

THE INCIDENCE OF SCROTAL VARICOCELE AS FOUND IN INFERTILE PATIENTS BY CLINICAL EXAMINATION, B-MODE AND COLOR DOPPLER ULTRASOUND.

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Abstract

Background: Considerable attention has been made for improving the diagnosis of varicocele none invasively by color Doppler ultrasound due to the association between it and male sub fertility and the potential for enhanced fertility after varicocelectomy. The color Doppler ultrasound diagnostic criteria for varicocele were; a. Dilatation of pampiniform plexus more than 2mm. b. Retrograde flow in the upright position regardless the size of pampiniform plexus.

Objectives: To assess the value of color Doppler ultrasound compared to clinical examination and B.mode ultrasound in diagnosis of scrotal varicocele.

Methods: A cross sectional study was done on one hundred infertile or hypo fertile patients with clinical suspicion of varicocele who were examined by B. mode and color Doppler US for confirmation or exclusion of the diagnosis or to exclude recurrence after varicocelectomy.

Results: Color Doppler US including B.mode facility increased the incidence of false negative clinical cases by 22% which is very significant and was important to correct the diagnosis of false positive clinical cases in 6% of patients , they were highly valuable in confirming the clinical suspicion of varicocele in 62%.Color Doppler US was highly essential to detect subclinical cases in 5% and detecting recurrence after varicocelectomy in 37% of postoperative cases.

Conclusion: Color Doppler Ultrasound became the standard reference non-invasive imaging modality for diagnosis of scrotal varicocele and following patients after varicocelectomy.

Keywords: Varicocele, B.mode ultrasound, Color Doppler imaging (CDI).

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Introduction

The most common method for identifying varicocele is physical examination, which is convenient, inexpensive and non-invasive. Clinical signs of varicocele are: scrotal swelling, infertility, and abnormally warm scrotum which are due to increased blood flow^[1]. Palpable varicocele has been classified clinically in three grades^[2].

Grade I: Varicocele is palpable only during Valsalva maneuver.

Grade II: Varicocele is palpable without Valsalva maneuver.

Grade III: Varicocele is visible and palpable without Valsalva maneuver.

However, physical examination is subjective and is dependent on the experience of examining physician and its limitation was demonstrated in a multicenter study by WHO^[3].

It has been suggested that small varicocele not detectable by physical examination alone (subclinical varicocele) may have a role in sub fertility and merit correction^[4,5]. Patients with fertility problems may be referred for scrotal ultrasound examination to evaluate testicular size and parenchyma texture, to assess epididymal integrity and to evaluate the presence of subclinical varicocele^[6].

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Ultrasound and /Doppler criteria for diagnosis of varicocele are dilatation of veins of pampiniform plexus $> 2\text{mm}$ ^[7,12] and retrograde flow during Valsalva and/or in the up right position regardless the size of pampiniform plexus^[13].

Varicocele occurs in 10-15% of adult men^[9,10], and Meacham et al stated that the incidence of varicocele in the general population is 13.4% and in patients with hypo fertility 37%^[14]. They are more common on the left side^[7,9,12,15,16].

There are two types of varicocele: primary and secondary. Primary varicocele is idiopathic and occurs between the ages of 15 and 25 years. They are the most common correctable cause of infertility^[12]. The primary varicocele is believed to be due to incompetent valves in the internal spermatic veins^[12].

Veins of pampiniform plexus normally have a diameter between 1-2mm; they change little in size with the patient in erect position, with abdominal compression or with Valsalva maneuver.

The primary type of varicocele may disappear with the patient in supine position therefore CDI should be performed in supine and erect position with Valsalva maneuver to detect varices^[18]. Secondary varicocele may result from elevated pressure in the internal spermatic vein produced by tumor, hydronephrosis or muscle strain^[12,16], they do not disappear with patient in supine position^[12], and in this situation the abdomen and pelvis should be scanned carefully to exclude a mass compressing the spermatic veins on the involved side^[9,15].

Methods

A cross sectional study was done on one hundred infertile or hypofertile male patients proved by two seminal fluid analysis and referred by the urologist with clinical suspicion for varicocele and were examined by B-mode and color Doppler ultrasound for confirmation or exclusion of the diagnosis during the period from June 2001 to Nov.

2002 using Siemens versapro color Doppler ultrasound machine.

The physical examination was done by a urologist and was performed in supine and standing position before and during Valsalva maneuver, to give the clinical impression before knowing the results of ultrasound examination.

All patients were selected depending on the history and at least two abnormal seminal fluid analyses in accordance to WHO seminal fluid normal values^[19] which are volume = 1.5-5cc, concentration ≥ 20 million/cc, motility $\geq 50\%$, and morphology $\geq 50\%$.

Values less than those mentioned above were regarded as abnormal. Laboratory personnel performing the seminal fluid analysis were unaware of the results of physical and ultrasound examination.

Once the physical and seminal fluid examinations were completed, the patient was referred for color Doppler ultrasound examination using linear high-resolution (7.5 MHz) transducer, initially in supine position and the patient was asked to hold his penis suprapubically.

For each patient the following steps were carried out by color Doppler ultrasound examination:-

1. Size of each testis: Testicular atrophy was diagnosed when testicular size was less than 3x2 cm depending on Feld and Hricak Criteria^[7,9].
2. Parenchyma texture, for exclusion of focal lesion.
3. The epididymes for any sign of inflammation, epididymal cyst or spermatocele.
4. Identification of pampiniform plexus by B-mode and color Doppler ultrasound to assess their size accurately in supine and erect positions.
5. Detection of reversed flow in pampiniform plexus using color Doppler ultrasound in supine and erect positions with Valsalva maneuver.

Results

One hundred male patients having at least one-year history of infertility, were examined, their age range was 21- 41 years. (Mean = 33 years).

Table 1: The incidence of varicocele by physical examination, B-mode ultrasound and CDI

Type of Examination	RT (%)	LT (%)	Total no. of patients
Physical	8	70	100
B-mode UIS	39	69	
Color Doppler UIS	21	50	

The incidence of patients with negative physical examination and positive B-mode and/or CDI for varicocele was 22%. The total incidence of right varicocele was 8% by clinical examination, 39% by B-mode ultrasound and reversed flow was detected by CDI in 21% of patients. The total incidence of left varicocele was 70% by clinical examination, 69% by B-mode ultrasound and reversed flow was detected by CDI in 50% of patients.

Only 6% of patients had high clinical suspicion for varicocele with no B-mode and / or CDI evidence. The high clinical suspicion for varicocele was supported by B-mode and/or CD ultrasound in 62% of patients, 54% were supported by B-mode only while 36% were supported by CDI ± B.mode ultrasound.

Recurrence of varicocele was diagnosed 6 months-6 years after varicolectomy by reversed flow in 3/8(37%) of patients by CDI. Varicocele was detected on the other side instead of or in addition to the clinically suspected side in 19% of patients by B-mode ultrasound and in 10% of patients by CDI.

CDI was the only clue for subclinical varicocele in the absence of clinical or B-mode ultrasound findings in 5% of patients, all of them were on the left side.

Size of the testes:

Testicular atrophy was found in 11% of patients with infertility, 5% on the right side and 6% on the left side. Bilateral testicular atrophy was present in 4% of patients.

Discussion

CDI is a valuable non-invasive new imaging modality which altered the diagnosis and management of causes of infertility, but it is an operator dependent procedure and needs sufficient experience, i.e., any case with suspicion of varicocele should be examined in supine and standing position as reversed flow which is very important to detect subclinical varicocele may be seen only on standing position with Valsalva maneuver. If such patients are examined in supine position only, the reversed flow may not be detected and these cases may be missed as normal, meanwhile they are also normal on physical examination, therefore, CDI has now become the most reliable test to detect non palpable reflux or confirm questionable reflux^[2].

CDI has superseded ultrasound in measurement of venous diameter which shows too much overlap between competent and incompetent veins, a spermatic veins > 3mm in diameter can be competent while veins less than 2mm can be incompetent, between 2 and 3 mm the overlap is such that B-mode ultrasound is not reliable, so CDI is more sensitive and can detect up to 93% of reflux.

Brief reflux that lasts less than a second is physiological and can be seen in 42-50% of normofertile men without palpable varicocele^[14].

Permanent reflux is non palpable in 20% of cases and lasts more than 2 seconds, it does not correlate with the diameter of spermatic veins^[2], in such cases CDI is very helpful to detect subclinical varicocele. Intermediate reflux is never palpable and lasts 1-2 seconds; it keeps decreasing during

Valsalva and stops before the end of the maneuver.

In this study permanent reflux only was regarded as subclinical varicocele depending on the study of Cornud et al^[20] who found that the Doppler aspect and change after treatment in patients with permanent reflux on CDI are identical to those with palpable varicocele. This standard helped a lot to clarify the controversy over whether or not non palpable reflux should be treated in hypofertile men, as Marsman and Schats stated that only patients with permanent reflux should be treated^[20].

B-mode and CDI were positive in 22% of patients with negative physical examination, which indicates that B-mode plus CDI can increase the incidence of varicocele by 22%, which is very significant and subsequently alters the management of infertile cases.

B-mode and CDI were very useful as a standard reference method to correct the diagnosis of false positive clinical cases, which were not uncommon (6%) in the current study, and this was useful to avoid unnecessary surgery.

B-mode and CDI were highly valuable in confirming the high clinical suspicion of varicocele in 62% of patients, and this is very important for surgery from the medico legal point of view as some of the patients who do not benefit from varicocelectomy claim that the clinical diagnosis was wrong and there was no solid evidence by a documented test, so CDI became solid documented investigation to convince the patient.

B-mode and CDI are very important in follow up of patients after varicocelectomy, especially in patients with persistent poor seminal fluid results. The usual expected findings after successful varicocelectomy are reduction in size of pampiniform plexus to normal with no reversed flow, this should be checked ideally at least 6 months after the operation to give enough time for the pampiniform plexus to decrease in size, this if they were mildly dilated, but if the

pampiniform plexus was markedly dilated it will be found dilated but thrombosed with no upward or reversed flow postoperatively. This group of patients are important for follow up by CDI as it is the only method which ensure successful varicocelectomy with no detectable flow regardless the size while clinically they may be regarded falsely as recurrent varicocele. Therefore B-mode ultrasound alone is not sufficient to diagnose recurrence of varicocele and in this study significant number of patients 3/8(37%) showed recurrence of varicocele depending not only on persistence of large pampiniform plexus on B.mode ultrasound but also the presence of reversed flow on CDI.

The high sensitivity of ultrasound in diagnosing varicocele was essential in detecting it on the other side or in addition to the clinically suspected side in 19% of patients by B-mode ultrasound and in 10% of patients by CDI which is important to prepare the patient for bilateral instead of unilateral varicocelectomy and missing varicocele on one side may be the cause of persistent poor seminal fluid results after unilateral varicocelectomy.

Detecting subclinical varicocele by CDI in 5% of patients with infertility is significant in this study making referral of infertile patients for CDI is mandatory. B-mode ultrasound was useful in detecting testicular atrophy as a medical cause of infertility, which was found in 11% of patients in this study, and it was bilateral in 4% of patients. CDI was useful in excluding or confirming varicocele as a surgical cause of infertility in patients with testicular atrophy.

The total incidence of right varicocele was significantly high by B-mode (39%) and CDI (21%) than by clinical exam (8%) and this is due to the fact that clinicians always concentrate in their examination on the left side because left varicocele is more common, as a result they easily miss subclinical (or even RT varicocele) while the total incidence of left varicocele in this study was almost the

same by clinical examination (70%) and B-mode ultrasound (69%) due to the dedicated clinical examination for the left side, but CDI was also useful in detecting reversed flow in 50% of patients with left varicocele.

The high incidence of left varicocele in this study compared to Meacham et al⁽¹⁴⁾ was (37%) was due to high selection criteria for CDI, referring only patients with high clinical suspicion rather than the patients with negative clinical examination.

Conclusion

Color Doppler ultrasound examination became the standard non-invasive investigation for varicocele as it is much more accurate than clinical examination and B-mode ultrasound. It is highly valuable for following patients after varicocelectomy, its main limitation that it is operator dependent.

Recommendation

Color Doppler ultrasound examination should be the standard reference investigation for diagnosis of scrotal varicocele before any varicocelectomy and can be a good base line for follow up after surgery. Color Doppler ultrasound should be the gold standard non-invasive imaging modality for subclinical varicocele.

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