Thai Journal of Obstetrics and Gynaecology
June 1996, Vol. 8, pp. 135-141

REPRODUCTIVE SCIENCE

Varicocele in Men with Infertility Evaluated by Scrotal Physical Examination and Scrotal Ultrasonography : Its Correlation with the Sperm Count

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ABSTRACT

Objective To investigate 1) the correlation of scrotal physical examination comparing to scrotal ultrasonography in the detection of varicocele in men with infertility, depicting scrotal ultrasonography as the gold standard, 2) the clinical significance of ultrasound diagnosed varicocele by comparing incidence of oligospermia in patients with and without varicocele.

Design A prospective study.

Setting University Hospital.

Subjects A total of 110 men with infertility more than 1 year duration who were referred to the infertility clinic for the investigation and treatment of infertility.

Main outcome measures Sensitivity, specificity, positive predictive value, negative predictive value of scrotal physical examination in the detection of varicocele in men with infertility depicting scrotal ultrasonography as the gold standard and incidence of oligospermia in patients with and without varicocele.

Results The scrotal physical examination in the detection of clinical varicocele has sensitivity of 73.90%, specificity of 90.60% and positive predictive value of 85.00% with negative predictive value of 82.80%. Of total 110 patients, 64 had normal ultrasound scans. Twenty-two of 64 (34.38%) were found to have oligospermia. Among 46 patients with varicoceles diagnosed by ultrasonography, 26 (52.56%) were found to have oligospermia. Significantly, more patients with varicoceles were found to have oligospermia (P = 0.034).

Conclusion Physical examination of the scrotum which is a noninvasive,inexpensive, and convenient technique remains an appropriate screening test with reasonable accuracy but ultrasound examination should be used in doubtful cases especially those with difficulty to detect this condition by scrotal physical examination or those in whom we suspect subclinical varicoceles. Significantly more patients with varicocele were found to have oligospermia than those without varicocele.

Key words : varicocele in infertile men, scrotal physical examination, scrotal ultrasonography, oligospermia

Varicocele is an abnormal tortuosity and dilatation of the veins of the pampiniform plexus within the spermatic cord. It is approximately found in 30-40% of men seeking clinical evaluation for infertility.[1-3] The relationship between varicocele and male subfertility has been recognized since the late 19th century.[4] It has a potential of reducing all seminal parameters[5] which can be improved by surgical varicocele repair.[3,6] Given the association between varicocele and male subfertility, as well as the potential for enhanced fertility following varicocele repair, considerable attention has been devoted to improving techniques for the diagnosis of this lesion. The most common method of identifying varicocele is physical examination. This technique is convenient, inexpensive and noninvasive. Physical examination, however, is somewhat subjective and is dependent on the experience of the examining physician. Additionally, it has suggested that small varicoceles not detectable by physical examination alone (subclinical varicoceles) may have a role in subfertility and merit correction.[7,8] Therefore, physicians have used various diagnostic techniques other than physical examination to find these small varicoceles.

Adjunctive tests that have been used for diagnosis include venography,[9] radioisotope scanning,[10] thermography,[11] and Doppler ultrasound.[12] All these methods have significant disadvantages, however, and none is used universally. Real-time sonography is a possible alternative technique for diagnosis with the advantage of direct visualization of dilated vessels. Given suitable scanning equipment, the examination is fairly simple to perform, quick, and noninvasive. Since scrotal sonography has proved invaluable to detect many intrascrotal abnormalities and has the unique ability to visualize the testicle and surrounding structure,[13-15] we have decided to investigate 1) the correlation of scrotal physical examination comparing to scrotal ultrasonography in the detection of varicocele in men with infertility, depicting scrotal ultrasonography as the gold standard, 2) the clinical significance of ultrasound diagnosed varicocele by comparing incidence of oligospermia in patients with and without varicocele.

Materials and Methods

From September 1989 to March 1991, a total of 110 men with infertility more than 1 year duration were referred to our infertility clinic at The Royal Free Hospital for the investigation and treatment of infertility. The age range of the patients was 19-41 years (mean age 29.5 years). All patients underwent both scrotal examination and scrotal ultrasound. Scrotal ultrasound was

performed immediately after the scrotal physical examination. Scrotal examination was performed with the patient in the standing position before and during Valsalva's maneuver. Patients were assessed for the presence of varicocele as well as testicular size and consistency. All varicoceles identified at physical examination were classified as grade 1 (palpable only during Valsalva's maneuver), grade 2 (palpable without Valsava's maneuver), grade 3 (visible without the need for palpation).[16]

The instrument used for scrotal ultrasound was a high-resolution real-time scanner (Diasonics) with a frequency of 7.5 MHz. Examination was performed on both sides at rest and during Valsalva's maneuver in both supine and upright positions. Testicular length, width and anterior-posterior dimension were measured. The number of veins and the maximum diameter of the largest vein were evaluated.

In the supine position, the scrotum was supported by a towel wrapped around the upper thighs. Imaging was performed by direct contact of the transducer with the scrotal skin. Because the scrotal contents were easily deformed by the transducer, copious amounts of acoustic gel were used to facilitate scanning. The examiner scanned the scrotum by supporting the testicle with one hand while holding the transducer with the other hand. The vessels were scanned on each side from the hilum of the testicle to the scrotal neck. This was accomplished by rotating the testicle slightly in its long axis to bring the vessels to the lateral aspect of the scrotum and directly beneath the face of the transducer. Imaging through the testicle was thus avoided and proximity of the vessels to the transducer increased. Scanning then was performed with the patient upright and the examiner kneeling in front of the patient.

All patients were required to stand for 2 minutes before beginning scanning in the upright position to increase hydrostatic pressure within the veins. A varicocele was considered to be present by scanning if 2 or more veins could be identified, with at least 1 vein having a diameter of 3 mm. or greater.[7] All the patients had 2 semen analysis performed from the initial visit spaced at least 1 week apart. Semen samples were evaluated in accordance with WHO standards. A subject was considered to have oligospermia if he had a sperm count of less than 20 milliom/ml. All data are expressed as percentage. Statistical comparisons were expressed in term of sensitivity, specificity, positive predictive value, negative predictive value, and chi-square test.

Results

Of 110 men with infertility, clinically palpable varicocele was found in 40 patients (36.36%). Fifteen were of grade 1, nineteen of grade 2 and four of grade 3. Of these 40 patients, 32 (80%) had left-sided varicocele, 2 (5%) had right-sided varicocele and the remaining 6 patients (15%) had bilateral varicoceles. Of the 40 patients with clinically palpable varicoceles, 34 (85%) had the diagnosis confirmed by scrotal ultrasound. Of these 34 patients who had varicocele diagnosed by scrotal ultrasound, 17 (50%) had varicocele on the left side, 1 (2.94%) had varicocele on the right side and the remaining 16 patients (47.07%) had bilateral varicoceles. (Table 1) Seventy patients in whom initial scrotal physical examination failed to detect varicocele, 12 (17.14%) were found to have varicocele by scrotal ultrasound, all of which were on the left side. This group of patients was classified as subclinical varicocele. Statistical analysis revealed that scrotal physical examination in the detection of clinical varicocele has sensitivity of 73.90%, specificity

Table 1. The outcome of scrotal physical examination (SPE) and scrotal ultrasonography in the detection of varicocele

	clinical diagnosis by SPE	ultrasound diagnosis
left-sided	32 (80.00%)	17 (50.00%)
right-sided	2 (5.00%)	1 (2.94%)
bilateral	6 (15.00%)	16 (47.06%)
Total	40	34 (85.00%)

Table 2. Correlation between scrotal physical examination (SPE) and scrotal ultrasonography (U/S) in the detection of varicocele

		Scrotal U/S		Total
		Positive	Negative	
SPE	Positive	34	6	40
	Negative	12	58	70
Total		46	64	110

Sensitivity	73.90%
Specificity	90.60%
Positive predictive value	85.00%
Negative predictive value	82.80%

Table 3. Comparison between ultrasound diagnosed varicocele and oligospermia

	Varicocele diagnosed by U/S		Total
	Positive	Negative	
Patient with oligospermia	26	22	48
Patient without oligospermia	20	42	62
Total	46	64	110

Chi-square test = 4.775

P = 0.0344

of 90.60% and positive predictive value of 85.00% with negative predictive value of 82.80%. (Table 2)

Of total 110 patients, 46 had normal ultrasound scans, 22 of 64 (34.38%) were found to have oligospermia. Fourty-six patients who had ultrasound diagnosed varicoceles 26 (52.56%) were found to have oligospermia. Significantly more patients with varicoceles were found to have oligospermia (P = 0.034, Table 3). Of the 46 patients with varicoceles, 30 had bilateral varicoceles. Half of these patients had oligospermia. In the remaining 16 patients who had unilateral varicocele 11 (68.75%) were found to have oligospermia. More patients with bilateral varicoceles were found to have oligospermia than those with unilateral varicocele but the difference was not statistically significant (P = 0.363).

Discussion

Varicocele has been implicated as a cause of male infertility resulting from abnormal spermatogenesis. Various mechanisms have been suggested to account for this testicular dysfunction which included 1) inhibition of the thermoregulatory system of the pampiniform plexus with a noted increase in scrotal temperature[17,18] 2) peritesticular blood stasis leading to anoxic tissue destruction and/or impairment of epididymal function.[18] In this study the incidence of varicocele is 36.36%. Other studies showed the incidence of 30-40% in men seeking clinical evaluation for infertility.[1-3] Detection of this condition in the clinical practice is important as it is commonly found in men seeking clinical evaluation for infertility and also it is the most common surgically corrected cause of male infertility. Improvement in seminal parameters is demonstrated in approximately 50-70% of patients following surgical varicocele repair. Conception rate after successful operation is 40-50%[1,3,6]

The usual standard method of detection is scrotal physical examination. Although it is convenient, noninvasive and inexpensive its disadvantage is possible false positive and false negative results and consequently other techniques have been tried such as venography,[9] radioisotope scanning,[10] thermography,[11] and Doppler ultrasound.[12] All of these have their significant disadvantages and limitations.

At present ultrasonography is playing an increasing role in the clinical practice especially high-resolution model which has high ability to visualize the small structure therefore it can provide an alternative to other tests to detect this condition.[7,19]

From this study using scrotal ultrasound as the gold standard, of 70 patients whose scrotal physical examinations were normal 12 had varicocele detected by ultrasound (false negative 17.14%). All of them had left-sided varicocele. On the other hand, of the 40 patients diagnosed to have varicocele by scrotal physical examination 34 had diagnosis confirmed by ultrasound (false positive 15%). Bilateral varicoceles were found by ultrasound in 10 patients whom only unilateral varicocele was detected by scrotal physical examination. Therefore, clinical palpable unilateral varicocele may have a risk of misdiagnosis of bilateral varicoceles. Statistical analysis revealed that scrotal physical examination in the detection of clinical varicocele has sensitivity of 73.90%, specificity of 90.60% and positive predictive value of 85.00% with negative predictive value of 82.80%. We conclude that scrotal physical examination which is a nonivasive, inexpensive, and convenient technique remain an appropriate screening test with reasonable accuracy but ultrasound examination should be used in doubtful

cases especially those with difficulty to detect this condition by scrotal physical examination such as subjects with active reflexes, thickened spermatic cords, tight scrotums or those in whom we suspect of subclinical varicoceles. Recent study by Meacham and colleagues[20] attempting to find the incidence of varicoceles in the general population evaluated by physical examination, gray scale sonography and colour Doppler sonography found colour Doppler sonography to be more sensitive than physical examination and gray scale sonography as colour Doppler sonography has the theoretical advantage of allowing direct demonstration of reversed flow in the testicular vein. Colour Doppler sonography may identify a group of patients as having varicoceles who have a normal physical examination and negative gray scale sonographic evaluation. The only disadvantage of colour Doppler sonography is the extremely high cost of the machine which makes it not feasible to be available like ultrasound machine in most general clinical practice.

This study shows that finding of oligospermia increases significantly in men with infertility who were found to have varicocele comparing to those without varicocele. Reduction of semen quality was apparent in approximately 50 % of the men with varicoceles.[1,4] Similar to other studies, our results show 56.52% (26 of 46) of patients with varicoceles had oligospermia. Our findings and others indicate that many varicoceles are not associated with abnormal semen analysis. We suggest that not all varicoceles necessitate surgical correction. The presence of detectable varicocele associated with abnormal semen analysis in an infertile couple should be an appropriate indication for treatment especially varicocele repair after the female partner has been completely evaluated.

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