

The Value of Routine Scrotal Color Doppler Ultrasonography in the infertile male

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الخلاصة

التقييم السريري لمحتويات كيس الصفن لدى مرضى العقم غالبا ما تعتمد على الفحص السريري حيث ان فحص الدوبلر الملون بالموجات فوق الصوتية لا يجرى بشكل روتيني لهم مما قد يؤدي الى عدم تشخيص الكثير من الحالات المرضية و التي تكون سببا مباشرا للعقم الذي يعانون منه. في بحثنا هذا قمنا بتقييم دور الفحص بالموجات فوق الصوتية لكيس الصفن و محتوياته كفحص روتيني لجميع المرضى الذين يعانون من العقم مقارنة مع النتائج بتلك التي نحصل عليها بواسطة الفحص السريري التقليدي. لقد شمل البحث 314 شخصا مصابا بالعقم حيث تم كشف حوالي 374 مشكلة مرضية لديهم بواسطة فحص الموجات فوق الصوتية في حين ان 31% من هذه المشاكل لم يتم كشفها بواسطة الفحص السريري و التي هي غالبا ما تكون دوالي الخصية من الدرجة البسيطة، قيلة مائية، اكياس البربخ، اورام الخصية الصغيرة اضافة الى ان الفحص السريري لا يمكنه التنبؤ بطبيعة نسيج الخصية. الفحص الروتيني بواسطة الامواج فوق الصوتية لكيس الخصية لدى مرضى العقم هو ذو قيمة عالية في تحديد الكثير من الامراض التي لا يمكن للفحص السريري الكشف عنها.

Abstract

Clinical assessment of scrotal contents in patients with infertility has relied mainly on physical examination. Color Doppler ultrasonography (US) is generally not performed as a routine examination. However, physical examination might miss many abnormalities readily detected by US, including testicular tumor and testicular microlithiasis (TM).

We assessed the value of scrotal color Doppler ultrasonography as a routine examination in infertile men compared with findings by physical examination.

Scrotal Color Doppler ultrasonography was performed in 314 infertile men with a mean age of (25±5.4) years to detect intrascrotal abnormalities. Findings were compared with those of physical examination.

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Intrascrotal abnormalities were detected by ultrasonography in 86.6% of patients. Of 374 abnormalities, 31% were undetected by physical examination. Left varicocele was found in 234 patients (74%); testicular microlithiasis in 10 (3.1%); epididymal cyst in 23 (7.3%); right varicocele in 7 (2.2%); and testicular cysts in 2 (0.6%). One occurrence (0.3%) was found for testicular tumor, hypoechoic small testicles in 11 (3.2%), and hydrocele in 45 (14.3%). Compared to ultrasonography, sensitivity in detecting left varicocele by physical examination was 77%. Sensitivity of physical examination in detecting left varicocele compared with to US was decreased as grade of left varicocele decreased.

The routine Color Doppler ultrasonography is valuable for diagnosing scrotal abnormalities in infertile men, frequently detecting non-palpable lesions that were missed by physical examination.

Key words: Ultrasonography, infertility, varicocele, testicular microlithiasis.

Introduction

Clinical assessment of scrotal contents in patients with infertility has relied mainly on physical examination. For example, varicocele, the most common abnormal finding in infertile men, is typically diagnosed by physical examination, yet, poor accuracy of palpation has been reported⁽¹⁻⁵⁾. Reflux in the testicular veins play a crucial role in the diagnosis of varicocele and the main aim of this study was to evaluate the incidence and the sonographic features-duration and velocity-of reflux in testicular veins of infertile men using color duplex sonography. Since US provides a non invasive diagnostic method without side effect on the testes, it can be applied without any risk to the patients⁽⁶⁾.

Moreover, because color Doppler ultrasonography is not performed as a routine examination, physical examination might miss many abnormalities readily detected by US, including testicular tumor and testicular microlithiasis. In addition to testicular atrophy, poor semen quality and cryptorchidism, ultrasonographic abnormalities

in testicular echogenicity associated with infertility are reported to be risk factors for testicular tumor⁽⁷⁻⁹⁾.

Therefore ,routine use of US in infertile men could disclose lesions such as occult testicular tumor and TM.

In this study we present the results of the scrotal ultrasonographic evaluation of 314 infertile patients attending our infertility clinic.

The aim of this study is to assess the value of scrotal color Doppler ultrasonography as a routine examination in infertile men.

Patients and Methods

The present study included 314 infertile men (mean age ±SD 25±5.4 years; range, 20-56) evaluated between October 2010 - April 2011.All patients had shown abnormal semen quality conducted according to World Health Organization criteria (Table-1) ⁽¹⁰⁾. Aside from infertility problems they had neither physical complaints nor acute health problems.

Table-1: Normal seminal fluid analysis values according to WHO criteria.

Characteristic	Normal value
Concentration, million/ml	□ 20
Motility %	□ 50
Forward motility %	□ 25
Normal morphology %	□ 50

High-frequency US using 7.5MHz transducer (Siemens sonoline sienna ,Erlangen ,Germany) was performed as a routine examination to detect intrascrotal lesions ,including varicocele ,testicular atrophy ,TM ,hydroceles ,and infections.

Venous diameters of the pampiniform plexus were measured in supine positions before and during a Valsalva maneuver; the maximum diameter obtained was recorded for evaluation. Varicocele was diagnosed when two or more tortuous dilated veins were seen ,reflux flow persisted for longer than 1 second according to Doppler color change. Varicoceles were classified as: grade 1,more than 2mm diameter; grade 2,2-4mm diameter and grade 3,more than 4mm diameter of pampiniform venous plexus ⁽¹¹⁾.

TM was defined as five or more randomly distributed non shadowing hyperechogenic foci smaller than 3mm in a single US image⁽¹²⁾.

Testicular size was measured and calculated with an integrated program⁽¹³⁾.The caput epididymidis was screened above the testis and the greatest possible diameter was measured in frontal view. Structural analysis of epididymidis and testes included search for inhomogeneity, hypo-and/or hyperechoic areas.

For the statistical evaluation student's t-test was performed applying the statgraphics statistical analysis package (GraphPad InStat 3,USA).Mean and standard deviation are given in the text.

Results

Of 314 infertile patients, 272(86.6%) had intrascrotal abnormalities (counting right varicocele associated with left varicocele as one lesion; namely, left varicocele).Total intrascrotal abnormalities detected by US was 333 abnormalities,103 of these US findings (31%) had escaped detection by clinical examination. An overview of the sonographic findings is shown in Table-2 and the sensitivity of US in detecting intrascrotal abnormalities compared with clinical examination is shown in Table-3.Details are described in the following paragraphs.

Table-2: Scrotal abnormalities detected by scrotal ultrasonography in 314 infertile men:

Abnormalities	Number of cases(%)
Left varicocele	234(74)
Testicular microlithiasis	10(3.1)
Epididymal cyst	23(7.3)
Right varicocele	7(2.2)
Hypoechoic small testicles	11(3.2)
Unilateral testicular cyst(Fig.4)	2(0.6)
Hydrocele	45(14.3)
Testicular tumor	1(0.3)
Total	333

Table-3: Sensitivity of scrotal US findings compared with clinical examination:

	Abnormalities by US	Escaped by clinical examination	% of escaped abnormalites
Left varicocele	234	54	23
Right varicocele	7	4	57
Epididymal cyst	23	8	34.7
Hydrocele	45	13	29
TM	10	10	100
Hypochoic testis	11	11	100
Testicular cyst	2	2	100
Testicular tumor	1	1	100
Total abnormalities	333	103	31

Varicocele

Two hundred thirty four patients had a left varicocele. Of these, 180 varicocele (77%) had also been diagnosed by palpation while fifty-four small varicocele (23%) were only diagnosed by sonography and Doppler sonography. Sensitivity of physical examination in detecting left varicocele compared to US was decreased as grade of left varicocele decreased (grade 1 ,55%;grade 2 ,84%;grade 3,97%)(Table-4).To establish a sonographic standard the vascular diameter of at least two plexus pampiniform veins was measured(Fig.1). One hundred thirty five (57.6%) of 234 left hemiscrotum and three (42%) of 7 right hemiscrotum showed reflux on Valsalva maneuver. The incidence of reflux induced by Valsalva's maneuver was not quite significant between the left side and the right (p =0.0684).

Table-4: . Sensitivity of physical examination in detecting left varicocele compared to US

	Number by US	Detected clinically	%
Grade I	88	48	55
Grade II	68	57	84
Grade III	78	75	97
	234	180	

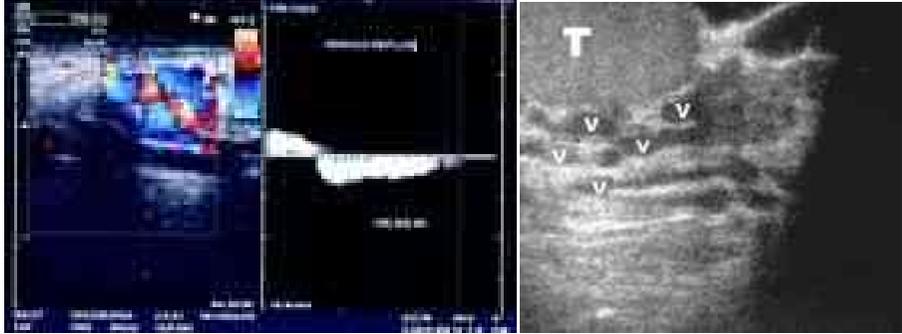


Figure 1:a:More than two vascular channels and reflux flow were evident by color change and increased retrograde flow in Valsalva maneuver.b:Venous diameters in the pampiniform plexus were measured during a Valsalva maneuver.

Epididymal cysts /spermatoceles

Twenty-three patients had a single cystic area in either left or right caput epididymidis(Fig.2). In 15 of the cases (65.2 %) a cyst or spermatocele was diagnosed by palpation. The mean size was 8.5 ± 3.6 mm.

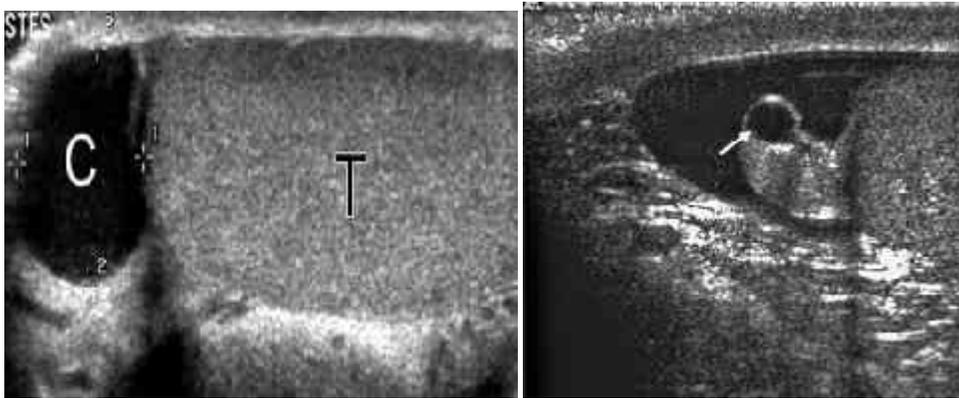


Figure 2:Epididymal cyst.A unilocular cystic lesion seen in the epididymal head.

Hydroceles

Forty-five hydroceles were diagnosed sonographically. They were clinically suspected in 32 of these cases (71.1%).Smaller hydroceles were only diagnosed by sonography(Fig.3). Twenty-four hydroceles occurred in combination with a varicocele or spermatocele.



Figure 3: Moderate amount of free hydrocele.

Hypo echoic testes

A hypoechoic echo structure of one or both testes was found in eleven patients. One of them was hypogonadal.

Testicular microlithiasis(TM)

Ten patients (3.1%) had TM detected only by US(Fig.5) .TM was bilateral in eight patients and unilateral in two. Of these patients ,6 had varicocele and one had history of mumps orchitis.

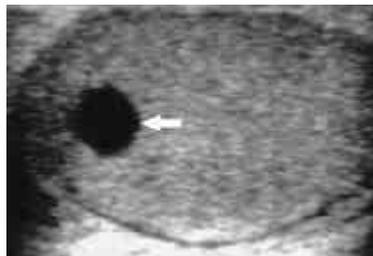


Figure 4: Testicular cyst.

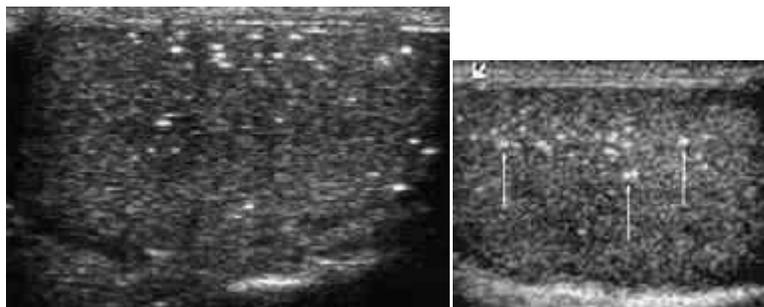


Figure 5: Multiple punctate hyperechoic non shadowing areas seen throughout the testis (microlithiasis)

Discussion

Physical examination has been the mainstay in evaluation of scrotal contents in patients with infertility⁽¹⁴⁾. US is performed mainly for patients with inconclusive findings on palpation involving anatomic features that impede palpation of scrotal contents⁽¹⁴⁾. US has had only limited use in infertile patients without such impediments to examination^(5,15-18). However, US provides a more accurate estimate of testicular volume than an orchidometer, and can also characterize the echogenicity of the testicular parenchyma, where irregularities might reflect changes in spermatogenic activity⁽¹⁹⁾.

In addition, previous studies using US as a routine examination in men with infertility demonstrate 38 to 57% incidence of intra-scrotal abnormalities, including many non-palpable lesions^(5,15-17). Pierik et al. report that 67% of intra-scrotal findings in a series using US were not evident on palpation⁽⁵⁾. In our present study, intra-scrotal US abnormalities were found in 86.6 % of 314 men with infertility, whereas 92 (33.8%) of these 272 findings were not evident on palpation. Intra-scrotal abnormalities not detected by physical examination in the rolled study was 103 of 333 i.e. about 31%.

As in previous reports, varicocele was the most frequent finding; however, other lesions including TM, epididymal cysts were also reported in those studies^(5,15-17).

An improved detection rate of varicoceles by use of sonography compared with palpations has been demonstrated by McClure & Hricake (1998)⁽²⁰⁾. A range of vascular diameters from 7-20mm was found by Rifkin et al (1985) in patients with a palpable Varicocele⁽²¹⁾. In our study dilated veins with vascular diameters greater than 2mm were confirmed as varicoceles by doppler sonography. Comparison with palpation shows that only small varicoceles with single dilated vessels could not be palpated and, therefore, seems to be the domain of sonography. Since it has been shown that decreased fertility may be due to even small varicoceles (Narayan et al.1981), sonography offers early detection of this fertility-influencing condition⁽²²⁾.

Testicular microlithiasis, noted in 10 patients in our study (3.1%), six of them had varicocele, one had epididymal cyst and one had a history of mumps orchitis. Previous US studies showed incidence of TM ranging from 0.6-9.0% in healthy population and 0.8-20 %⁽²³⁻²⁶⁾ in subfertile populations and 16.9-48.3% in patients with testicular tumors. Therefore, TM was especially frequent in the presence of testicular tumors, and might be a marker for risk of testicular tumor. In addition, infertility was associated with TM⁽²⁷⁻²⁹⁾. However, the natural history of TM is not well defined, and data are insufficient to implicate TM as a premalignant condition. However, several patients have been reported to develop a testicular tumor during follow up of TM^(23, 30-31). This suggests that TM might be considered a premalignant condition unless a benign context for TM can be established in a given case.

Subfertility is reported to be risk factor for testicular tumor^(7,8). Studies routinely using US in infertile populations show tumor incidence of 0.5-1.4%, higher than that seen in general population^(5,16-18). In the present study, a hyperechoic tumor about 6mm in diameter was detected in only one patient (0.3%). An incidental lesion might be asymptomatic as well as non-palpable, with no elevation of tumor markers^(5,16-18).

Testicular cysts are not rare in infertile men; incidence in previous reports was 0.7-1.1%. This lesion was diagnosed only by US in 0.6 % of patients in the present study. Testicular cysts required careful follow up because they might incorporate a teratoma. The incidence of epididymal cysts was greater, being 7.3 % here as well as 5.2 and 7.6% in previous reports. Overall, the clinical significance of epididymal cysts is uncertain, as was noted in previous reports⁽⁵⁾.

Forty-five of our patients (14.3%) revealed a hydrocele. Before US was available diaphanoscopy was the method of choice to diagnose a hydrocele. Today, US appear to be the non invasive diagnostic procedure of choice for evaluation of hydrocele. Palpation is often difficult when the scrotum is tense and swollen and diaphanoscopy may not reveal small hydroceles as some were also overlooked by

palpation. In addition, the areflexive area of a hydrocele provides good insight of scrotal contents (Teruey et al.,1981)⁽²³⁾.

Conclusion

Our present study demonstrates the benefit of scrotal color doppler ultrasonography in the detection of many intrascrotal abnormalities that were missed by physical examination, including testicular tumors, epididymal and testicular cysts, varicoceles and hydroceles. The high incidence of abnormalities detected by US indicate that ultrasonography should be used in a routine basis in the infertility clinic not only for the determination of testicular volumes and varicocele but also for diagnosis of intrascrotal abnormalities.

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