International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 24s, 2025
https://www.theaspd.com/ijes.php

Evaluation Of Scrotal Pathologies Using Ultrasound

Dr. Chiranth N A[1], Dr. Chiranth N[2], Dr. Shashikumar M R[3], Dr. Manu R[4], Dr. Tamanna Babbar[5], Dr. Dhananjay V R[6], Dr. Kushal M[7]

[1]Junior Resident, Department of Radiodiagnosis, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[2]Associate Professor, Department of Radiodiagnosis, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[3]Professor and Head, Department of Radiodiagnosis, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[4]Associate Professor, Department of Radiodiagnosis, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[5]Junior Resident, Department of Radiodiagnosis, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[6]Junior Resident, Department of Radiodiagnosis, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.
[7]Junior Resident, Department of Radiodiagnosis, Adichunchanagiri Institute of Medical Sciences (A.I.M.S), Adichunchanagiri University, B.G. Nagara – 571448, Karnataka, India.

Abstract

Background: *The scrotum and its contents are normally accessible for clinical examination under normal conditions. Physical examination may be limited by to tenderness or swelling. Gray scale and Doppler ultrasound imaging supplements the clinical examination, as an accurate means of evaluating diverse scrotal diseases. It permits differentiation between the lesions like torsion that require urgent surgical management from orchitis which can be managed conservatively.*

Objectives

- *To study the pattern of distribution of non-traumatic scrotal diseases among 12 years or older patients attending the outpatient department of radiodiagnosis department Adichunchanagiri Hospital and Research centre, B.G. Nagara, Nagamangala Taluk, Mandya District to study the sonographic appearance of the spectrum of scrotal diseases.*
- *To establish the surgical or non-surgical method of treatment for the pathologies detected in the study subjects.*

Materials And Methods: *The study was conducted on 73 patients presenting to the outpatient department of radiodiagnosis, Adichunchanagiri Hospital and Research Centre, B.G. Nagara, Nagamangala Taluk, Mandya District with symptoms pertaining to the scrotum during a period of 18 months. They were subjected to scrotal ultrasound examination. Frequency and proportion were calculated using Epi Info™ for Windows version 7.*

Keywords: *Gallstones, Cholelithiasis, Endoscopy, Digestive System, Ultrasonography, Postcholecystectomy Syndrome, Gastritis, Duodenitis, Esophagitis, Hiatal Hernia, Dyspepsia, Abdominal Pain*

INTRODUCTION:

The scrotum is a Musculo-fascial sac containing the testes, epididymis and its appendages. The global burden of scrotal pathologies is significant due to their impact on reproductive health, quality of life, and associated healthcare costs. Conditions like varicocele affect about 15% of adult men and contribute to up to 40% of male infertility cases. Testicular torsion, though less common, can lead to a high rate of testicular loss if not managed promptly, adding to emotional and economic challenges. Testicular cancer, which predominantly affects young men aged 21–40, has been increasing in incidence in developed countries, although improved treatments have resulted in better outcomes 1. Infectious conditions such as epididymo-orchitis are widespread, with higher prevalence in regions where healthcare access is limited. Severe conditions like Fournier's gangrene and filariasis-associated scrotal elephantiasis contribute to significant morbidity and mortality in low- and middle-income countries.

Dermatological conditions of the scrotum, such as sebaceous cysts, scrotal dermatitis, and elephantiasis due to chronic lymphatic obstruction, are also significant concerns, particularly in tropical regions.

Role of ultrasound

High frequency ultrasound in the range of 7–15 MHz, provides high-resolution, real-time imaging that is an excellent modality to evaluate the scrotal wall, epididymis, testis and it's appendages as it provides good anatomical detail, along with colour doppler imaging helps determining the vascularity of the testes and it's viability, making it particularly valuable for identifying vascular conditions such as testicular torsion and varicocele.

METHODOLOGY

Materials and Methods

Source of Data

The study was conducted on patients fulfilling the inclusion and exclusion criteria in the **Ultrasound Section of the Department of Radiodiagnosis, Adichunchanagiri Hospital and Research Centre, B.G. Nagara, Nagamangala Taluk, Mandya District.**

Follow-up was carried out in the outpatient department.

This was an inpatient-based study.

- **Study Duration:** 18 months (May 2023 – November 2024).
- **Study Design:** Descriptive cross-sectional study.
- **Sample Size:** 73 (calculated using periodic sampling).

Inclusion Criteria

- Patients aged **12 years and older** with **positive non-traumatic examination findings** for scrotal pathologies.

Exclusion Criteria

- Post-operative patients.

Method of Collection of Data

After obtaining informed consent, patients included in the study were interviewed regarding their symptoms, which were recorded.

All patients underwent **scrotal ultrasonography** using a **7.0–12.0 MHz high-frequency linear array transducer coupled with Colour Doppler**.

- **Demographic data** collected: age, symptoms, clinical diagnosis.
- **Ultrasound findings** analyzed for:
    - Hydrocele
    - Varicocele
    - Testicular abscess
    - Extra-testicular abscess
    - Epididymal cyst
    - Epididymitis
    - Orchitis
    - Testicular torsion
    - Tumours
    - Scrotal wall thickening
    - Inguino-scrotal hernia
    - Calcifications (if any)

Subsequently, cases were confirmed by:

- Surgical findings
- Histopathology reports
- Response to treatment
- Follow-up scans, wherever applicable.

Statistical Analysis

Sample size calculation:

$$S = \frac{Z^2 \cdot P \cdot Q}{D^2}$$

Where:

- $S =$ sample size
- $Z =$ standard value at 0.05 level $= 1.96$
- $P =$ prevalence proportion $= 0.05$

- $Q = 1 - \mathrm{P} = 0.95$
- $D =$ margin of error $= 0.05$

$$S = \frac{(1.96 \times 1.96 \times 0.05 \times 0.95)}{0.05 \times 0.05} = 73$$

- Sampling Technique: Purposive sampling
- Type of Study: Cross-sectional / Observational

Data analysis methods:

- Descriptive statistics: mean, standard deviation, frequency, percentage.
- Non-parametric statistics: chi-square test.

Software Used: SPSS for Windows, Version 28
Level of Significance: $p < 0.05$

RESULTS

Age Distribution of Study Population

Table 1. Distribution of patients based on age group

Age (in years)	Number of patients	Percentage (%)
11–20	9	12.3
21–30	11	15.0
31–40	11	15.0
41–50	17	23.2
51–60	13	17.8
61–70	5	6.8
71–80	6	8.2
81–90	1	1.3
Total	**73**	**100**

The study included a total of **73 patients**. The most commonly involved age group was **41–50 years** (n = 17; 23.2%), followed by **51–60 years** (n = 13; 17.8%).
The least number of patients were in the **81–90 years group** (n = 1; 1.3%).
Patients aged **21–60 years constituted 80%** of the study population.
The youngest patient was **12 years old** and the oldest was **82 years old**.
The **mean age** of the study population was **44.49 years**.

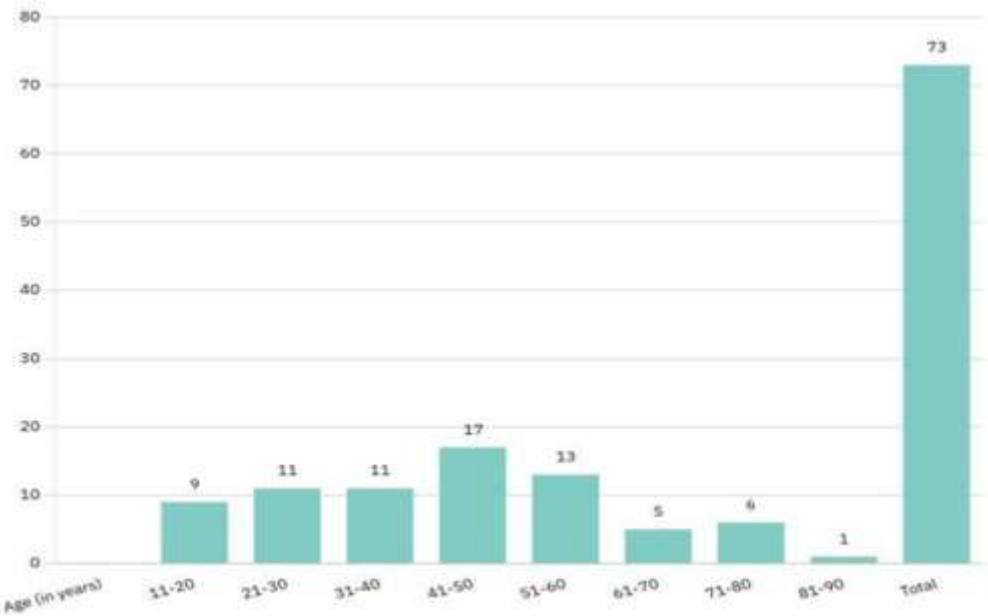

Figure 1. Age distribution of the study population USG Diagnosis of Various Causes of Scrotal Pathologies

Table 2. USG diagnosis of various scrotal pathologies

Condition	Number of Lesions	Percentage (%)
Epididymal cyst	24	12.06
Acute epididymitis	11	5.57
Acute epididymo-orchitis	30	15.07
Testicular torsion	3	1.51
Hydrocele	40	20.10
Varicocele	47	23.61
Scrotal wall edema	3	1.51
Scrotal wall abscess	5	2.51
Testicular tumour	2	1.00
Testicular abscess	1	0.50
Funiculitis	25	12.56
Inguino-scrotal hernia	7	3.51
Undescended testis	1	0.50
Total	**199**	**100**

On USG, a total of **199 lesions** were detected. The most common lesion was **varicocele** (n = 47; 23.61%), followed by **hydrocele** (n = 40; 20.10%), **epididymo-orchitis** (n = 30; 15.07%), **funiculitis** (n = 25; 12.56%), and **epididymal cysts** (n = 24; 12.06%).

Less frequent findings included epididymitis (n = 11; 5.57%), inguino-scrotal hernia (n = 7; 3.51%), scrotal wall abscess (n = 5; 2.51%), scrotal wall edema (n = 3; 1.51%), testicular torsion (n = 3; 1.51%), testicular tumour (n = 2; 1%), and undescended testis and testicular abscess (n = 1 each; 0.5%).

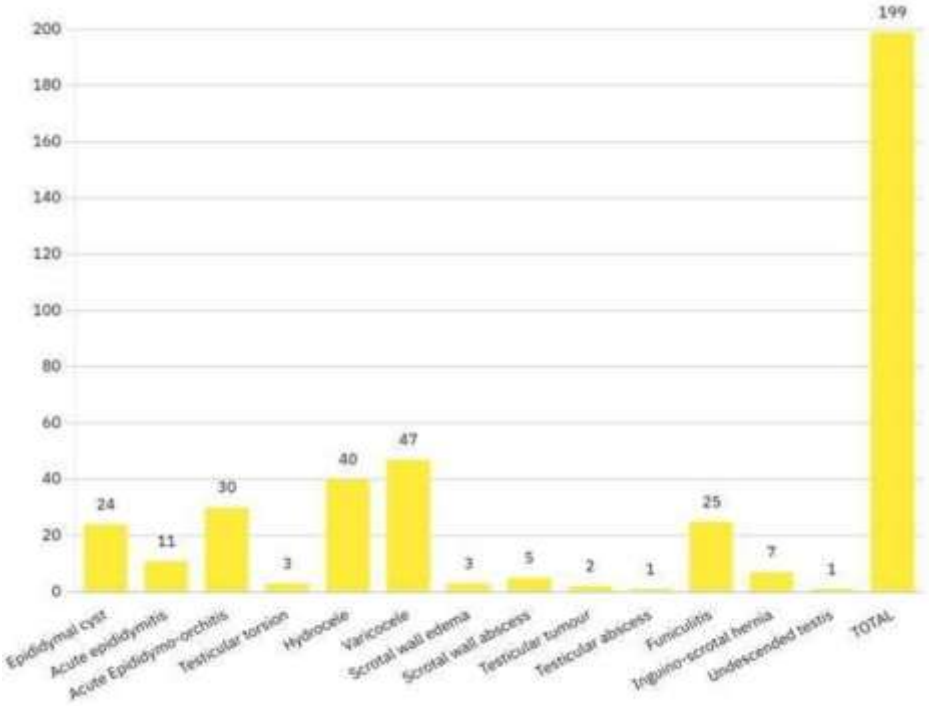

Figure 2. USG diagnosis of various scrotal pathologies Laterality of Lesions

Table 3. Distribution of lesions based on side involved

Side Involved	Number of Lesions	Percentage (%)
Right	54	35.76
Left	49	32.45
Bilateral	48	31.79
Total	**151**	**100**

The number of scrotal lesions was higher on the **right side (35.76%)**, followed by the **left side (32.45%)**, while **bilateral involvement** accounted for **31.79%**.

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 24s, 2025
https://www.theaspd.com/ijes.php

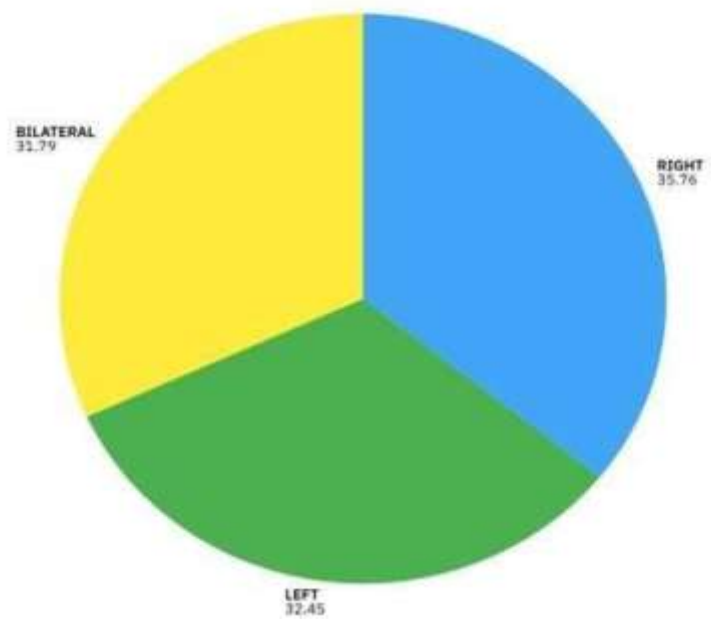

Figure 3. Laterality of lesions Symptoms Associated with Scrotal Pathologies

Table 4. Symptoms associated with scrotal pathologies

Symptom	Number of Patients	Percentage (%)
Swelling	53	72.60
Pain	61	83.56
Fever	11	15.06
Infertility	5	6.85

The most common presenting symptom was **pain** (n = 61; 83.56%), followed by **swelling** (n = 53; 72.60%). Most patients with infectious causes (epididymitis, epididymo-orchitis, testicular abscess) presented with both pain and swelling.

Fever was noted in 11 patients (15.06%), predominantly in infective/inflammatory lesions. **Infertility** was seen in 5 patients (6.85%), all of whom had varicocele.

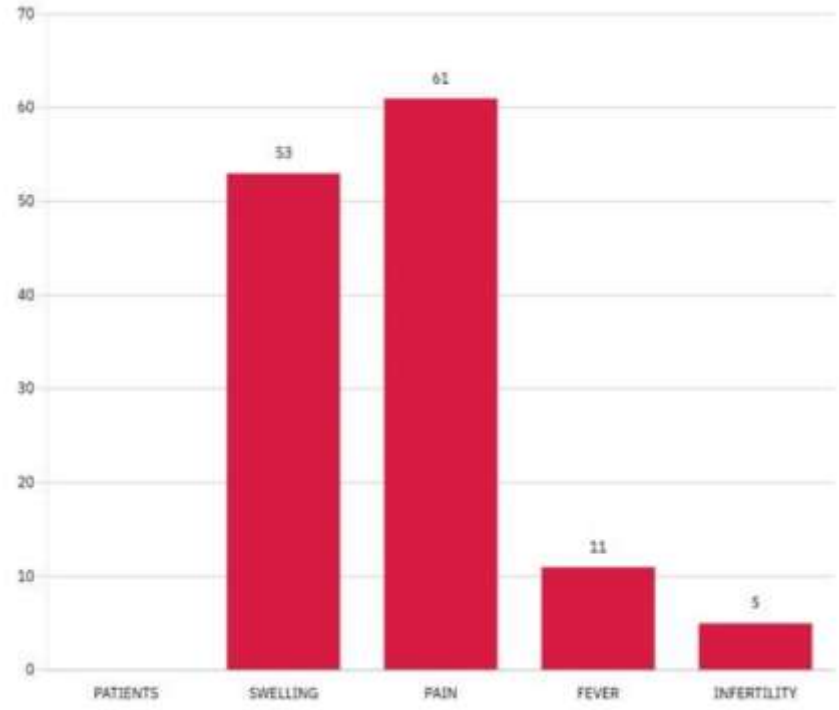

Figure 4. Symptoms associated with scrotal pathologies

DISCUSSION

The objectives of the study were to study the distribution of scrotal pathologies among the subjects and the sonographic appearance of the spectrum of scrotal diseases. Histopathology or follow-up USG were done wherever required. This descriptive observational study was carried out over a period of 18 months from May 2024 to November 2024 on 73 patients with complaints pertaining to the scrotum. They were subjected to high frequency ultrasonography and colour Doppler imaging at the Department of Radiodiagnosis, Adichunchanagiri institute of Medical sciences & Research Institute. Consecutive patients who met the inclusion criteria were included in the study.

The study included a total of 73 patients. The patients most commonly involved were those belonging to the age group of 41-50 years (n = 17;23.2 %), followed by 51 to 60 years (n= 13; 17.8 %. The least number of patients belonged to the age group of 81-90 years (n = 1; 1.3 %). The patients from the age group of 21 to 60 years constituted 80% of the study population. The youngest patient was 12 years old. The oldest patient was 82 years old. The mean age of the study population was 44.49 years.

On USG, the total number of lesions detected were 199. The most common lesion causing of scrotal pathologies was varicocele(n=47,23.61%), followed by hydrocele(n=40, 20.10%), epididymo-orchitis (n =30, 15.07%), funiculitis (n= 25, 12.56%), epididymal cyst (n= 24, 12.06 %) epididymitis (n = 11; 5.57%) , inguinoscrotal hernia (n = 7, 3.51 %) scrotal wall abscess (n= 5,2.51%) testicular torsion (n=3,1.51%),scrotal wall edema (n=3,1.51%), testicular tumour (n=2,1.0 %) and undescended testis and testicular abscess (n=1, 0.50 %).

The number of scrotal lesions seen on the left side were 47(32.45%), on the right side were 53 (35.76%) and in bilateral locations were 46(31.79 %), however hydrocele was pathology seen in most number of cases.

Almost all the scrotal pathologies were associated with pain (n=53, 72.60%) except in two cases. The second most common complaint was scrotal swelling and was seen in forty patients (n=53, 72.60%).

CONCLUSION

High frequency ultrasonography with colour Doppler study serves as an excellent diagnostic imaging modality in the evaluation of scrotal swellings. It is the investigation of choice as it is highly sensitive, easy to perform, widely available, repeatable and involves no risk of ionizing radiation, especially to radiosensitive parts like testis. It helps to arrive at an accurate diagnosis in a majority of patients with scrotal swellings, thus guiding further management. When USG findings are inconclusive MRI may be useful.

Periodic follow-up USG studies are recommended for all patients with inflammatory scrotal lesions for monitoring response to treatment or to reveal development of complications.

REFERENCES:

1. Colquhoun AJ. The testis and scrotum. Ellis and Calne's Lecture Notes in General Surgery. 2023 Mar 6:466-75.
2. Asif AA, Shah N, Orzulak FJ. Staphylococcus lugdunensis causing epididymo-orchitis with scrotal pyocele. IDCases. 2021 Jan 1;24:e01142.
3. Dhadwal A, Kumari P, Thakur C. A Comprehensive Review on Hydrocele. Research Journal of Pharmacology and Pharmacodynamics. 2024;16(2):107-13.
4. Bhaskar MV. Role of High Resolution Sonography and Colour Doppler in the Evaluation of Scrotal Diseases (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India)).
5. Sweet DE, Feldman MK, Remer EM. Imaging of the acute scrotum: keys to a rapid diagnosis of acute scrotal disorders. Abdominal Radiology. 2020 Jul;45(7):2063-81.
6. Kilcoyne KR, Mitchell RT. Fertility preservation: testicular transplantation for fertility preservation: clinical potential and current challenges. Reproduction. 2019 Nov 1;158(5):F1-4.
7. Coursey Moreno C, Small WC, Camacho JC, Master V, Kokabi N, Lewis M, Hartman M, Mittal PK. Testicular tumors: what radiologists need to know—differential diagnosis, staging, and management. Radiographics. 2015 Mar;35(2):400-15.
8. Kaltsas A, Dimitriadis F, Zachariou D, Zikopoulos A, Symeonidis EN, Markou E, Tien DM, Takenaka A, Sofikitis N, Zachariou A. From Diagnosis to Treatment: Comprehensive Care by Reproductive Urologists in Assisted Reproductive Technology. Medicina. 2023 Oct 15;59(10):1835.
9. Kulchavenya E. Urogenital tuberculosis: epidemiology, diagnosis, therapy. Springer International Publishing; 2014 Apr 2.
10. Liew FF, Dutta S, Sengupta P. Fertility treatment-induced oxidative stress and reproductive disorders. Journal of Integrated Science and Technology. 2024;12(3):756-
11. Liguori GI, Bucci S, Zordani A, Benvenuto S, Ollandini G, Mazzon G, Bertolotto MI, Cacciato F, Siracusano SA, Trombetta CA. Role of US in acute scrotal pain. World journal of urology. 2011 Oct;29:639-43.