



ROLE OF HIGH FREQUENCY REAL TIME ULTRASONOGRAPHY AND COLOR DOPPLER SONOGRAPHY IN EVALUATION OF SCROTAL PATHOLOGIES

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ABSTRACT

Ultrasonography is exceptionally well suited to study of scrotum and its contents. Sonography is simple to perform, rapid, non-invasive relatively inexpensive, easily reproducible, widely available and does not involve irradiation of gonads. 100 cases of scrotal pathology were studied using High-frequency real time gray scale ultrasonography and Doppler study in our institution, during the period October 2009 to September 2011, were included in this study. 32 cases were detected have inflammatory scrotal pathology on high frequency US and Doppler study. Chronic Epididymo orchitis was the commonest inflammatory pathology detected, noted in 12 cases (37.5 %). Next most frequent inflammatory pathology detected was acute Epididymo orchitis, noted in nine cases (21.8%). High frequency ultrasonography is highly sensitive in distinguishing scrotal mass as either testicular or testicular masses and is clearly superior to clinical diagnosis. High frequency ultrasonography with Doppler is highly sensitive in demonstrating the varicoceles. When compared to physical examination, it is highly sensitive in detecting sub clinical cases of varicoceles.

INTRODUCTION

Scrotum is a cutaneous bag containing right and left testis, the epididymis and the lower part of the spermatic cord. Externally, scrotum is divided into right and left parts by a ridge or median raphe, which is continued forwards on to the undersurface of the penis and backwards along midline of the perineum to the anus [1]. The testis separated from the examining fingers by little more than few mm covering of loose skin and fibro muscular tissue, so is most accessible for clinical examination. Consequently one should pre suppose that clinical diagnosis of a scrotal swelling would be straightforward look significant pathology and physical

signs elicited may be improperly interpreted [2]. On the contrary, certain testicular swellings are most difficult to diagnose with confidence based on physical examination alone. It is often difficult to decide whether a palpable scrotal mass is arising from the testes itself or from the extra testicular elements. In addition, the normal examination may over look significant pathology and physical signs elicited may be improperly interpreted [2].

In the clinical examination of the scrotal swelling, physical evaluation by itself may be inadequate due to tenderness, swelling or gross distortion of scrotal contents. Clinical signs and symptoms are usually nonspecific, variable and misleading. Until mid1970 clinical evaluation of scrotal contents was confined to palpation, trans-illumination, supplemented by investigative modalities like, thermography and venography. The present day diagnostic armamentarium includes gray scale Ultrasonography, Doppler studies,

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Magnetic Resonance Imaging, in addition to radioisotope studies and testicular angiography [3]. Since Miskin and Bain and Murray Miskin, Martin Bucksman and Jerald Bain first published report about using diagnostic ultrasound as a modality of investigating scrotal pathologies, advances in instrumentation and transducer design have progressed to the point where high frequency US is the modality of choice in investigating scrotal and testicular pathology [4].

Ultrasonography is exceptionally well suited to study of scrotum and its contents. Sonography is simple to perform, rapid, non-invasive relatively inexpensive, easily reproducible, widely available and does not involve irradiation of gonads.

METHODOLOGY

In this series, 100 cases of scrotal pathology were studied using High-frequency real time gray scale ultrasonography and Doppler study in our institution,

during the period October 2009 to September 2011, were included in this study. These patients were referred to our department for scrotal ultrasonography and Doppler study by department of Urology and department of Surgery of our institution.

Prior to subjecting the patients for ultrasound examination, patient details, detailed clinical history was obtained along with thorough physical examination. The color Doppler sonography was routinely performed in all these patients. Subsequently these cases were followed up and correlated with histopathology report, fine needle aspiration cytology results, surgical findings, response to treatment. Follow up scans were done in selected cases when clinically indicated. Abdominal ultrasound scan was done in conjunction with scrotal scans in cases of testicular malignancy to look for associated pathology, in cases of varicoceles to look for any cause of testicular vein obstruction. Conventional radiography was done wherever indicated.

RESULTS

Table 1. Distribution of cases according to various age groups

Sl no	Age group (years)	No of cases	Percentage
1	0 – 10	7	7 %
2	11 – 20	11	11 %
3	21 – 30	24	24 %
4	31 – 40	24	24 %
5	41 – 50	20	20 %
6	51 – 60	7	7 %
7	61 – 70	3	3 %
8	71-80	4	4%
	Total	100	100 %

Table-1 shows the age distributions of cases, which varied from 2 Years to 73 Years. Highest number of cases presented were in the age group of 21 To 30 years (24 cases – 24%), and 31 to 40 years (24 cases – 24%).

The age groups of 21 to 40 years constitute ~50%.

Table 2. Inflammatory Scrotal Pathology

	Pathology	No of Cases	% of Cases
1	Acute Epididymitis	6	18.5 %
2	Acute Epididymo Orchitis	7	21.8 %
3	Acute Orchitis	1	3.1%
4	Chronic Epididymitis	2	6.2%
5	Chronic Epididymo Orchitis	12	37.5 %
6	Scrotal Wall Inflammation	1	3.1%
7	Scrotal Filariasis	1	3.1%
8	Fournier's Gangrene	2	6.2%
	Total	32	100 %

In our study, out of 100 cases, 32 cases were detected have inflammatory scrotal pathology on high frequency US and Doppler study. Chronic Epididymo orchitis was the commonest inflammatory pathology detected, noted in 12 cases (37.5 %). Next most frequent inflammatory pathology detected was acute Epididymo orchitis, noted in nine cases (21.8%).



Table 3. High-Resolution Us Appearance of Inflammatory Scrotal Pathology

Sl. no	Echo pattern	Acute epididymitis	Acute Orchitis	Acute Epididymo-orchitis	Chronic epididymitis	Chronic Epididymo-orchitis
1	Hyper echoic	-	-	-	1	-
2	Hypo echoic	4	1	5	-	-
3	Iso echoic	1	-	1	-	-
4	Heterogeneous	1	-	1	1	9
5	Complex cystic	-	-	-	-	3
6	Purely cystic	-	-	-	-	-
7	Epididymal	-	-	-	2	2
8	calcification	-	-	-	-	-
9	Testicular	-	-	-	-	2
10	calcification	-	-	-	-	-

Table 4. Color Doppler Appearance of Inflammatory Scrotal Pathology

Color-Doppler appearance	Acute epididymitis	Acute Orchitis	Acute Epididymo-orchitis	Chronic epididymitis	Chronic Epididymo-orchitis
Focal increase in Vascularity			2		3
Diffuse increase in Vascularity	2	1	7	2	4
Focal decrease in Vascularity				1	4
Diffuse decrease in Vascularity					1

DISCUSSION

Inflammatory conditions noted in 32 cases, Congenital lesions were noted in 10 cases, pathology related to male infertility noted in 4 cases, traumatic lesions noted in 4 cases, neoplastic lesions noted in 3 cases. Miscellaneous conditions like, Inguino-scrotal hernia, testicular calcification noted in 12 cases. Arger et al [5], in a series of 62 patients, detected the following pathologies: Inflammatory diseases in 16 cases (26%), and non-inflammatory swellings in 45 cases (67%). Willscher et al [6], in a study of 43 pts (86 testes), noted the following distribution of pathologies: Inflammatory diseases 12 cases, Non-inflammatory diseases in 28 cases. Richie et al [7], in their study of 124 patients (243 testicles) by ultrasonography, found inflammatory lesions in 31 cases, and non-inflammatory swellings in 75 cases. In our study, inflammatory conditions constitute the largest number of detected pathology, followed by Non-inflammatory swellings.

In our study, the bulk of the pathology detected by high-resolution US and MRI are from two groups: Inflammatory pathologies and Non-inflammatory swellings which correlates with findings documented in previous studies.

However, in our study, we noticed that proportion of Inflammatory pathology is higher, compared to previous studies.

Factors contributing for this variation:

1. Higher incidence of chronic inflammatory pathology, eg-Tuberculosis.

2. larger gap of time between onset of symptoms and time of examination and sources of other infections like UTI etc.

3. Higher complication rate in our study.

In our study, out of 100 cases, 32 cases were detected have inflammatory scrotal pathology on high frequency US and Doppler study. Chronic Epididymo orchitis was the commonest inflammatory pathology detected, noted in 12 cases (37.5%). Next most frequent inflammatory pathology detected was acute Epididymo orchitis, noted in 7 cases (21.8%). Other detected inflammatory pathology include, scrotal filariasis 1 cases, Acute orchitis 1 cases (3.1%), chronic epididymitis, 2 cases (6.2%), scrotal wall inflammation 1 cases (3.1%), acute epididymitis 6 cases (18.5%), Fournier's gangrene noted in 2 cases (6.2%).

Horstman, Middleton, and Nelson [8], in their study of 45 patients, found acute epididymitis present in 25 cases (56%), acute Epididymo-orchitis in 19 cases (42 %), acute orchitis in 1 case (2 %) . No case of chronic Epididymo orchitis was reported.

Lerner et al [9], in their limited series of 5 cases of acute inflammatory diseases of scrotum, found acute epididymitis in 3 patients (60%), acute Epididymo orchitis in 2 patients (40%) .

Farriol et al [10], in their study of 25 cases of acute inflammatory diseases of scrotum using high-resolution grey scale and power Doppler sonographic



study, found epididymitis in 11 cases (44%), Epididymo-orchitis in 10 cases (40%), orchitis in 2 cases (8%), funiculitis in 2 cases (8%).

Compared to other studies, in the present study there is low incidence of acute inflammatory and higher incidence of complications of acute scrotal inflammatory disease. This is due to the fact that there is a larger gap of time between onset of symptoms and time of examination (average 5 days), which may be less in western population, (details not available), but it is hypothesized that those patients are evaluated at early stage of disease and less likely to present with complications. Of 6 cases of acute epididymitis, we observed diffuse hypoechogenicity with diffuse increase in vascularity, and size of epididymis was increased. These findings are similar to the findings of Horstman et al, in their study of 45 cases (51 hemiscrotum), Farriol et al, in their study of 11 cases: Of 7 cases of acute Epididymo-orchitis, we observed diffuse hypoechogenicity in 4 and diffuse increase in vascularity in 6 cases. 3 cases was normal echotexture, 6 cases showed diffuse increase in vascularity and size of epididymis was increased in 6 cases. These findings are similar to the findings of Horstman et al 32, in their study of 45 cases (51 hemiscrotum), Farriol et al, in their study of 11 cases 20. Only one case of acute orchitis, showed diffuse hypoechoic appearance on high frequency US sonography. The size of the testis was normal and on color

Doppler sonography, it showed increased vascularity in the testis.

These findings are similar to the findings of Horstman et al [11], in their study of 45 cases (51 hemiscrotum), Farriol et al [10], in their study of 11 cases.

CONCLUSION

Ultrasonography enables in clear demonstration of morphological alterations associated with acute scrotal inflammatory diseases, and color Doppler sonography is highly sensitive in diagnosing acute scrotal pathology. In addition, Color Doppler sonography accurately differentiates between testicular ischemia and torsion from acute inflammatory diseases in acute painful scrotal conditions.

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CONFLICT OF INTEREST: Nil

STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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