiming, among others, at the evaluation of both testicles volume. The examination was performed before the surgical procedure and then in the period of 6-8 months after the laparoscopically performed surgical procedure. The ultrasound examination was made by means of sector head (frequency of 7.5 MHz) and the examination unit B&K Medical 3535. During the examination the patient was in standing position. The testicle volume (in cm<sup>3</sup>) was calculated by means of urological measurement module, which was the part of ultrasound examination unit software.

**Results:** In the patients with seminal cord varices a statistically significant increase of the left testicle volume after applied laparoscopical surgery treatment was gained ( $p < 0.001$ ). The increase of the left testicle volume was found in 71 of 83 operated patients.

**Conclusions:**

1. The application of the laparoscopic method in the patients with left seminal cord varices causes an increase of the testicle volume on the operated side.
2. The ultrasound evaluation of the testicle volume is safe for the patient and simple for the physician diagnostic method.

**Key words:** varicocele, testis volume, laparoscopy.

## Introduction

Varicocele (seminal cord varices) means widening of pampiniform plexus veins in the scrotum that makes the venous outflow from the testicles more difficult. It occurs in 11% of men, mostly on the left side.

Insufficiency or congenital lack of venous valves in testicular veins is considered one of the most important reasons for that disease [1]. Seminal cord varices cause degenerative processes in the testicles described as “orchidopathia e varicocele”. One of the coefficients of surgical treatment efficacy could be an increase of the testicle volume after the surgical procedure [2]. Percutaneous ultrasound examination of the testicles is considered the most accurate method of their dimension estimation [3].

A surgical treatment is an essential way of the seminal cord varices therapy. There are many methods of surgical treatment of seminal cord varices, although in spite of different modifications the relapse coefficient in that illness is estimated as 5-25%. According to the majority of authors the main reason for disease recurrence are difficulties in finding and cutting of all branches of the internal seminal vein. In the 90 s new, laparoscopic methods of surgical treatment were used in urology, which being the minimal invasive method secures at the same time very good visibility of anatomical details in the field of operation. The advantages of the laparoscopic method were used in the treatment of seminal cord varices [4].

Surgical treatment of seminal cord varices with the help of the laparoscopic method has been performed in the world since 1990 and in the Urological Clinic of Military Medical Academy of Łódź (since 2002 – Dept. of Urology and Urological Rehabilitation, Medical University in Łódź) since September 1993 [5].

### Material and methods

During last 15 years 131 patients were operated – the laparoscopic dissection and cutting of internal seminal blood vessels (venous branches and artery) on the left side was performed. In 83 patients with left side seminal cord varices the ultrasound examination of the scrotum was performed aiming, among others, at the evaluation of both testicles volume. The age of patients was differentiated – between 15 and 35 years and the mean age was 23.2.

The examination was performed before the surgical procedure and then in the period of 6-8 months after the laparoscopically performed surgical procedure. The ultrasound examination was made by means of sector head (frequency of 7.5 MHz) and the examination unit B&K Medical 3535. During the examination the patient was in the standing position. The testicle volume (in cm<sup>3</sup>) was calculated by means of urological measurement module, which was the part of ultrasound examination unit software. The examination was performed always by the same person, in a warm room, with maintenance of intimacy conditions. The statistical evaluation of the results was made by means of non-parametric tests Friedman ANOVA with Kendall concordance coefficient.

The patients were qualified for the surgical treatment regarding the complaints of pain in the left half of the scrotum (119 patients) and/or fertility disorders (29 patients) finding at the same time the seminal cord varices. Apart from ultrasound evaluation all patients were physically examined (including Ivanissevich test – negative at all patients) and the sperm examination was performed. The stage of clinical advancement of the disease was assigned by means of the three-level scale proposed by Oster.

Before the laparoscopic procedure one dose of wide-spectrum antibiotic was administered intravenously and the Foley catheter was introduced into the urinary bladder. During the operation in general anaesthesia the patient was lying on his back. The cave of peritoneum was inflated with carbon dioxide up to the maximal pressure of 14 mmHg by means of Verres needle introduced in the skin cutting place e. g. on the lower margin of the navel. Then three troacars with diameters of 5, 10 and 10 mm were introduced into the cave of peritoneum on the lower margin of the navel and symmetrically on both sides on the level of 5 cm below the navel, a little medially from the anterior axillar line. Then the widened testicular veins were identified and the posterior lame of peritoneum was cut laterally from the inspected vessels on a 4 cm long stretch. The fascicle of vessels – usually 2-3 veins and artery was isolated as a whole. The metal clips were put on the vessels – two on each side. Then the vessels were cut between the clips about 3 cm above the profound inguinal ring. The posterior lame of peritoneum was sutured by means of titanium clips. The troacars were removed and the gas was evacuated from the cave of peritoneum. Single sutures were put on the transversal fascia. The skin was administered by means of Steri-strip strips. The catheter was removed from the urinary bladder after finishing the operation.

### Results

In the patients with seminal cord varices a statistically significant increase of the left testicle volume after applied laparoscopical surgery treatment was gained ( $p < 0.001$ ). The increase of the left testicle volume was found in 71 of 83 operated patients, in whom the ultrasound examination was performed before and after the surgical treatment and the time of monitoring after the surgical procedure was longer than six months. The left testicle volume (on the side of found seminal cord varices) before the operation fluctuated between 12.4 cm<sup>3</sup> and 23.6 cm<sup>3</sup> (average 17.9 cm<sup>3</sup>) while after the operation – between 14.9 cm<sup>3</sup> and 26.6 cm<sup>3</sup> (average 19.9 cm<sup>3</sup>). The right testicle volume fluctuated between 15.7 cm<sup>3</sup> and 25.6 cm<sup>3</sup> (average 19.7 cm<sup>3</sup>) before the operation and between 15.5 cm<sup>3</sup> and 26.8 cm<sup>3</sup> (average 20.1 cm<sup>3</sup>) after the surgical treatment. The results of corresponding examinations were showed in Table I.

### Discussion

Although the topic of seminal cord varices has appeared in medical papers for a few centuries, it is still a not completely known disease. In spite of many, often convincing theories about seminal cord varices etiology that problem remains still unclear,

**Table I.** Results of sonographic evaluation of volume of testicles in patients with varicocele before and after laparoscopic operation;  $p < 0.001$ 

Patients n=68	Before operation			After operation		
	Testis volume (cm <sup>3</sup> )	Minimal volume of testis	Maximal volume of testis	Mean volume of testis	Minimal volume of testis	Maximal volume of testis
Left testicle	12.4	23.6	<b>17.9</b>	14.9	26.6	<b>19.9</b>
Right testicle	15.7	25.6	<b>19.7</b>	15.5	26.8	<b>20.1</b>

there is also no accordance about the most appropriate method of their treatment method.

Over the past several years the most common surgical procedure in many countries was the extraperitoneal cutting of testicular vessels – the vein branches and the artery, proposed by Palomo.

The suddenly developing since the beginning of the 90s urological laparoscopy significantly enriched the arsenal of operative methods applied in the treatment of the urogenital system diseases. In the entire world many authors commenced to use that method in the surgical treatment of seminal cord varices, emphasizing its facility, accuracy and minimal invasive character. The image of anatomical structures transmitted into the display allows their good identification and delicate, conservative dissection that results the limitation of postoperative complications and considerable shortening of recovery time [6].

The choice of method, which allows to objectively and thoroughly estimate the effectiveness of the surgical treatment still remains an important problem. One of the objective indexes of surgical treatment efficiency of patients with seminal cord varices is, besides the degree of sperm parameter amelioration, the finding of increase of the testicle volume after the surgical treatment [7]. The testicle dimension is nowadays considered an important criterion for estimation of the gonad function.

It is also considered that about 98% of testicle volume consist of seminal ducts (*tubuli seminiferi*) and that number correlates well with the evaluation of spermocreating function of the testicle [8]. The diminishing of the testicle volume seems to be correlated with the obliteration of structural elements of the seminal ducts and diminishing of their dimension [9]. The accuracy of testicle volume measurements is of vital importance, not only in assigning of criteria for qualification of the patients for the surgical treatment, but also in the evaluation of the efficiency of the surgical treatment of the patients with seminal cord varices. In the boys, in whom the seminal cord varices were found, the sperm examination – because of the young age – is not performed, the accuracy of estimation of the testicle volume before and after the treatment is of

particular significance, because it often occurs the only one objective criterion of the testicle function evaluation [10].

The physical examination of a patient although simple to perform is still saddled with big percent of errors in estimation both widths of broadened vessels of pampiniform plexus and the dimensions of both testicles. The measurements of the male gonad volume could be performed by means of different sorts of orchidometers: ellipsoidal of Prader, annular of Takihara or Seager's orchidometer. The testicle volume evaluation performed with the help of those instruments consists mostly in the comparison of testicle dimension with the pattern. The measurement could be then saddled with the error that depends on examiner's experience as well as on inaccuracy resulting from the fact that estimation includes the testicle volume with its covers and scrotum skin. That fact can be without the meaning in children, but it is of a great significance in the adult patients, particularly in case of co-existing pathologies in the region of the scrotum, for example testicle hydrocele. The experiments of Al Salim et al. prove the significantly greater accuracy of ultrasound measurements of the testicle volume than the measurements performed with the help of orchidometer [8]. The ultrasound evaluation with reference to the gonad dimension is considered nowadays a "golden standard". Many authors emphasize important advantages of that diagnostic method: the accuracy of measurements, repeatability and facility of the examination as well as the safety of appliance.

The majority of performed experiments not only in the boys, but also in adult patients with seminal cord varices shows the diminishing of the testicle volume on the side of varices. The neighbor testicle maintains the normal volume relatively long. Those observations are also confirmed by means of pathological examinations of the bioplates derived from both testicles, which indicates significantly further advanced recurrent changes in the gonad on the side of the varices. The surgical correction is considered the most appropriate fashion, while the increasing of the testicle volume – the sensitive and objective index of the treatment's good result. However, the problem of

defining limit values, which could be an indication to the surgical treatment of that disease, so as the evaluation of correlation of the testicle volume changes and the sperm composition disorder requires further experiments. Those questions require moreover carefully planned prospective experiments on the big populations of the patients.

### Conclusions

1. The application of the laparoscopic method in the patients with left seminal cord varices causes an increase of the testicle volume on the operated side.
2. The ultrasound evaluation of the testicle volume is safe for the patient and simple for the physician diagnostic method.

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