

## ORIGINAL RESEARCH

# Evaluation of scrotal swellings by colour doppler ultrasonography

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### ABSTRACT

**Background and Objective:** The preferred method for separating testicular torsion from inflammatory diseases is colour Doppler ultrasonography (US), which can help patients avoid needless surgical explorations.

**Methods:** In the radiology department of Tripura Medical College and Dr. B.R. Ambedkar Memorial Teaching Hospital, Hapania, Agartala, Tripura, a nine-month cross-sectional study of 100 patients was conducted (January to November 2020). The study, which will employ a purposeful sampling technique, will cover all patients with scrotal oedema who were referred throughout the study period. Analysis was done on the clinical presentation, result, and US outcomes.

**Results:** The results of colour Doppler sonography showed that torsion had 100% positive and negative predictive values (PPV and NPV), 100% sensitivity, and 100% specificity. Some residual perfusion may be found in cases of partial or early torsion, producing false-negative results.

**Conclusion:** As a result, we draw the conclusion that colour Doppler sonography can effectively rule out testicular torsion, hence preventing the need for pointless surgical exploration. As a result, it can considerably enhance results and lower patient morbidity. It is a crucial addition to the clinical evaluation of the scrotum and is accurate, quick, affordable, and nonionizing.

**Keywords:** Color Doppler, Scrotum, Ultrasonography

### INTRODUCTION

It's crucial to be able to properly determine if an acute scrotal discomfort patient needs surgery versus nonsurgical treatment. The advantages of early surgery for testicular salvage in ischemic illness, particularly testicular torsion, are well documented; nevertheless, they must be weighed against the expenses of operating unnecessarily on many patients with nonsurgical disease, particularly acute epididymo-orchitis. Acute scrotum is characterised as acute discomfort that may or may not be accompanied by scrotal enlargement and by local or widespread symptoms. Acute epididymitis or epididymo-orchitis and torsion of the spermatic cord are the two most frequent differential diagnosis for an acute scrotum. Strangulated hernia, segmental testicular infarction, testicular tumour, and idiopathic scrotal oedema are a few less frequent diagnoses. [1]

High resolution grey-scale ultrasonography has been a very useful tool for assessing scrotal morphologic anomalies over the past ten years. However, because the morphologic alterations in a few disorders are non-specific, it has some limitations. With the development and launch of colour Doppler USG—a non-invasive method that enables simultaneous real-time presentation of tissue shape in greyscale and blood flow in color—this is now possible. For evaluating scrotal lesions and testicular perfusion, gray-scale ultrasonography (USG) in conjunction with colour or power Doppler imaging is a widely used approach. [2-5].

Testicular and extra-testicular disorders are separated and categorised as scrotal lesions. Vascular disorders such torsion, infections, neoplasms, and inflammatory illnesses are among the most typical pathologies of the testicles. Lesions of the spermatic cord, epididymis, and scrotal wall are additional testicular lesions.

In many scrotal processes, the clinical symptoms include pain, swelling, redness, and a palpable lump. With the help of USG, it is possible to recognise and classify intra- or extratesticular lesions, differentiate between benign and malignant lesions, and determine which lesions require immediate surgery (such as testicular torsion, malignant tumours, and traumatic rupture) and which can be treated conservatively (eg, epididymo-orchitis, torsion of the testicular appendages). [6-8] Ionizing radiation is not needed for the safe, reasonably priced, and widely accessible imaging modality known as ultrasonography. Reviewing the numerous scrotal diseases that usually and infrequently occur in typical clinical circumstances is the primary goal of this study.

## **METHODS**

For nine months, a cross-sectional study was carried out among 100 patients in the radiology division of Tripura Medical College and Dr. B.R. Ambedkar Memorial Teaching Hospital, Hapania, Agartala, Tripura (January to November 2020). All patients with scrotal oedema who were referred during the study period will be included in the study, which will use a deliberate sampling strategy. The research committee received the study's protocol after it received ethical approval. Study was only carried out after receiving ethical approval.

The investigation made use of a USG machine with a 7–14 MHz probe, model SONOACE X8 from MEDISON. After receiving the patient's written and informed consent, a USG was performed. The patient was lying on his back while having a towel placed between his thighs to support his scrotum during the scrotal USG procedure. For carrying out the investigation, high-frequency linear-array transducers are advised. An important component of the examination is the study of the spermatic cord, especially in patients with varicocele and probable testicular torsion. In order to assess extratesticular vascularization and testicular perfusion, colour Doppler imaging was used in each patient. Power Doppler imaging was employed in addition to traditional colour Doppler imaging in cases with suspected testicular torsion or tumours. In contrast to the colour Doppler display, which uses the mean Doppler frequency shift to show blood flow, power Doppler imaging uses the integrated power of the colour signal. Some publications assert that adding power Doppler imaging to scrotal imaging boosts the sensitivity for detecting blood flow, however other writers disagree.

Data was entered, and the appropriate version of Microsoft Excel 2007 was used for analysis. A frequency, percentage, mean, and standard deviation were used to express the outcome.

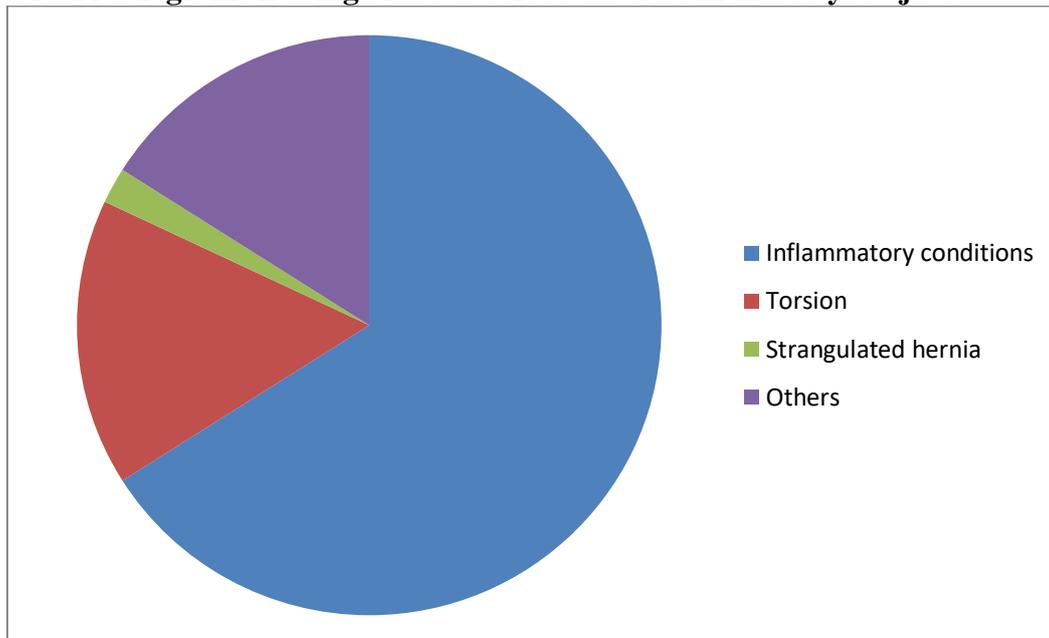
## **RESULTS**

In our study, we evaluated 100 patients presenting with acute scrotal pain by color Doppler ultrasonography. The results of these imaging studies were correlated with final diagnosis established by means of surgery or clinical follow-up [Table 1].

**Table 1: US diagnosis of acute scrotum**

	<b>Number of cases</b>	<b>US diagnosis</b>
Epididymo-orchitis, epididymitis, funiculitis	72	66
Torsion	16	16
Obstructed/strangulated hernia	2	2
Others like torsion of testicular appendage, hydrocele, varicocele	10	16

**Figure 1: Pie diagram showing of causes of acute scrotum in study subjects**



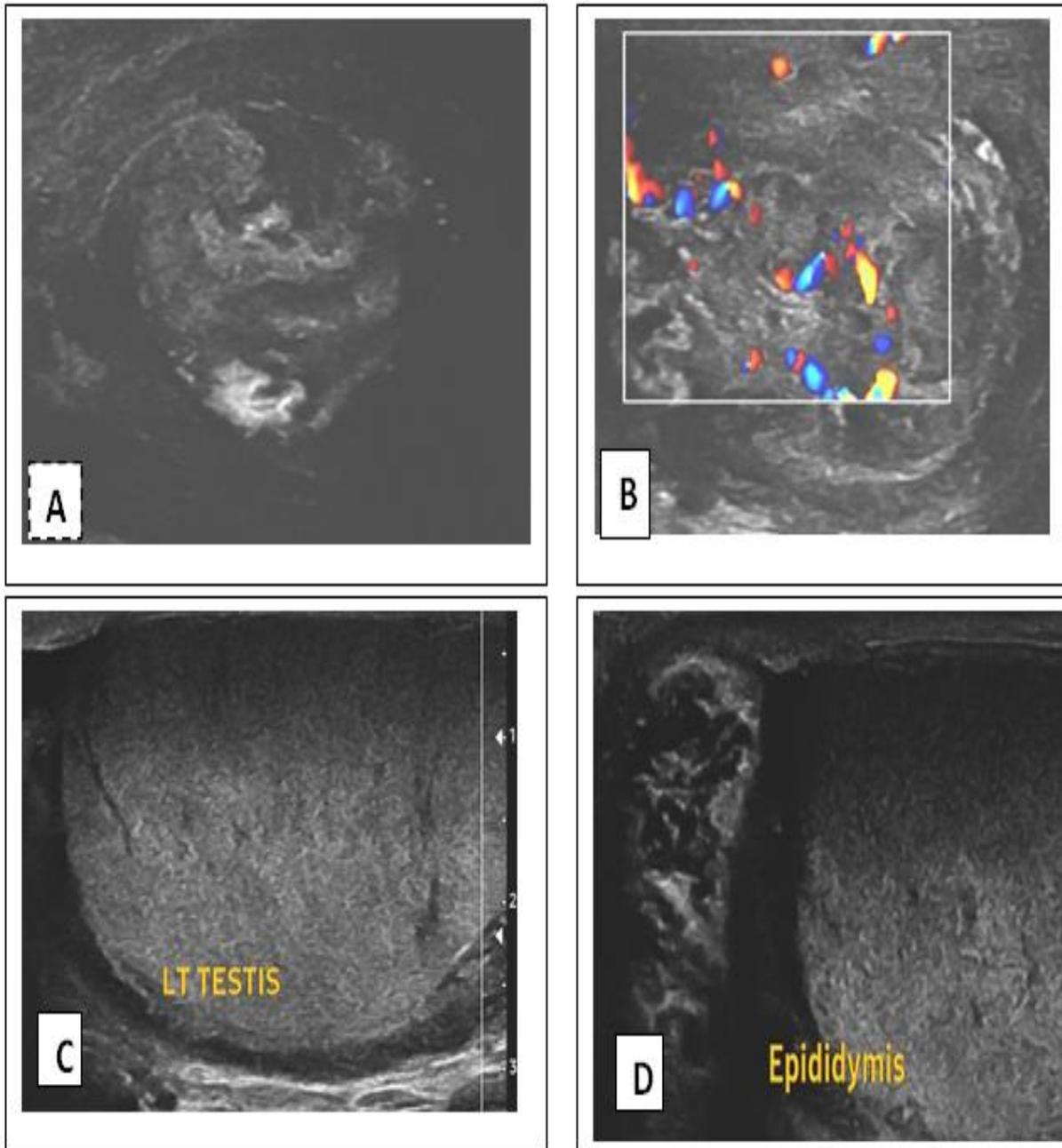
**Table 2: US diagnosis in testicular torsion**

<b>Torsion</b>	
True positive	16
True negative	84
False positive	0
False negative	0

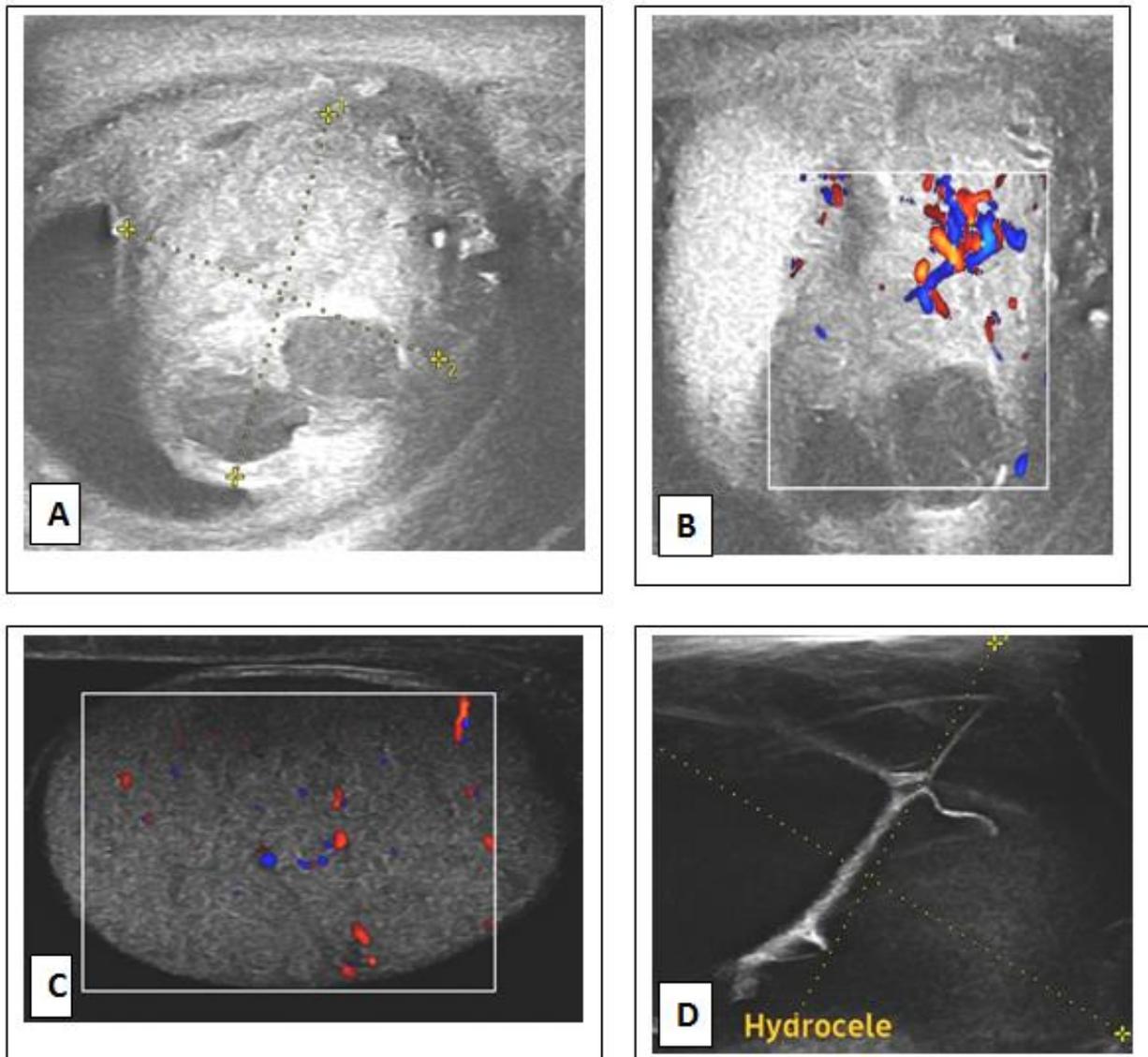
**Table 3: Accuracy of US in diagnosing testicular torsion**

<b>Torsion</b>	
Positive predictive value	100%
Negative predictive value	100%
Specificity	100%
Sensitivity	100%

**Images**  
**Testicular torsion**



**Image 1: Testicular torsion (Partial)- USG images – (A) Gray scale image shows twisted heterogeneous spermatic cord (B) Color Doppler study shows flow in the vessels of the twisted cord. (C) Swollen mild hypoechoic testis with inhomogeneous echotexture & (D) Bulky heterogeneous epididymis.**

**Inflammatory conditions**

**Image 2: Epididymo-orchitis with complications. USG images-** (A) Enlarged and mild heterogeneous epididymis with internal small hypoechoic components, scrotal wall thickening and reactive hydrocele. (B) Color Doppler shows increased vascularity with lack of vascularity in hypoechoic components, peripheral vascularity in hypoechoic components-Abscess. (C) Color Doppler shows increased vascularity in testicular parenchyma. (D) Septated collection in scrotal sac-Complex hydrocele.

**DISCUSSION**

Although it can happen at any age, testicular torsion is more frequent in boys between the ages of 10 and 25. Because torsion necessitates emergency surgery to preserve the testis, prompt diagnosis is essential. The spermatic cord rotates anywhere from  $90^{\circ}$  to  $720^{\circ}$ . Within six hours of start, this typically causes testicular venous outflow obstruction, testicular engorgement, arterial obstruction, and a swift, permanent testicular infarction. [9] The testicular salvage rate is 80–100% if surgery is done within 5–6 hours of the pain starting, 70% if done between 6–12 hours, and only 20% if done more than 12 hours later. Testicular torsion can occur intravaginally or extravaginally. The more frequent kind, intravaginal torsion, occurs most frequently during adolescence. The testis and epididymis are completely invested by the tunica vaginalis as a result of the testis being abnormally suspended by a

lengthy spermatic cord stalk. This strange phenomenon has been compared to a bell. In 50–80% of patients, abnormal testicular suspension is bilateral. The majority of extra vaginal torsion cases in neonates lack the "bell clapper" characteristic. It is believed to be caused by the testis's weak or missing attachment to the scrotal wall, which allows the testis, epididymis, and tunica vaginalis to rotate together and twisting of the cord at the level of the external ring. [10]

Testicular torsion typically manifests as an abrupt onset of acute scrotal discomfort with accompanying swelling, nausea, and vomiting. Additionally typical presentations are frequent. [11] An ashamed youngster may claim to have lower abdominal or inguinal pain rather than scrotal pain, and the doctor needs to be aware of this. A young child may downplay their symptoms out of fear. Examining may reveal a high-lying, transverse testis. Lifting the testis does not relieve the discomfort (Prehn's sign), and there may also be a lack of the cremasteric reflex. [9,11] This clinical sign has shown high clinician variability and might be challenging to elicit. It is inadequate as an adequate screening or diagnostic test because of this significant inconsistency. [12]

## CONCLUSION

In our study, we discovered that testicular torsion had 100% specificity and sensitivity. The typical age range for testicular torsion was 14 to 18 years, while the range for epididymo-orchitis was quite wide, between 30 and 45 years. Therefore, we draw the conclusion that a patient presenting to the emergency room with acute scrotal pain must have a colour Doppler of the scrotum. This can help to avoid additional surgical explorations by conclusively ruling out testicular torsion and resolving the clinical conundrum between torsion testis and epididymo-orchitis. As a result, it can considerably enhance results and lower patient morbidity. It is a crucial addition to the clinical evaluation of the scrotum and is accurate, quick, affordable, and nonionizing.

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