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SCROTAL PATHOLOGY EVALUATION USING HIGH RESOLUTION SONOGRAPHY IMAGING

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ABSTRACT

The primary goal of this study is to learn more about scrotal pathology and research it. It has been discovered that there has been significant progress in terms of both diagnosis and treatment. In this regard, it is essential to determine what factors influence scrotal diseases and to identify boxes, tables, and photos that aid clinical analysis. This study aims to see how real-time grayscale sonography works to detect scrotal lesions and its imaging properties. Furthermore, we try to distinguish between benign and malignant scrotal masses and correlate sonographic results with guided FNAC and/or biopsy wherever possible.

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1. INTRODUCTION

Scrotal edoema and discomfort are common in clinical practice [1]. Although a patient's history and physical examination may be sufficient to make a diagnosis in some instances, a vast number of patients require further tests to get a comprehensive picture of their symptoms [2,3]. Clinical examinations are frequently deceptive or non-specific. The discomfort and/or edema of the scrotal contents might sometimes prevent a thorough examination [4]. Patients who come with sudden onset of scrotal discomfort might be challenging to diagnose. Early exploration has traditionally been favored [5,6]. However, because it is believed that over 80% of acute scrotal processes are inflammatory in origin, this may result in a slew of unnecessary procedures.

Research published in 1974 was the first to employ B-mode ultrasonography to assess the testes and scrotum [7]. Ultrasonography has become an invaluable diagnostic technique for evaluating scrotal disease due to dramatic developments in sonographic technology and apparatus over the previous two decades [8]. In identifying, characterizing, and localizing intrascrotal anomalies, high–resolution real–time ultrasonography has proven a high degree of accuracy and sensitivity [9,10]. Noninvasive imaging and evaluation of tiny arteries in superficial organs are now achievable because of high–resolution real-time ultrasonography. The testis is the superficial organ where CDFI has had the most impact. It has reduced the number of clinical diagnostic options evaluated in the differential diagnosis, reducing the necessity for scrotal surgery and assisting in making precise diagnoses in situations of acute scrotal discomfort [11].

Because computed tomography uses ionizing radiation, it is not advised for gonadal evaluation [12]. CT's use in scrotal pathology is limited to staging testicular cancers by determining the precise location of retroperitoneal lymph nodes [13]. The normal scrotum and its contents may be seen in fine anatomic detail using a Magnetic Resonance Imaging (MRI) session [14]. Its large field of view allows it to check both the right and left hemi scrotal contents and the inguinal areas simultaneously, which is a significant benefit over ultrasonography. The testes, epididymis, and spermatic cord can all be distinguished thanks to the excellent contrast and spatial

resolution [15]. The costs of MRI, the lengthier examination duration, and picture deterioration caused by patient mobility are drawbacks.
Testicular scintigraphy has good sensitivity and specificity in diagnosing testicular torsion [16]. However, its low resolution, lack of structural information, high cost, and use of ionizing radiation restrict it. The advantages of both testicular scintigraphy and grey scale sonography are combined in color Doppler flow imaging [17]. The goal of this study was to assess the use and accuracy of high-resolution sonography and use this multifaceted data to lessen diagnostic challenges in these instances.

2. MATERIALS AND METHODS

The research was carried out at Sri Lakshmi Narayana Institute of Medical Sciences, Medical College, and Hospital in collaboration with the Department of Surgery. It included 93 individuals of various ages who had symptoms of scrotal illness. Patients who did not return for their follow-up appointments were excluded from the research.

2.1. CLINICAL ASSESSMENT

A thorough history of clinical symptoms and presenting complaints was collected. All patients underwent bimanual palpation to establish the state of scrotal contents. As needed, fluctuation, reducibility, and transillumination tests were performed. In cases of suspected testicular cancers, probable metastasis sites were investigated.

2.2. RADIOLOGICAL EXAMINATION

Grayscale, CDFI, and PD sonography of scrotal lesions were performed with high-frequency 7 to 12 MHz linear / sector array transducers. When substantial scrotal swellings were present, 5 or 3.5 MHz transducers were required for sufficient penetration. These tests were carried out using a TOSHIBA NEMIO X 2.0. The picture visualization was acquired on a monitor extension. The multiformat camera was used to retrieve the selected photographs in several planes that were saved on the hard drive. The colorful visuals were taken directly from the display and shot.

2.3. PREPARATION

There was no need to prepare the patient in any way. Pubic hairs were preferred to be shaved prior to the inspection. If abdominal sonography was thought to be essential, patients were fasted overnight.

2.4. INCLUSION CRITERIA:

- All cases with clinical manifestations of testicular pathology.
- Cases of all age groups.

2.5. EXCLUSION CRITERIA:

- All cases with lacerated trauma.

2.6.TECHNIQUE

The examination took place in a location that provided the patient with enough comfort and privacy. The patient was urged to lie down supine with his legs slightly apart. For support, a towel sling was inserted beneath the scrotum. The penis was lifted and draped on an anterior abdominal wall. The scrotal contents were palpated carefully to begin the examination. A suitable amount of Aquasonic gel was applied to the scrotal area

to avoid pressure and discomfort.

The scrotum was scanned from the anterior, lateral, and inferior surfaces in the longitudinal and transverse planes. When necessary, the examination was extended to include the spermatic cord and groin areas. In cases of varicocele, the assessment was carried out in the supine position, using the Valsalva maneuver, and then in the upright position to confirm the diagnosis. Masses were photographed and captured in several planes. Special attention was paid to set gains and time gain compensation (TGC) to avoid pathological masking and optimize contrast resolution in grey-scale imaging. To illustrate minor variations in echo texture, a comparison with the contralateral testis proved beneficial.

2.7. LABORATORY INVESTIGATIONS

Relevant investigations were performed wherever required, and a USG-guided FNAC or biopsy was performed. Finally, an investigation was carried out to correlate clinical results with sonography. CDFI and PD were tested for efficacy in a variety of lesions. The importance of linking perceptible results and the sonographic examination was emphasized. The sonographic results were associated with histology in 68 individuals. Other patients were sonographically and clinically followed up on.

3. RESULTS

A total of 93 individuals were assessed utilizing high-resolution grayscale sonography, Color Doppler flow imaging (CDFI), and power Doppler flow imaging (PDFI) for pathological scrotum disorders (PD). These patients varied in age from 3 months to 72 years (Table 1).

Table 1: Age distribution of the cases

S.No	Age Groups (Years)	No. of Cases	Percentage (%)
1	0-10	11	11.8
2	11-20	14	15
3	21-30	35	37.6
4	31-40	20	21.5
5	41-50	08	8.6
6	51-60	04	4.3
7	60 and above	01	1
Total		93	100

The significant symptomatology of the patients is shown in Table 2:

Table 2: Clinical Symptomatology

S. No	Symptoms	No. of Cases	Percentage (%)
1	Scrotal Swelling	64	44.4
2	Scrotal Pain	46	22.9
3	Empty Scrotal Sac (One Or Both Sides)	4	1.9
4	Trauma	9	4.5
5	Infertility	21	10.5

Scrotal edoema was the most common symptom (36.3 percent), followed by scrotal discomfort (22.9 percent). The majority of the patients experienced several symptoms. Table 3 shows the incidence of intratesticular and extratesticular lesions.

Table 3: Incidence of Intratesticular / Extratesticular Lesions

S.no.	Type of Lesion	No. of cases
1.	Intratesticular	15
2.	extratesticular	77
3.	Intra+Extratesticular	52
Total		144

Table 4: Sonographic Features of Malpositioned Testis (N=5)*

Features	No. of cases	Percentage (%)
Position of testis • Inguinal • Deep Inguinal Ring • Other	 3 2 0	 60 40 0
Size (compared to normal size) • Increased • Normal • Decreased	 1 1 3	 20 20 60
Echo pattern • Normal • Hypoechoic • Hyperechoic • Heteroechoic	 1 3 0 1	 20 60 0 20
Asso. Features • Torsion • Inguinal Hernia • Hydrocele	 1 1 2	 20 20 40

*one patient had bilateral undescended testis.

The inguinal canal was the most prevalent for undescended testis (60 percent). Two patients had associated hydrocele, and one had an inguinal hernia. One patient had torsion of the testes as a complication. The most frequent fluid collection observed was hydrocele. Inflammatory disorders of the scrotum were linked to 31.6 percent of the cases. All cases had unilateral varicoceles. Varicoceles were present on the left side in 13 cases (86.7%) and on the right in 2 cases (13.3%). All patients were proven surgically to have a varicocele.

Three cases of spermatocele (50%) and six cases of epididymal cysts (75%) affected the head of the epididymis. The contents of spermatocele were echogenic in 83 percent (5/6) of cases, but epididymal cysts were anechoic in all cases. In two instances of spermatoceles and one epididymal cyst, vessels were detected within the septae (Table 5).

TABLE 5: Comparison of Benign and Malignant Testicular Cysts

FEATURES	Benign cysts(n=3)	Malig.cysts(n=4)
Number • Single • Multiple	 3 0	 3 0
Location • Upper pole • Lower pole • Anterior • Posterior	 2 1 2 1	 3 1 1 3
Cyst walls • Smooth, thin • Shaggy, thick & poorly marginated	 3 0	 0 4
Unilocular Multilocular	3 0	1 3
Surrounding soft tissue • Normal • Abnormal	 3 0	 0 4
Cyst contents • Anechoic • Echogenic	 3 0	 3 1
CDFI AND PD FEATURES • Vascularity of the testis • Vascularity of the cysts	 Normal avascular	 Hypervascular Avascular

In this investigation, benign cysts were solitary, unilocular, and had smooth, thin walls. On the other hand, Malignant cysts had shaggy, thick, and weakly marginated walls in all cases and were multilocular in 75% of them. In benign cysts, normal testicular parenchyma was evident surrounding them, whereas tumor parenchyma was apparent around malignant cysts.

4. DISCUSSION

This study aimed to compare the multidimensional data generated by high-resolution grayscale sonography and Color Doppler flow imaging in the diagnosis of scrotal disease. This study comprised 93 individuals who indicated a lesion in the scrotal tissues. Young guys were more likely to have scrotal diseases. Scrotal edema was the most common complaint, followed by scrotal discomfort. A total of 144 pathological lesions were found in the 93 individuals who participated in the research. In 5.3 percent of our patients, cryptorchidism was discovered. The right side of the body was heavily affected. The inguinal canal was our patients' most prevalent site for cryptorchid testes (60 percent). Sixty percent of the testes were homogeneous and hypoechoic. One example involved the torsion of undescended testes. On the contralateral side, two testes had grade I vascular signals, whereas the other had grade II.

5. CONCLUSION

In clinical and laboratory data, different parameters in scrotal illnesses have been researched and analyzed sonographically (grayscale, CDFI, and PD). The following conclusions may be drawn from this research: Scrotal diseases were seen in all age categories, with young guys having the highest prevalence. The most prevalent clinical signs were scrotal swellings followed by scrotal discomfort. Scrotal lesions' anatomical characteristics and vascularity could be consistently defined using high–resolution sonography with color Doppler flow imaging (CDFI) and power Doppler (PD). Sonography accurately determined whether a scrotal tumor was solid or cystic. In this investigation, 100 percent accuracy was attained. Sonography helped determine if a scrotal abnormality was intra or extra-testicular. This was crucial because practically all additional testicular diseases are harmless. In 98 percent of our situations, this was doable. Sonography was found to be 100 percent sensitive to the diagnosis of hydrocele. It also aided in determining the integrity and size of testes in situations with big hydrocele, which is a challenging clinical task. Idiopathic hydroceles might be distinguished from those caused by trauma or infections using sonography. High-resolution sonography might be employed as a first-line inquiry in evaluating scrotal diseases, according to the findings of this study.

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Nil

COMPETING INTEREST

The authors declare no conflict of interest.

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