Section: Radiodiagnosis

Original Research Article

DIAGNOSTIC EFFICACY OF HIGH RESOLUTION USG COUPLED WITH COLOUR DOPPLER IN SCROTAL SWELLINGS

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Abstract

Background: Acute testicular pain and swelling is an emergency but the overlapping clinical features often hampers the accurate diagnosis of the underlying pathology. Prompt diagnosis and urgent treatment is necessary in such cases. **Aim:** Assessment of high resolution ultrasound and color Doppler for diagnosis and differentiation of scrotal swellings. **Materials and Methods:** This prospective study included 320 subjects with scrotal swelling. The subjects were evaluated using ultrasonography with high frequency linear array transducer with Colour Doppler. **Results:** Scrotal swelling most commonly affects subjects in the age group of 30 to 40 years, and least in the age group of 0-10 years. Hydrocele was the most common cause of scrotal swelling. Left side was more commonly affected compared to right, though it may affect bilaterally. **Conclusion:** High frequency Ultrasonography coupled with Color Doppler is an excellent diagnostic imaging tool for scrotal diseases. Periodic USG scans is recommended for scrotal inflammation to monitor follow-up.

INTRODUCTION

The scrotum is a musculo-fascial pouch enclosing the testes, epididymis and their appendages. In the absence of any pathology, the approachability of these anatomic structures becomes convenient for clinical examination. Scrotal swelling has multifactorial etiology, and the associated tenderness poses a barrier for the clinician to differentiate intra and extra-testicular lesions as well as from benign and malignant lesions. Conditions like acute testicular torsion and acute epididymo-orchitis are extremely painful and hampers the accurate diagnosis of the underlying pathology. The overlapping clinical features require prompt diagnosis and urgent necessary treatment.[1]

The availability of high- frequency ultrasound provides high-quality anatomical detail and is proven to be a satisfactory and reliable method for evaluation of the scrotal wall, epididymis, testes and their appendages. An added availability of colour flow Doppler imaging enhances the diagnostic efficacy in perplexing situations, by providing viability and vascularity status of the testes.[2] Non-invasive, radiation free, easy availability and reproducibility, real time imaging, less time consuming, easy use and cost effective are amongst the major advantages of using ultrasonography as diagnostic tool for scrotal diseases. Therefore, USG is considered as the first choice investigation tool for scrotal pathologies.[3] Magnetic resonance imaging, testicular angiography and radioisotope studies are the other available recent modality of investigations for various scrotal pathologies.[4]

The development and availability of sonogram with high frequency linear transducer together with color Doppler is another landmark in as diagnostic tool for scrotal pathologies. Equipment with ionizing radiation are not preferred for testicular examination owing to its own disadvantages.[5] This makes ultrasound with color Doppler as a machine of choice for evaluation of scrotal pathologies. These equipment are easily available, non-invasive, non-ionising reproducible, and cost effective.[6]

Therefore this study was designed, for assessment of high resolution ultrasound and color Doppler for diagnosis and differentiation of scrotal swellings.

MATERIALS AND METHODS

Study design : This prospective, descriptive , unicentric study was conducted in the department of radiodiagnosis, at Bhagwan Mahavir Institute of Medical Sciences and Hospital, Pawapuri. The study

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was conducted over a period of 1 year from November 2021 to October 2022. The study was approved by the institutional research and ethical committee. All the study participants were informed about the study and a written and informed consent was obtained after explaining about the study.

Inclusion Criteria

Patients of all age groups with clinical manifestations of non-traumatic scrotal diseases

Exclusion Criteria

Post-operative cases

Study sample

The subjects referred from different OPD of our institute for scrotal imaging and examination, during the study period and meeting the inclusion and exclusion criteria, were randomly selected and included in the study. The study sample consisted of 350 subjects randomly selected on the basis of clinical features of scrotal diseases.

Procedure

Baseline demographic data (age, symptoms and clinical diagnosis) were recorded at the beginning of the study. All the subjects included in the study underwent scrotal ultrasonography using 7.0- 12.0 MHZ high frequency linear array transducer coupled with Colour Doppler. The ultrasound findings were analyzed with regard to the location and type of the abnormality. Subjects were calssified as those having - hydrocele, varicocele, testicular abscess, extra-testicular abscess, epididymal cyst, epididymitis, orchitis, testicular torsion, tumours, scrotal wall thickening, inguino-scrotal hernia and calcifications etc. Subsequently, these cases were followed up and confirmed with either surgical findings, histopathology reports, response to treatment or follow up scans wherever applicable.

Statistical Analysis

The data was tabulated in the Microsoft excel worksheet and was evaluated using SPSS software for statistical analysis.

RESULTS

The present study evaluated 350 subjects with scrotal swelling and tenderness. 30 subjects could not follow up or lost papers therefore a total of 320 subjects were included in the study. The percentage of subjects who completed the study was 91.4 %.

A total of 320 patients were studied till end. A majority of subjects were in the age range of 30-40 years followed by 20- 30 years and the prevalence were least in the age below 10 years. [Table -1]

Table 1: Distribution of subjects according to age. (n = 230)

Age range	Number	Percentage
Below 10	12	3.75
10-20	32	10
20-30	108	33.75
30-40	120	37.5
Above 40	48	15
TOTAL =	320	100

The distribution of subjects according the number of sides involved is shown Table 2. 144 subjects had isolated lesion on the left side, 140 subjects had isolated lesion on the right side, while 36 subjects had bilateral lesions.

Table 2: Distribution of subjects according to side of scrotal lesions

Side involved	Number	Percentage
Left side	144	44
Right side	140	42
Bilateral locations	36	14
TOTAL =	320	100

Table 3: USG diagnosis of various causes of scrotal pathologies. (n=320)

DIAGNOSIS	NUMBER	PERCENTAGE
Hydrocele	88	26
Epididymal cyst	52	17
Epididymo-orchitis	44	14
Epididymitis	32	8
Funiculitis	24	7
Varicocele	20	6
Pyocele	16	5
Testicular torsion	12	4
Testicular abscess	12	4
Inguino-scrotal hernia	8	3
Testicular microlithiasis	4	2
Testicular tumour	4	2
Tubercular epididymo- orchitis	4	2
TOTAL=	320	100

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Hydrocele was the most common cause of scrotal pathologies, followed by epididymal cyst, epididymo-orchitis, epididymitis, funiculitis, and varicocele. Other common reason for scrotal abscess with high prevalence included, pyocele, testicular torsion, and testicular abscess. inguino-scrotal hernia, testicular microlithiasis, testicular tumour, and tubercular epididymo-orchitis had very little prevalence (Table 3).

DISCUSSION

30 to 40 years was the most commonly involved age group, followed by 20 to 30 and above 40 years. Thinyu et al. reported a similar age group distribution for scrotal disorders in their study.[7] The most common symptoms was swelling, the other common symptoms included pain, fever and infertility. A significantly high number of scrotal lesions were detected.

On USG, hydrocele remained the most common cause scrotal pathology. A similar observation was reported by Arjhansari K and Vises N et al.[8] in their retrospective study. In the present study 308 out of 320 patients complaints of scrotal swelling, and the most common cause was found to be hydrocele. Pain remained on position two as the most common symptom for scrotal swelling, and was reported by 50 patients. The most common etiology for pain was found to be infection / inflammation. Previously reports of the studies in the series has shown the percentage of subjects with pain in scrotal swelling was between 60-75 Percent. Our study reports also were comparable to the observations made in other studies.[9,10]

Right side was more commonly affected by the acute epididymitis, compared to the left side. Another common finding observed in almost all patients was enlarged epididymis with hypoechoic echotexture and diffusely increased vascularity. The other factors augmenting the diagnosis of epididymitis included reactive hydrocele and scrotal wall thickening. A similar incidence of enlarged epididymis with relatively lower incidence of hyper-vascular epididymis was reported by Smith et al.[11]

Acute epididymo-orchitis was accurately diagnosed in all cases. Only 56 subjects was reported to have acute epididymo-orchitis in our study. All these subjects showed complete resolution of ultrasound features after systemic antibiotic administration. Bulky testis and epididymis showing hypoechoic echopattern and increased vascularity was the contributing USG features in the diagnosis for a majority of the cases.

Chronic tubercular epididymo-orchitis was observed in 08 cases. These were characterized by enlarged epididymis and testis with increased vascularity along with heterogeneous echopattern with hyperechoic areas. The previous study reports of by Horstman et al.[12] and Farriol et al.[13] observed many folds higher percentage of acute epididymo-orchitis compared to the present study. Limited availability, limited access and poor socioeconomic status of medical facilities could be the possible cause for this difference.

The number of subjects with testicular abscess were also very less. Right testis was more commonly involved compared to left. All patients with testicular abscess had enlarged testis and epididymis with increased vascularity. On USG it showed, hypoechoic areas with internal echoes. These findings were similar to the study reports of Luker and Siegel.[14]

Hydrocele remained the most common lesion for scrotal swelling for the present study. This was comparable to the findings of previous studies. Hydrocele was seen most commonly in the age group of 30 to 40 years. Right sided hydrocele was more common than the left side hydrocele and about 30 % subjects had bilateral hydrocele.

CONCLUSION

High frequency Ultrasonography with color Doppler study may be trusted as a reliable and an excellent diagnostic imaging tool in the diagnosis of scrotal swellings. It is easy to perform, widely available, highly sensitive, and repeatable. The technique has an added advantages for radiosensitive body parts like testis. Periodic follow-up USG is recommended for inflammatory scrotal lesions.

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