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GROSS OBSERVATIONAL STUDY IN PATIENTS WITH SCROTAL PATHOLOGY IN REFERENCE TO THEIR CLINICAL EXAMINATION, ULTRASONOGRAPHIC AND CLINICOPATHOLOGICAL FINDINGS

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Abstract

Objective: To study the nature, type, and clinical presentation of various scrotal pathologies at our centre, and to determine whether clinical examination findings correlate with ultrasonographic results and any associated causes**.**

Methods: This was a gross observational prospective study involving 119 patients recruited from the Department of General Surgery at Akash Institute of Medical Sciences and Research Centre, Bangalore. Patients were evaluated for scrotal pathologies through clinical examination of both sides of the scrotum, ultrasonography, and clinicopathological investigations (blood tests, urine routine, and microscopy). The study was conducted from December 2022 to May 2025.

Results: The mean age of the participants was 29.13 ± 11.64 years. Most participants were in the age group of 21–30 years (31.1%), followed by 31–40 years (29.4%), <20 years (26.1%), 41–50 years (7.6%), 51–60 years (5.0%), and 61–70 years (0.8%). Positive urine culture was observed in 68% of participants, of whom 86.7% were diagnosed with inflammatory pathology. Epididymo-orchitis was the most common scrotal pathology (43.7%), followed by hydrocele (22.7%).

Conclusion: Scrotal pathologies are commonly encountered in general surgical practice and are associated with low mortality. In this study, the most common scrotal pathology was epididymo-orchitis, followed by hydrocele. Clinical examination in benign scrotal pathologies correlated well with ultrasonographic findings; hence, ultrasonography may not be necessary in all cases. However, radiological imaging is recommended in cases where clinical findings do not correlate with age or duration of illness.

Keywords: Scrotal Pathology, Clinical Examination, Ultrasonographic, Clinicopathological Findings

INTRODUCTION:

Scrotal pathologies are commonly encountered in general surgical practice. These conditions affect individuals across all age groups and arise from various etiologies, making accurate diagnosis essential for guiding appropriate surgical or conservative management. The most frequently encountered scrotal pathologies are epididymo-orchitis and hydrocele[1].

Most scrotal pathologies are diagnosed clinically and often present with similar signs and symptoms. However, certain presentations—such as acute scrotum in the elderly, rapid testicular enlargement, or sudden loss of sensation—should raise suspicion for testicular malignancy[2].

The clinical signs of acute scrotum can often overlap with epididymo-orchitis, particularly in pediatric and young adult patients, making clinical differentiation challenging in many cases[3]. Ultrasonography is a critical imaging modality in evaluating scrotal and testicular pathologies, as it offers detailed anatomical visualization of the testis and adjacent structures. It also helps distinguish whether a swelling is intratesticular or extratesticular and whether it is cystic or solid[4]. Sonography has been reported to have a sensitivity of 93.33% in diagnosing scrotal pathologies. Current imaging modalities include high-frequency grayscale ultrasound combined with color Doppler, MRI, testicular angiography, and CT scanning[5].

Although scrotal pathologies are more prevalent among younger age groups[6], it is important to differentiate testicular pathologies such as epididymo-orchitis, testicular torsion, and epididymitis, which may present with overlapping clinical features. Prompt diagnosis and management are crucial, as delayed treatment can lead to persistent symptoms, impaired quality of life, infertility, or even testicular loss[7]. Therefore, it is imperative that all cases of scrotal involvement—whether acute or benign—be evaluated comprehensively at the first presentation.

Based on the above, we conducted a study to assess the nature, type, and clinical presentation of various scrotal pathologies encountered at our centre. We also aimed to evaluate whether clinical examination findings correlate with ultrasonographic findings, and to identify any associated causes.

Materials and Methods:

This was a gross observational prospective study involving 119 patients, conducted in the Department of General Surgery at Akash Institute of Medical Sciences and Research Centre, Bangalore. Patients were assessed for scrotal pathology through clinical examination of both sides of the scrotum, ultrasonography, and clinicopathological investigations (blood tests, urine routine, and microscopy).

Study Duration: December 2022 to May 2025

Sample Size:

A total of 119 patients were included in the study.

The sample size was calculated using the formula:

$n = Z^2pq / d^2$

Where:

- n = required sample size
- Z = standard normal deviate, set at 1.96 for a 95% confidence level
- p = estimated proportion of the population
- q = 1 - p
- d = allowable error

Inclusion Criteria:

- All patients presenting with painless or painful scrotal swellings
- Any purely scrotal pathology, irrespective of age

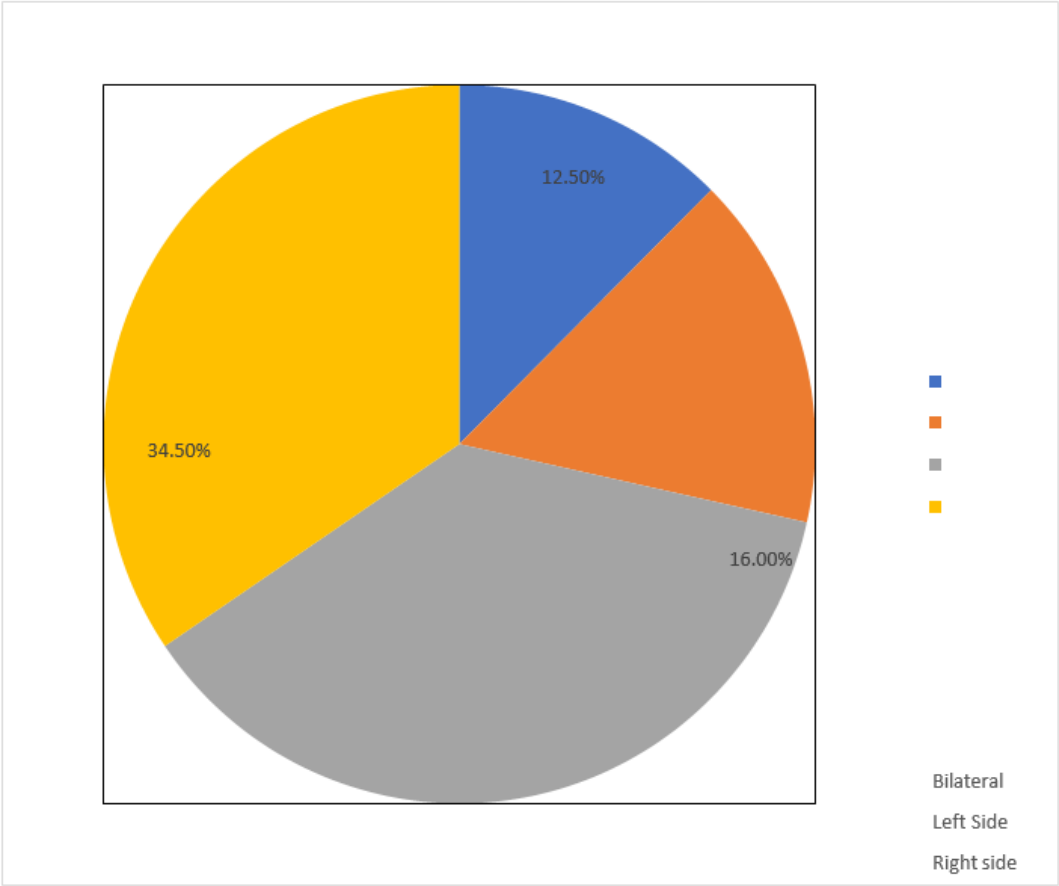
Exclusion Criteria:
• Cases of inguino-scrotal swellings or hernia

Methods Used in the Study:
• Clinical examination
• Presenting symptoms
• Ultrasonographic (USG) findings
• Clinicopathological findings

STATISTICAL ANALYSIS
This is an observational study and hence the result was represented in percentage forms. Graphical representation was done wherever possible. Quantitative data were presented as Mean+SD. Tested with Chi square test and P value<0.05 were taken as statistically significant.

Results: In our study mean age of the study participants (29.13±11.64) years. Majority of the study participants 21-30 years (31.1%), 31-40 years (29.4%), <20 years (26.1%), 41-50 years (7.6%), 51-60 years (5.0%) and 61- 70 years (0.8%).

Figure 1: Pain and its Laterality in scrotum among the study participants (n=119)



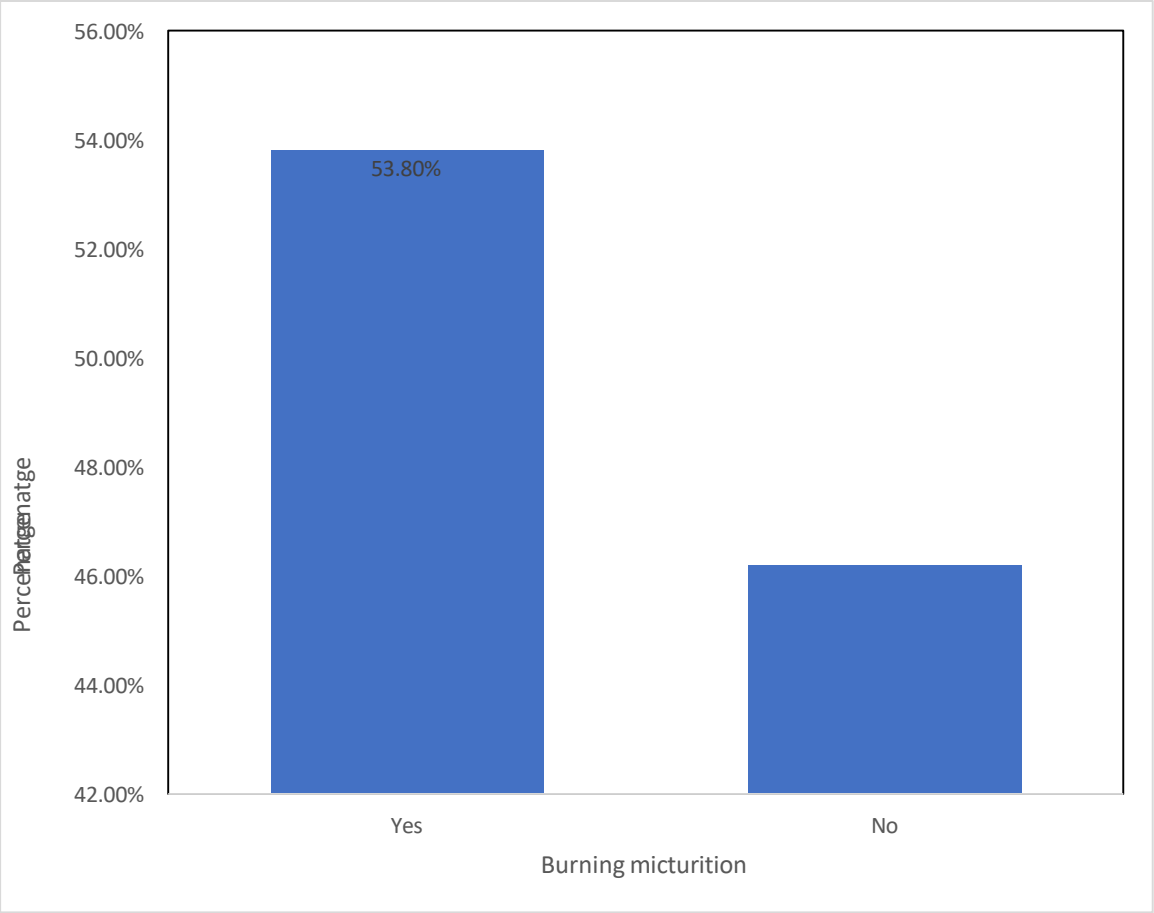


Figure 2: Urinary symptoms among the study participants (n=119)

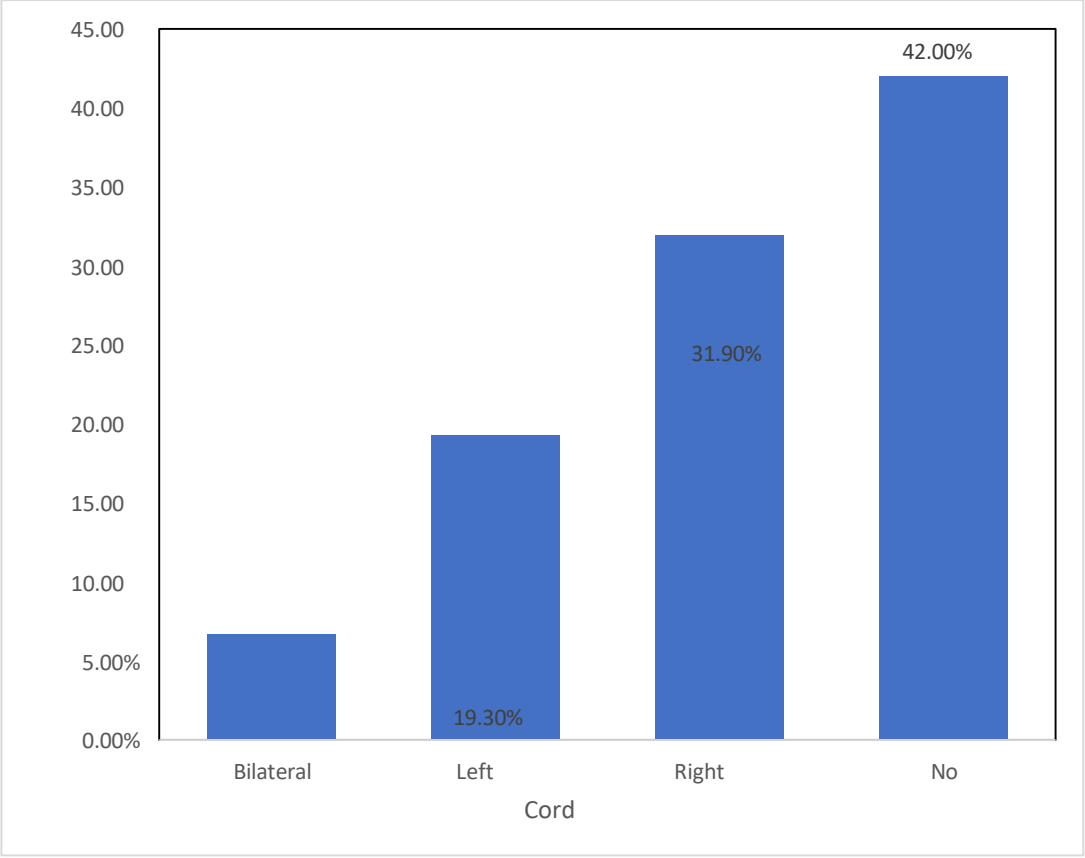


Figure 3: Distribution of cord tenderness among the study participants (n=119)

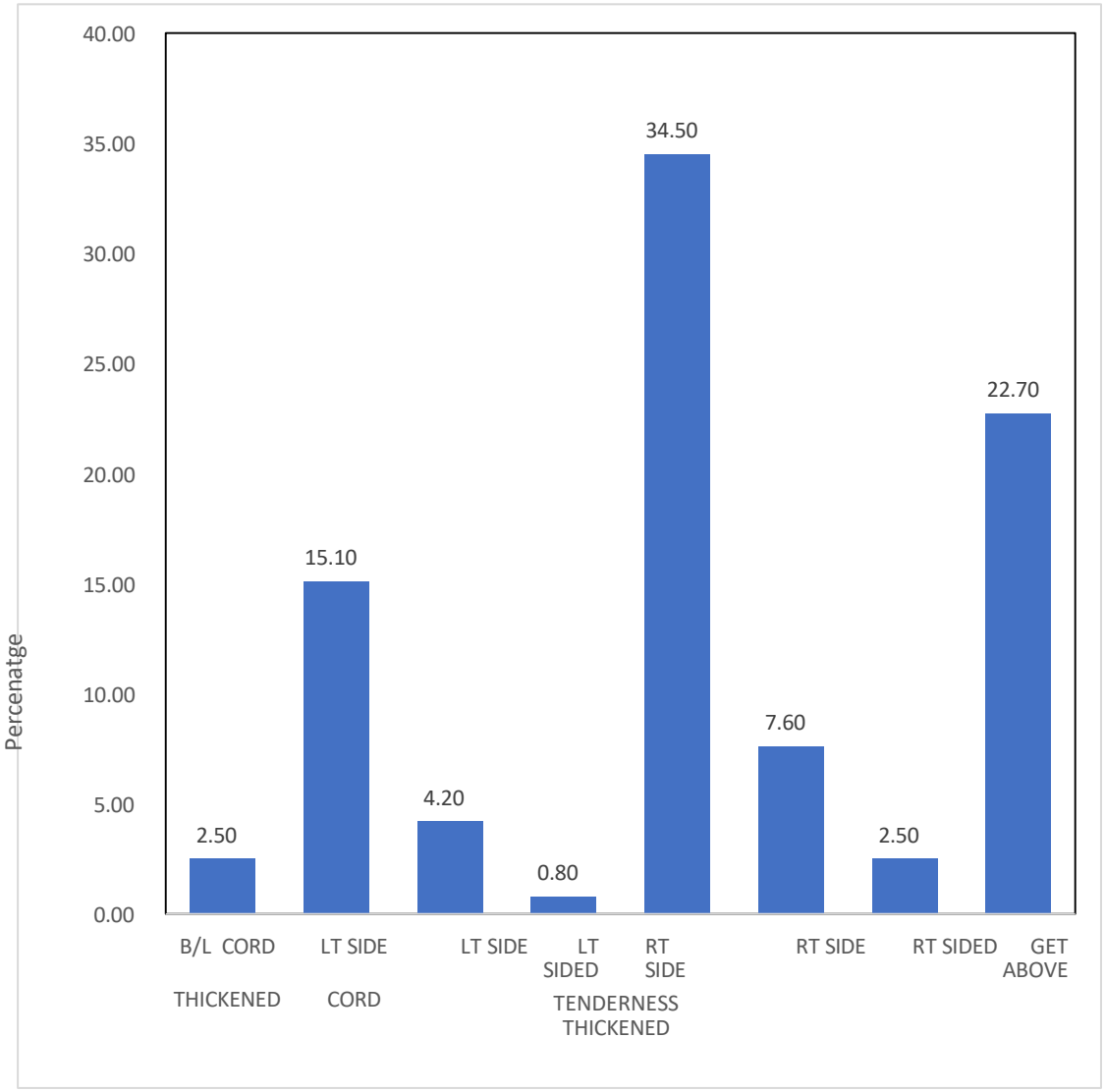


Figure 4: Findings based on clinical examination among the study participants (n=119)

Table 1: Swelling consistency on basis of clinical examination among the study participants (n=119)

Slno	Swelling consistency	Frequency	Percentage%
1	Hard	26	21.8
2	Soft	31	26.2
3	Firm	46	38.6
4	Cystic	16	13.4

Table 2: Findings of urine examination among the study participants (n=119)

Slno	Urine routine	Frequency	Percentage%
1	Albumin +	3	2.5
2	Glucose +	3	2.5
3	Pus cells	78	65.5
4	No Findings	38	31.9

our study 68% of the participants shows the positive urine culture findings out from which 86.7% of participants diagnosed with inflammatory pathology.

Table 3: Organism detected on urine culture among the study participants (n=119)

Slno	Urine culture sensitivity	Frequency	Percentage%
1	Chlamydia trachomatis	21	17.2
2	E.Coli	25	21.0
3	P. Aeruginosa	17	14.3
4	S Faecalis	18	14.6
5	No growth	38	31.9

In our study, the ultrasonographic findings shows (9.2%) had epididymitis, (44.5%) epididymo-orchitis, (22.7%) hydrocele, (3.4%) right sided testicular torsion, (5.9%) scrotal wall cellulitis and (11.8%) varicocele.

Table 4: Ultrasonographic Findingsamong the study participants (n=119)

Slno	Ultrasonographic Finding	Frequency	Percentage%
1	Epididymitis	11	9.2
2	Epididymo-orchitis	53	44.5
3	Hydrocele	27	22.7
4	Testicular Torsion	4	3.4
5	Scrotal Wall Cellulitis	7	5.9
6	Varicocele	14	11.8

In our study, epididymo-orchitis was the commonest scrotal pathology accounting for (43.7%) of total cases, followed by hydrocele which accounted for (22.7%).

Table 5: Distribution of the various pathologies among the study participants (n=119)

Slno	Scrotal Pathologies	Frequency	Percentage%
1	Epididymitis	11	9.2
2	Epididymoorchitis	52	43.7
3	Fournier Gnagrene	3	2.5
4	Hydrocele	27	22.7
5	Scrotal Wall Cellulitis	7	5.9
6	Testicular torsion	4	3.4
7	Varicocele	14	11.8
8	Testicular Carcinoma	1	0.8

Table 6: Association of clinical findings with diagnosis among the study participants (n=119)

Clinical Findings		Diagnosis						
		EPIDIDYMITIS	EPIDIDYMO-ORCHITIS	FOURNIER GANGRENE	HYDROCELE	SCROTAL WALL CELLULITIS	TESTICULAR TORSION	VARICOCELE
B/L CORD THICKENED	Count	0	0	3	0	0	0	0
	%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
LT SIDE CORD	Count	2	16	0	0	0	0	0

THICKENED								
	% within Diagnosis	18.2%	30.2%	0.0%	0.0%	0.0%	0.0%	0.0%
LT SIDE SWELLING	Count	0	0	0	0	0	0	5
	% within Diagnosis	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	35.7%
LT SIDED SCROTAL TENDERNESS	Count	0	0	0	0	0	1	0
	% within Diagnosis	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%
RT SIDE CORD THICKENED	Count	9	32	0	0	0	0	0
	% within Diagnosis	81.8%	60.4%	0.0%	0.0%	0.0%	0.0%	0.0%
RT SIDE SWELLING	Count	0	0	0	0	0	0	9
	% within Diagnosis	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	64.3%
RT SIDED SCROTAL TENDERNESS	Count	0	0	0	0	0	3	0
	% within Diagnosis	0.0%	0.0%	0.0%	0.0%	0.0%	75.0%	0.0%
GET ABOVE SWELLING POSSIBLE	Count	0	0	0	27	0	0	0
	% within	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%

	Diagnosis							
*x^2 (df) p		14.08 (9), 0.12	83.36 (9), <0.001	119.0 (9), <0.001	119.0 (9), <0.001	119.0 (9), <0.001	119.0 (9), <0.001	104.01 (9), <0.001

(chi square)x^2=599.01, df =42, p=<0.001

There is significant correlation between clinical findings with diagnosis.

Table 7: Association of diagnosis with urine culture among the study participants (n=119)

Diagnosis		**Urine culture sensitivity**					**P value *x^2 (df),**
		C TRACHOMATIS	E COLI	NAD	P AERUGINOSA	S FAECALIS	
EPIDIDYMITIS	Count	1	4	0	4	2	9.66 (4), 0.04
	%	5.6%	16.0%	0.0%	23.5%	9.5%	
EPIDIDYMO-ORCHITIS	Count	14	17	0	10	11	45.22 (4), <0.001
	%	66.7%	68.0%	0.0%	58.8%	64.7%	
FOURNIER GANGRENE	Count	2	0	0	0	1	7.90 (4), 0.09
	%	11.1%	0.0%	0.0%	0.0%	4.8%	
HYDROCELE	Count	0	0	27	0	0	74.44 (4), <0.001
	%	0.0%	0.0%	69.23%	0.0%	0.0%	
SCROTAL WALL CELLULITIS	Count	2	5	0	0	0	18.85 (4), 0.003
	%	4.5%	13.4%	0.0%	0.0%	0.0%	
TESTICULAR TORSION	Count	0	0	4	0	0	8.823 (4), 0.06
	%	0.0%	0.0%	10.25%	0.0%	0.0%	
VARICOCELE	Count	3	4	0	3	4	4.59 (4), 0.33
	%	16.7%	16.0%	0.0%	17.6%	19.0%	
TESTICULAR CARCINOMA	Count	0	0	1	0	0	2.19 (4), 0.17
	%	0.0%	0.0%	2.56%	0.0%	0.0%	

(chi square)x^2=129.22, df =24, p=<0.001

There is significant correlation between diagnosis and urine culture sensitivity

Discussion:

In our study, epididymo-orchitis was the most common scrotal pathology, accounting for 43.7% of total cases, followed by hydrocele (22.7%). This is comparable to the study by Cass et al[8], which showed an incidence of epididymo-orchitis of 72.5%, compared to 20.67% for testicular torsion. Another study conducted by N.H. Moharib et al[9] reported testicular torsion (33.92%) as the most common cause of acute scrotal pathology, followed by epididymitis (8.92%). A study conducted by Y.H. Çavuşoğlu et al[10] found the incidence of epididymo-orchitis to be 67%, followed by testicular torsion (18%). Similar to our study, epididymo-orchitis was the predominant pathology.

In our study, the mean age of participants was 29.13 ± 11.64 years. The age distribution was as follows: 21–30 years (31.1%), 31–40 years (29.4%), <20 years (26.1%), 41–50 years (7.6%), 51–60 years (5.0%), and 61–70 years (0.8%). A study conducted by Kailashnath et al[11] found the highest number of cases in the age groups 18–28 years (35.56%) and 28–38 years (32.22%). Similarly, Chauhan et al[12] reported that the 21–30-year age group had the highest incidence (41%). These findings are consistent with our study, which also showed that younger age groups are more commonly affected by scrotal pathologies.

In our study, 10.9% of patients had left-sided swelling, 15.1% had right-sided swelling, and 8.4% had bilateral scrotal swelling. According to Kailashnath et al[11], right-sided swelling was observed in 53.33% of patients, left-sided in 37.78%, and bilateral in 8.89%. Similarly, Patel et al[13] observed right-sided swelling in 59%, left-sided in 39%, and bilateral in 2%. In comparison, our study showed a higher rate of bilateral swelling (8.4%), which is more consistent with the findings of Kailashnath et al.

In the present study, all patients underwent ultrasonography except for those with Fournier's gangrene. Ultrasonographic findings showed 9.2% had epididymitis, 44.5% had epididymo-orchitis, 22.7% had hydrocele, 3.4% had right-sided testicular torsion, 5.9% had scrotal wall cellulitis, and 11.8% had varicocele. A study by Kumar et al[10] emphasized that high-frequency ultrasonography with color Doppler is an excellent diagnostic imaging modality for scrotal swellings. It is highly sensitive, easy to perform, repeatable, and avoids ionizing radiation—particularly important for radiosensitive organs like the testis. In a study by Kailashnath et al[14], radiological diagnosis was advised for 87 patients but was not performed in three cases (Fournier's gangrene, sebaceous cyst, and scrotal abscess). Clinical diagnoses were made in cases of hydrocele, epididymo-orchitis, testicular torsion, varicocele, scrotal abscess, and sebaceous cyst. Our study showed a statistically significant association ($p < 0.001$) between clinical findings and diagnoses. Thus, we believe that ultrasonography may be omitted in patients with a clear clinical diagnosis such as epididymo-orchitis or hydrocele, especially in younger individuals.

In our study, 68% of participants showed positive urine culture findings, among which 86.7% were diagnosed with inflammatory pathology. This is comparable to the study by Pasupuleti et al[15], in which E. coli was the most commonly isolated organism, similar to our findings. In the study conducted by Sung Dae Kim et al[16], 65% of patients with inflammatory scrotal pathology had sexually transmitted diseases (STDs) such as Chlamydia trachomatis or Neisseria gonorrhoeae, while 45% of those with non-inflammatory pathology had gram-negative Escherichia coli. In contrast, 53.8% of our study participants reported urinary symptoms, and 68.06% had positive urine cultures. The most common organism in our study was E. coli, followed by C. trachomatis. The association between scrotal pathology and positive urine culture was statistically significant ($p < 0.001$, Chi-square test). Therefore, we recommend that all patients with scrotal pathology undergo urine examination.

Conclusion

Scrotal pathologies are a common clinical problem in general surgery with a low mortality rate. In our study, the most common scrotal pathology was epididymo-orchitis, followed by hydrocele. As benign scrotal pathologies, clinical examination often correlates well with ultrasound findings. Therefore, not all scrotal pathologies require ultrasonography. However, in cases where clinical findings do not correlate with the patient's age or duration of symptoms, radiological investigations should be performed. Our study also found a significant association between scrotal pathologies and urine culture findings. Hence, we conclude that all patients with scrotal pathologies should undergo urine examination as part of their diagnostic workup.

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