Original article

Role of ultrasound and colour doppler in evaluation of scrotal pathology in rural population: A descriptive observational study from Latur, Maharashtra

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Abstract

Background: The importance of scrotum, its contents and their pathologies can be assumed from it being considered as the tenth compartment of the abdomen. The high incidence of male infertility and other morbidities associated with scrotal pathologies make a detailed study into them and their management worthwhile. Sonography is a non-invasive, cost effective, practicable, requires no radiation, no previous preparation, most rapid, widely available, easy to follow up, and presently imaging technique of choice for scrotal diseases.**Objectives:** To study the role of ultrasound and colour doppler in evaluation of scrotal pathology in rural population.**Methodology:** The present Descriptive observational study was carried out at Department of Radiodiagnosis, Tertiary care centre MIMSR Medical College, Latur. Involving 118 patients referred from Dept of Surgery for Scrotal Ultrasound and Colour Doppler with pain, swelling or clinically non palpable testis. **Results:** 50% of the patients had complaints from 31 to 90 days followed by 19.56% with 1-7 days, 16.1% with 8-30 days, 10.2% with 91-365 days and 4.2% had more than one year. Distribution according to USG and CD diagnosis revealed Acute epididymitis in 11%, Acute epididymo orchitis in 8.5%, Acute orchitis in 10.2%, Right sided hydrocele-7.6%, Left sided hydrocele-9.3%, Bilateral hydrocele-10.2%, Right sided hernia-8.5%, Left sided hernia-6.8%. **Conclusion:** When colour Doppler sonography is supplemented with High frequency grey scale US, the sensitivity of diagnosing acute scrotal pathology will be increased.We conclude that High-frequency ultrasonography and colour Doppler sonography is an extremely valuable tool in evaluation of scrotal and testicular pathologies.

Key words: ultrasound and colour doppler, **scrotal pathology**

Introduction

The importance of scrotum, its contents and their pathologies can be assumed from it being considered as the tenth compartment of the abdomen. The high incidence of male infertility and other morbidities associated with scrotal pathologies make a detailed study into them and their management worthwhile.[1]

Scrotal lesions can be broadly classified as testicular and extra testicular. The common testicular lesions are torsion, trauma, neoplasms and inflammatory conditions. Extra testicular lesions include lesions of the spermatic cord, epididymis and scrotal wall. In

clinical practice, colour Doppler imaging of the scrotum is mainly indicated in acute painful scrotal conditions and assessment of varicoceles. Epididymo-orchitis and testicular torsion have similar clinical presentations and colour Doppler is useful in accurately differentiating between the two. Most of the patients with disease of the scrotum and its contents present with swelling of the scrotum and little more few other symptoms and signs. This study intends to look into the various pathologies of the scrotum and its contents, which present as scrotal swelling; and to highlight upon the best way to approach them; in order to restore the anatomy and physiology to the maximum possible level. [2]

Acute scrotal pain makes up approximately 0.5% of all complaints presenting to an emergency department.[3] Some of the most common diagnoses for this complaint are testicular torsion and epididymitis.[4] Misdiagnosing testicular torsion can lead to organ loss, cosmetic deformity, and compromised fertility.[5] Imaging services are not always available to emergency physicians to provide the needed studies to make the diagnosis.[6]

Sonography is a non-invasive, cost effective, practicable, requires no radiation, no previous preparation, most rapid, widely available, easy to follow up, and presently imaging technique of choice for scrotal diseases. Hence the purpose of the study is to evaluate high resolution and colour doppler sonographic appearance of spectrum of scrotal diseases and its accuracy in diagnosis.

Objectives

To study the role of ultrasound and colour doppler in evaluation of scrotal pathology in rural population.

Materials and Methods

Study setting: Department of Radiodiagnosis, Tertiary care centre

Study population: All patients referred from Dept of Surgery for Scrotal Ultrasound and Colour Doppler with pain, swelling or clinically non palpable testis

Study period: Two years (From September 2022 to August 2024)

Study design: Descriptive observational study

Sampling technique: Simple Random sampling method

Sample size: 118 cases

Inclusion criteria:

- All cases with clinical manifestations of non-traumatic scrotal diseases.
- Both acute and non-acute scrotal swellings
- Cases of all age groups.
- Those willing to participate in our study with due written consent

Exclusion criteria:

- All cases with scrotal trauma
- Those not willing to give written consent

Methods of data collection

The study was conducted as per the tenets of the Declaration of Helsinki. Written informed consent was obtained from each survey participant.

All patients referred to the department of Radiodiagnosis withthe clinical manifestations of various scrotal diseases in a period of 2years from September 2022 - August 2024was subjected forthe study.All patients included in the study will undergo scrotalultrasonography using 7.0-12.0 MHZ high frequency linear arraytransducer coupled with colour doppler equipment. This is followedby pelvic and abdominal scan using 3.5-5.0 MHZ transducer whenever required.All cases were critically evaluated followed up to surgical,

pathological or therapeutic diagnosis.Findings during surgery and histopathology was noted and compared with the sonographic features.

Statistical analysis and methods

Data was collected by using a structure proforma. Data entered in MS excel sheet and analyzed by using SPSS 24.0 version IBM USA.Qualitative data was expressed in terms of proportions. Quantitative data was expressed in terms of Mean and Standard deviation. Association between two qualitative variables was seen by using Chi square/ Fischer's exact test

Descriptive statistics of each variable was presented in terms of Mean, standard deviation, standard error of mean.A p value of <0.05 was considered as statistically significant whereas a p value <0.001 was considered as highly significant.

Results

Table 1: Distribution according to age group

		Frequency	Percent
Age group in years	1 to 10	5	4.2
	11 to 20	6	5.1
	21 to 30	29	24.6
	31 to 40	20	16.9
	41 to 50	16	13.6
	51 to 60	19	16.1
	>60	23	19.5
	Total	118	100.0

We included total 118 patients in our study. Out of 118 patients, majority 24.6% were from 21-30 years age group followed by 19.5% from above 65 years, 16.9% from 31-40 years, 16.1% from 51-60 years, 13.6% from 41-50 years and least 5.1% from 11-20 years age group.

Table 2: Distribution according to duration of complaints

		Frequency	Percent
Duration in days	1 to 7 days	23	19.5
	8 to 30 days	19	16.1
	31 to 90 days	59	50.0
	91 to 365 days	12	10.2
	More than 1 year	5	4.2
	Total	118	100.0

Distribution according to duration of complaints showed that 50% of the patients had complaints from 31 to 90 days followed by 19.56% with 1-7 days, 16.1% with 8-30 days, 10.2% with 91-365 days and 4.2% had more than one year.

Table 3: Distribution according to complaints

		Frequency	Percent
Complaints	Pain in scrotal region	82	69.5
	Swelling	73	61.9
	Fever	28	23.7
	Dysuria	28	23.7

Distribution according to complaints revealed pain in scrotal region in 69.5%, swelling in 61.9%, fever in 23.7% and dysuria in 23.7% patients.

Table 4: Distribution according to clinical diagnosis

		Frequency	Percent
Clinical diagnosis	Acute epididymitis	12	10.2
	Acute epididymo orchitis	9	7.6
	Acute orchitis	10	8.5
	Funiculitis	4	3.4
	Varicocele	4	3.4
	Undescended testes	4	3.4
	Congenital hydrocele	3	2.5
	Scrotal wall pathologies	3	2.5
	Right sided hydrocele	9	7.6
	Left sided hydrocele	11	9.3
	Bilateral hydrocele	12	10.2
	Right sided hernia	10	8.5
	Left sided hernia	8	6.8
	Bilateral hernia	9	7.6
	Fournier's gangrene	1	0.8
	Space occupying lesions	4	3.4
	Scrotal abscess	4	3.4
	Microlithiasis	1	0.8
	Chronic hydrocele	2	1.7

Distribution according to clinical diagnosis revealed as follows: Acute epididymitis-10.2%, Acute epididymo orchitis-7.6%, Acute orchitis-8.5%, Funiculitis-3.4%, Varicocele-3.4%, Undescended testes-3.4%, Congenital hydrocele-2.5%, Scrotal wall pathologies-2.5%, Right sided hydrocele-7.6%, Left sided hydrocele-9.3%, Bilateral hydrocele-10.2%, Right sided hernia-8.5%, Left sided hernia-6.8%, Bilateral hernia-7.6%, Fournier's gangrene-0.8%, Space occupying lesions-3.4%, Scrotal abscess-3.4%, Microlithiasis-0.8% and Chronic hydrocele-1.7%.

Table 5: Distribution according to USG and CD diagnosis

		Frequency	Percent
USG and CD diagnosis	Acute epididymitis	13	11.0
	Acute epididymo orchitis	10	8.5
	Acute orchitis	12	10.2
	Funiculitis	2	1.7
	Varicocele	6	5.1
	Undescended testes	4	3.4
	Congenital hydrocele	4	3.4
	Scrotal wall pathologies	4	3.4
	Right sided hydrocele	9	7.6
	Left sided hydrocele	11	9.3
	Bilateral hydrocele	12	10.2
	Right sided hernia	10	8.5
	Left sided hernia	8	6.8
	Bilateral hernia	9	7.6
	Fournier's gangrene	1	0.8
	Space occupying lesions	6	5.1
	Scrotal abscess	6	5.1
	Microlithiasis	2	1.7
	Chronic hydrocele	4	3.4

Distribution according to USG and CD diagnosis revealed as follows: Acute epididymitis-11%, Acute epididymo orchitis-8.5%, Acute orchitis-10.2%, Funiculitis-1.7%, Varicocele-5.1%, Undescended testes-3.4%, Congenital hydrocele-3.4%, Scrotal wall pathologies-3.4%, Right sided hydrocele-7.6%, Left sided hydrocele-9.3%, Bilateral hydrocele-10.2%, Right sided hernia-8.5%, Left sided hernia-6.8%, Bilateral hernia-7.6%, Fournier's gangrene-0.8%, Space occupying lesions-5.1%, Scrotal abscess-5.1%, Microlithiasis-1.7% and Chronic hydrocele-3.4%.

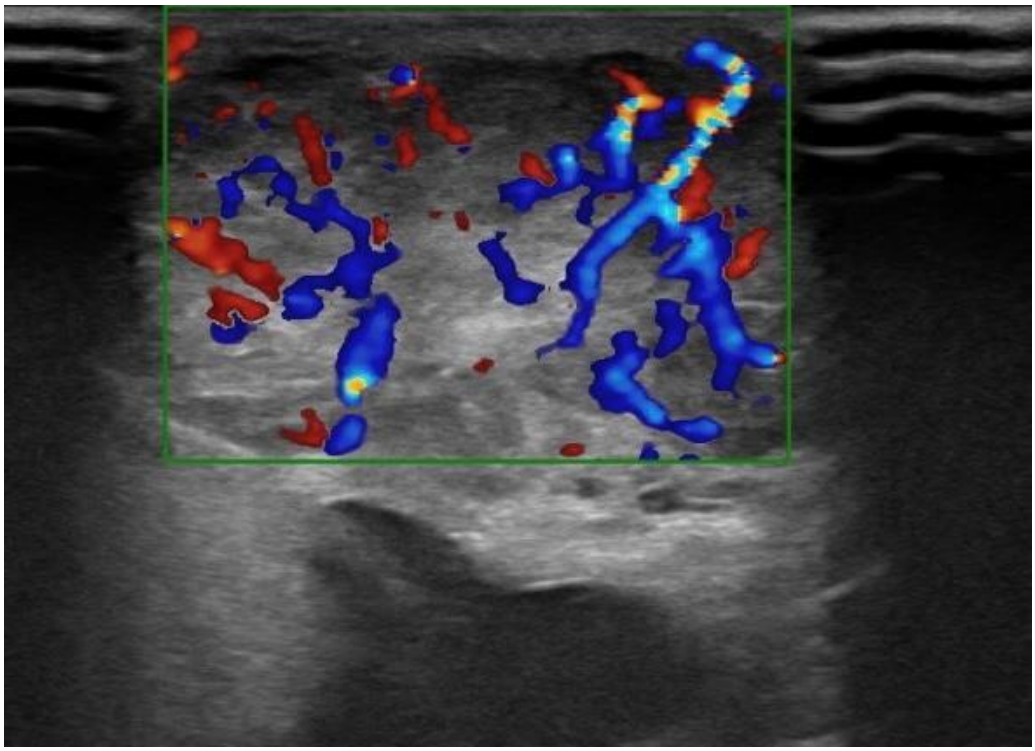

Image 1: Colour Doppler USG image of leiomyosarcoma of scrotal wall

Image 2: USG B scan image of leiomyosarcoma of scrotal wall

Discussion

Sociodemographic characteristics of the population

We included total 118 patients in our study. Out of 118 patients, majority 24.6% were from 21-30 years age group followed by 19.5% from above 65 years, 16.9% from 31-40 years, 16.1% from 51-60 years, 13.6% from 41-50 years and least 5.1% from 11-20 years age group.

Navale N. et al[7]included50 patients in his study and out of 50 patients, 18 (36 %) patients were between age group of 21 to 40years of age. Highest number of cases presented were in the age group of 21 to 30 (18 cases – 36%), followed by 31 to 40 years (9 cases – 18%). Therefore, age group of 21 to 40 years constitutes 54% of our cases.**Jatinder Pal Singh et al**[8]**in 2018** conducted the study to determine the role of Colour Doppler ultrasonography in the evaluation of scrotal swellings and also to compare the findings of scrotal colour Doppler ultrasonography with clinical, surgical and histopathological findings where indicated. In his study of 80 patients, the mean age of patients was 35.25 + 12.93 years. Maximum no. of patients was between 30 to 40 yrs.**Priyan Voltaire R et al**[9]reported that the median age of study group was 38.12± 1.2 years. 51% of cases were between 21-40 years.40 cases of inflammatory pathology, 68 cases of non-inflammatory pathology and 6 normal cases were included.

These findings are almost comparable to our study findings.

Clinical presentation

The scrotal lesions were bilateral in 58.5% cases, 23.7% had left sided and 17.8% were right sided. Distribution according to complaints revealed pain in scrotal region in 69.5%, swelling in 61.9%, fever in 23.7% and dysuria in 23.7% patients.

Navale N. et al[7]reported commonest clinical presentation was scrotal swelling (17 cases-34%), followed by only scrotal pain (15 cases - 30%) and then infertility in 8 cases (16%). 11 cases had pathology bilaterally, unilaterally in 35 cases. Out of 35 cases of unilateral side involvement, 23 cases of involvement were on right side, 12 cases involvement was on left side.

Distribution according to clinical diagnosis

Distribution according to clinical diagnosis revealed as follows: Acute epididymitis-20.35%, Acute epididymo orchitis-11.9%, Acute orchitis-11%, Funiculitis-1.7%, Varicocele-3.4%, Undescended testes-3.4%, Congenital hydrocele-3.4%, Scrotal wall pathologies-0.8%, Right sided hydrocele-5.9%, Left sided hydrocele-5.9%, Bilateral hydrocele-9.3%, Right sided hernia-9.3%, Left sided hernia-11%, Bilateral hernia-2.5%, Fournier's gangrene-2.5%, Space occupying lesions-1.7%, Congenital hydrocele-4.2%, Scrotal abscess-3.4%, Microlithiasis-0.8% and Chronic hydrocele-0.8%.

Jatinder Pal Singh et al[8]reported that the commonest abnormality detected clinically was Inflammatory disease (20 Cases, 25%). Unilateral varicocele was detected in 14 cases (17.5%). Torsion was suspected in 12 cases. Other findings included Epididymal cysts (8 Cases),
Hydrocele (6 cases), tumor (4 Cases), Inguinal hernia (4 Cases). Other nonspecific swellings were seen in 12 Cases.

Distribution according to USG and CD diagnosis

Distribution according to USG and CD diagnosis revealed as follows: Acute epididymitis-22%, Acute epididymo orchitis-13.6%, Acute orchitis-13.6%,Funiculitis-2.5%, Varicocele-5.1%, Undescended testes-1.7%, Congenital hydrocele-2.5 Scrotal wall pathologies-2.5%, Right sided hydrocele-8.5%, Left sided hydrocele-6.8%, Bilateral hydrocele-16.9%, Right sided hernia-11.9%, Left sided hernia-12.7%, Bilateral hernia-1.7%, Fournier's gangrene-2.5%, Space occupying lesions-3.4%, Congenital hydrocele-3.4%, Scrotal abscess-5.1%, Microlithiasis- 1.7% and Chronic hydrocele-1.7%.

Navale N. et al[7]reported that Hydrocele was the most common pathology noted in 12 cases (43%), followed by varicocele noted in 6 cases, epididymitis noted in 5 cases, epididymo-orchitis with funiculitis noted in 5 cases, epididymal cysts in 4 cases, undescended testis in 2 cases, testicular neoplastic lesions noted in 2 cases, testicular torsion in 1 case, spermatocele in 1 case, testicular hematoma in 1 case, malrotated testis in 1 case, bilateral small testis in 1 case, congenital hydrocele in 1 case, encysted hydrocele of spermatic cord in 1 case, scrotal wall varices in 1 case, scrotal filariasis with intratesticular varicocele and bilateral testicular cyst in 1 case. These findings are almost consistent with our study findings.

Donald P Orr .et al[10] conducted a prospective study in 20 cases. Out of 21 abnormal testes, hydrocele was the commonest diagnosis (34.2%) followed by epididymoorchitis.

Conclusion

1. Most commonly observed findings on USG and CD in our study were Acute epididymitis-22%, Acute epididymo orchitis-13.6%, Acute orchitis-13.6%, Right sided hydrocele-8.5%, Left sided hydrocele-6.8%, Bilateral hydrocele-16.9%, Right sided hernia-11.9%, Left sided hernia-12.7%.
2. Intra testicular pathology was present in 53.4% of the patients and extra testicular pathology was present in 46.6% of the patients.
3. High-resolution ultrasonography and colour doppler enable in clear demonstration of morphological alterations associated with acute and chronic scrotal inflammatory diseases.
4. High frequency real time sonography is highly sensitive in distinguishing scrotal mass as either testicular or extra testicular masses and is clearly superior to clinical diagnosis.
5. When colour Doppler sonography is supplemented with High frequency grey scale US, the sensitivity of diagnosing acute scrotal pathology will be increased.
6. We conclude that High-frequency ultrasonography and colour Doppler sonography is an extremely valuable tool in evaluation of scrotal and testicular pathologies.

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