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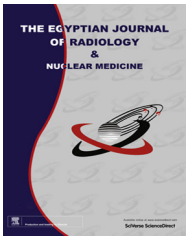

ORIGINAL ARTICLE

Preoperative sonographic and Doppler parameters predictors of semen analysis improvement after unilateral varicocelectomy

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KEYWORDS

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Varicocele;
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Abstract *Objective:* To assess the sonographic and Doppler parameters predicting varicocelectomy outcome.
Methods: This study included 86 infertile patients with abnormal semen analysis. All patients had preoperative ultrasound and color Doppler to calculate testicular volume, pampiniform vein caliber and duration of reflux in the dilated veins during sustained valsalva maneuver. The patients underwent unilateral varicocelectomy and had semen analysis 6 months after operation, improvement index of the semen analysis was calculated.
Results: The patients were classified into 2 groups: Group 1: 58 patients with normal-sized testes, and group 2 included 28 patients with subnormal testes (8–12 cm^3), in the first group, the patients with improvement index >0.5 were 26 (44.8%), the group with subnormal testicular volume showed improvement in 5 patients (17.8%) , the difference between the two groups was statistically significant <0.05. There was a significant positive correlation between the degree of reflux preoperatively and the improvement index ($P < 0.001$), also there was a positive correlation between the vein diameter and the improvement index ($P = 0.03$).
Conclusions: The best preoperative sonographic parameters of success of unilateral varicocele repair are the presence of normal-sized testes, high grade reflux, and to lesser degree large vein diameter.

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1. Introduction

Varicocele is a dilatation of the pampiniform venous plexus and the internal spermatic vein. It is detected in approximately 15–20% of the general male population, with the prevalence increasing to 40% in infertile men (1,2). The presence of a varicocele has been associated with impaired testicular function,

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often causing abnormalities in semen parameters, including sperm count, motility and morphology, testis size and histology, blood hormone levels and pregnancy rates (3,4). The most likely mechanism is an elevation of testicular temperature due to an impaired countercurrent heat exchange mechanism. In addition, varicocele inhibits Sertoli cell function and decreases androgen secretion by Leydig cells, causing premature, age-related hypoandrogenism (5).

Color Doppler ultrasound (CDU) is the preferred method for diagnosing varicoceles. CDU defines the anatomic and physiologic aspects of varicoceles by measuring the size of the pampiniform plexus and blood flow parameters of the spermatic veins (6,7).

Several authors have reported significant improvement of semen parameters after surgical varicocelectomy in infertile men (8,9). On the other hand several studies have demonstrated that improvement of semen parameters is not always achieved by varicocelectomy (10).

Because the outcome and prognosis after varicocelectomy are still controversial, and there are many preoperative parameters that determine the probability of success of the operation, there is a great need for research to improve preoperative selection of patients. Some of these parameters are general, related to the patient's age and clinical condition; some of them are related to semen analysis; and others are local parameters related to the testes and the varicocele itself. This study was done to assess the sonographic findings that could predict the outcome of varicocele repair in the treatment of male infertility/subfertility related to varicocele.

2. Materials and methods

From October 2011 to March 2013, 86 men with unilateral varicocele were included in the study. Patient's age ranged from 22 to 39 years, with a mean age of 27.4 years. Inclusion criteria were infertile men with abnormal semen analysis. Patients with infection, history of genitourinary trauma, chromosomal disorders and bilateral varicocele were excluded from the study. Written consents were taken from all patients after thorough explanation and understanding the study.

All patients underwent preoperative semen analysis twice, their preoperative semen analysis showed oligospermia, asthenospermia, or oligoasthenospermia. All patients underwent varicocele repair by a low ligation technique using the subinguinal approach performed by a senior urologic surgery consultant under general or spinal anesthesia according to the anesthetist's preference after routine preoperative assessment and written patient consent. Semen analysis was repeated after 6 months, and improvement index was calculated for all patients. Improvement index in sperm count, for example, was calculated by dividing the difference between postoperative and preoperative sperm concentration by preoperative sperm concentration. Good outcome was defined as improvement index of more than 0.5, and poor outcome was defined as improvement index of <0.5.

CDS examination was performed using GE E8 color Doppler ultrasound with the patients in supine position. Examination was performed at the level of the inguinal canal and just over the superior-lateral edge of the testis or posterior-lateral edge in large varicoceles. The maximum venous diameters in the testicular veins were measured both during rest and Valsalva's maneuver (maximal abdominal strain against a closed epiglottis just after a deep inspiration) using a 7.5 MHz linear array transducer. Veins that were larger than 2 mm in diameter at rest were considered to be a varicocele. If reflux was present, the duration of Valsalva's maneuver was measured in spectral analysis.

The degree of venous reflux was quantified by measuring the duration of venous reflux as follows: brief reflux lasted less than 1 s; intermediate reflux lasted from 1 to 2 s; and permanent reflux lasted longer than 2 s (11).

The Pearson correlation coefficient test, spearman's rho test and independent *t* test were used for the comparison of continuous variables. Chi square test and Mann Whitney *U* test were used to compare categorical variables. $P < .05$ was considered to indicate a statistically significant difference.

Table 1 Relationship between testicular volume and post operative improvement in the study.

	No	No of improved patients post varicocelectomy	%	*P* Value
Normal testicular volume (>12 cc)	58	26	44.8	<0.05
Subnormal testicular size (8–12 cc)	28	5	17.8	

Chi square test.

Table 2 Relationship between the vein diameter, degree of reflux and post varicocelectomy improvement in semen quality in patients with normal testicular volume.

	No		No	No of improved patients post operative	%
Vein size 2–3 mm	16	Reflux >2 s	7	3	42.8
		Reflux 1–2 s	5	1	20
		Reflux <1 s	4	1	25
3–4 mm	24	Reflux >2 s	14	8	57.1
		Reflux 1–2 s	7	3	42.8
		Reflux <1 s	3	1	33.3
>4 mm	18	Reflux >2 s	13	7	53.8
		Reflux 1–2 s	4	2	50
		Reflux <1 s	1	–	0