

DIAGNOSTIC ACCURACY OF HIGH RESOLUTION USG COMBINED WITH COLOR DOPPLER IN SCROTAL SWELLINGS

Khurshheed Durrani¹, Seema Tabassum²

¹Assistant Professor, Department of Radiology, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India

²Associate Professor, Department of Anatomy, Darbhanga Medical College, Laharia sarai, Darbhanga, Bihar, India

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Corresponding Author:
Dr. Seema Tabassum,
Email: drseemadurrani28@gmail.com

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Abstract

Background: The accurate diagnosis of the underlying pathology in cases of acute testicular pain and swelling is often hindered by overlapping clinical features, making prompt diagnosis and urgent treatment necessary. This study aimed to assess the effectiveness of high resolution ultrasound and color Doppler in diagnosing and differentiating scrotal swellings. **Materials and Methods:** A total of 320 subjects with scrotal swelling were included in this prospective study. The subjects underwent evaluation using ultrasonography with a high frequency linear array transducer with Colour Doppler. **Result:** The age group most commonly affected by scrotal swelling was 30 to 40 years, while the least affected age group was 0-10 years. Hydrocele was found to be the most common cause of scrotal swelling. The left side was more commonly affected compared to the right, although it may also affect both sides. **Conclusion:** High frequency Ultrasonography coupled with Color Doppler proves to be an excellent diagnostic imaging tool for scrotal diseases. It is recommended to conduct periodic USG scans for scrotal inflammation to monitor follow-up.

INTRODUCTION

The scrotum is a musculo-fascial pouch that encloses the testes, epididymis, and their appendages. In the absence of any pathology, the accessibility of these anatomical structures becomes convenient for clinical examination. Scrotal swelling has a multifactorial etiology, and the associated tenderness poses a barrier for the clinician to differentiate between intra and extra-testicular lesions, as well as benign and malignant lesions. Conditions such as acute testicular torsion and acute epididymo-orchitis are extremely painful and hinder the accurate diagnosis of the underlying pathology. The overlapping clinical features require a timely diagnosis and prompt necessary treatment.^[1-5]

The availability of high-frequency ultrasound provides high-quality anatomical detail and has been proven to be a satisfactory and reliable method for evaluating the scrotal wall, epididymis, testes, and their appendages. The added availability of color flow Doppler imaging enhances the diagnostic efficacy in perplexing situations by providing information on the viability and vascularity status of the testes. Non-invasive, radiation-free, easy availability and reproducibility, real-time imaging, less time-consuming, easy to use, and cost-effective are among the major advantages of using ultrasonography as a diagnostic tool for scrotal

diseases. Therefore, ultrasonography is considered the first-choice investigation tool for scrotal pathologies.^[6-10]

Magnetic resonance imaging, testicular angiography, and radioisotope studies are other available recent modalities of investigation for various scrotal pathologies. The development and availability of sonograms with high-frequency linear transducers, together with color Doppler, is another landmark in diagnostic tools for scrotal pathologies. Equipment with ionizing radiation is not preferred for testicular examination due to its own disadvantages. This makes ultrasound with color Doppler the machine of choice for evaluating scrotal pathologies. These equipment are easily available, non-invasive, non-ionizing, and reproducible.^[11,12]

MATERIALS AND METHODS

A unicentric, prospective, descriptive study was conducted at Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, in the department of radio diagnosis. The study was conducted over a period of one year, from November 2021 to October 2022, and was approved by the institutional research and ethical committee.

The study included patients of all age groups with clinical manifestations of non-traumatic scrotal diseases, while post-operative cases were excluded.

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

Baseline demographic data were recorded at the beginning of the study, and all the subjects 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. Statistical analysis was performed using SPSS software.

RESULTS

A comprehensive assessment was conducted on 350 individuals presenting with scrotal swelling and tenderness. Regrettably, 30 participants were unable to adhere to the follow-up protocol or misplaced their documents, resulting in the inclusion of a total of 320 subjects in the study. The completion rate of the study stood at an impressive 91.4%.

Throughout the study, a total of 320 patients were diligently examined until its conclusion. Notably, the majority of subjects fell within the age bracket of 30-40 years, closely followed by those aged 20-30 years. Conversely, the prevalence of scrotal swelling and tenderness was found to be significantly lower among individuals below the age of 10 years, as indicated in [Table 1].

[Table 2] illustrates the distribution of subjects based on the number of sides involved. A total of 144 subjects exhibited an isolated lesion on the left side, whereas 140 subjects displayed an isolated lesion on the right side. Additionally, 36 subjects presented bilateral lesions.

The prevalence of scrotal pathologies was primarily attributed to hydrocele, with epididymal cyst, epididymo-orchitis, epididymitis, funiculitis, and varicocele following suit. Additionally, scrotal abscesses were commonly caused by pyocele, testicular torsion, and testicular abscess. Inguino-scrotal hernia, testicular microlithiasis, testicular tumor, and tubercular epididymo-orchitis had minimal prevalence, as indicated in [Table 3]

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

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

DISCUSSION

The age group most commonly involved in scrotal disorders was between 30 to 40 years, followed by 20 to 30 and above 40 years. Thinyu et al. reported a similar distribution of age groups in their study on scrotal disorders. The most common symptom

reported was swelling, followed by pain, fever, and infertility. A significantly high number of scrotal lesions were detected. On ultrasound (USG), hydrocele was found to be the most common cause of scrotal pathology. This observation was also reported by Arjhansari K and Vises N et al. in their retrospective study. In our present study, out of 320

patients, 308 complained of scrotal swelling, with hydrocele being the most common cause. Pain was the second most common symptom, reported by 50 patients, and the most common cause of pain was found to be infection/inflammation. Previous reports have shown that 60-75 percent of subjects with scrotal swelling experience pain, which is consistent with our study findings. The incidence of acute epididymitis was higher on the right side compared to the left side. Enlarged epididymis with hypoechoic echotexture and increased vascularity was a common finding in almost all patients, along with reactive hydrocele and scrotal wall thickening, which further supported the diagnosis of epididymitis. Smith et al. also reported a similar incidence of enlarged epididymis, but with a relatively lower incidence of hyper-vascular epididymis. Acute epididymo-orchitis was accurately diagnosed in all cases, with only 56 subjects being reported in our study. These subjects showed complete resolution of ultrasound features after receiving systemic antibiotic treatment. Bulky testis and epididymis with hypoechoic echopattern and increased vascularity were the main ultrasound features contributing to the diagnosis in the majority of cases. Chronic tubercular epididymo-orchitis was observed in 08 cases.^[13-18]

The incidence of testicular abscess was notably low, with a higher prevalence observed in the right testis compared to the left. All patients diagnosed with testicular abscess exhibited enlarged testis and epididymis, accompanied by increased vascularity. Ultrasonography revealed hypoechoic areas with internal echoes, consistent with the findings reported by Luker and Siegel.^[14] In the present study, hydrocele remained the most frequently observed scrotal swelling. This finding aligns with previous research. Hydrocele was predominantly observed in individuals aged between 30 and 40 years. Right-sided hydrocele was more prevalent than left-sided hydrocele, and approximately 30% of subjects presented with bilateral hydrocele.^[19,20]

CONCLUSION

High frequency Ultrasonography with color Doppler study is a dependable and exceptional diagnostic imaging tool for the diagnosis of scrotal swellings. It is a convenient, widely accessible, highly sensitive, and repeatable technique. Moreover, it offers an additional benefit for radiosensitive body parts such as the testis. For inflammatory scrotal lesions, it is advisable to undergo periodic follow-up Ultrasonography.

REFERENCES

1. Coley BD. Sonography of pediatric scrotal swelling. *Semin Ultrasound CT MR* 2007;28(1):297-306.
2. Appelbaum L, Gaitini D, Dogra VS. Scrotal ultrasound in adults. *Semin Ultrasound CT MR* 2013;34(3):257- 73.
3. Rizvi SA, Ahmad I, Siddiqui MA, Zaheer S, Ahmad K. Role of color Doppler ultrasonography in evaluation of scrotal swellings: pattern of disease in 120 patients with review of literature. *Urol J* 2011;8(5):60-5.
4. Mirochnik B, Bhargava P, Dighe MK, Kanth N. Ultrasound evaluation of scrotal pathology. *RadiolClin North Am.* 2012 Mar;50(2):317-32, vi. doi:10.1016/j.rcl.2012.02.005.
5. Wright S, Hoffmann B. Emergency ultrasound of acute scrotal pain. *Eur J Emerg Med.* 2015 Feb;22(1):2-9. doi:10.1097/MEJ.0000000000000123.
6. Sommers D, Winter T. Ultrasonography evaluation of scrotal masses. *RadiolClin North Am.* 2014 Nov;52(6):1265-81. doi:10.1016/j.rcl.2014.07.014
7. Thinyu S, Muttarak M. Role of ultrasonography in diagnosis of scrotal disorders: A review of 110 cases. *Biomed Imaging Interv J* 2009;5(2):e2.
8. Arjhansiri K, Vises N, Kitsukjit W. Sonographic evaluation of the intrascrotal disease. *J Med Assoc Thai* 2004;87 Suppl 2:S161-7.
9. Siddiqui EH, Siddiqui S, Rasool G, Khan N. Scrotal Pathologies: Role of high resolution & Doppler ultrasound in evaluation. *Professional Med J* 2013;20(4):924-28.
10. Agarwal Am, Tripathi PS, Shankwar A, Naveen C. Role of Ultrasound with Color Doppler in Acute Scrotum Management. *J Family Med Prim Care* 2014;3(6):409- 12.
11. Smith RP, Tracy CR, Kavoussi PK, Witmer MT, Costabile RA. The impact of color Doppler ultrasound on treatment patterns of epididymitis in a universitybased healthcare system. *Indian J Urol* 2013;29(5):22-6.
12. Horstman WG, Middleton WD, Melson GL. Scrotal inflammatory disease: Color Doppler US findings. *Radiology* 1991;179(3):55-9.
13. Farriol VG, Comella XP, Agromayor EG, Creixams XS, Martinez De La Torre IB. Gray- scale and power Doppler sonographic appearances of acute inflammatory diseases of the scrotum. *J Clin Ultrasound* 2000;28(1):67-72.
14. Luker GD, Seigel MJ. Color Doppler sonography of the scrotum in children. *AJR Am J Roentgenol* 1994;163(3):649-55.
15. D'Andrea A, Coppolino F, Cesarano E, Russo A, Cappabianca S, Genovese EA, et al. US in the assessment of acute scrotum. *Crit Ultrasound J* 2013;5:Suppl 1:S8.
16. Vijayraghavan S. Sonographic differential diagnosis of acute scrotum: real time whirlpool sign, a key sign of torsion. *J Ultrasound Med* 2006;25(6):563-574.
17. Grantham JG, Charboneau JW, James EM, Kirschling RJ, Kvols LK, Segura JW, et al. Testicular neoplasms: 29 tumors studied by high- resolution US. *Radiology* 1985;157(4):775-80.
18. Micallef M, Torreggiani WC, Hurley M, Dinsmore WW, Hogan B. The ultrasound investigation of scrotal swelling. *Int J STD AIDS* 2000;11(5):297-302.
19. Goede J, Hack WW, van der Voort-Doedens LM, Sijstermans K, Pierik FH. Prevalence of testicular microlithiasis in asymptomatic males 0 to 19 years old. *J Urol* 2009;182(5):1516-1520.
20. Cast JE, Nelson WM, Early AS, Biyani S, Cooksey G, Warnock NG, et al. Testicular microlithiasis: prevalence and tumour risk in a population referred for scrotal sonography. *AJR Am J Roentgenol* 2000;175(1):1703-6.