# Assessment of Sonographic Diagnosis of Acute Scrotum: An Observational Study

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### ABSTRACT

**Introduction:** High-resolution imaging of the scrotum is especially important for evaluating small scrotal structures. The performance of scrotal sonogrpahy in the trauma setting is emphasized as the amount of soft tissue swelling, ecchymosis, and hematoma does not always correlate with the degree of testicular injury. Hence; the present study was carried out for assessing sonographic diagnosis of acute scrotum.

**Material and methods:** A total of 90 patients with presence of symptoms of scrotal pain of few months duration were enrolled. Complete demographic and clinical data of all the patients was toadied. Scrotal ultrasonography (US) was carried out in all the patients. The spectrum of clinical profile was recorded separately. Lower frequency transducer was used for assessing marked scrotal enlargement. Diagnostic analysis of both testes was performed in sagittal and transverse planes.

**Results:**In diagnosing Epididymitis associated acute scrotal pain, sensitivity and specificity of sonography was found to be 100% and 97.78% respectively. In diagnosing Funniculitis associated acute scrotal pain, sensitivity and specificity of sonography was found to be 90% and 100% respectively. In diagnosing Testicular torsion, Testicular Infarct, and Orchitis associated acute scrotal pain, sensitivity and specificity of sonography was found to be 100% each.

Conclusion: Sonographic analysis is extremely useful in diagnosing patients with acute scrotal pain.

**Keywords:** Acute Scrotum, Sonographic

# INTRODUCTION

Imaging of acute scrotal disease is typically required when the clinical assessment is equivocal or if the clinician desires confirmation of the suspected clinical diagnosis. Presently, color Doppler imaging (CDI) is the imaging study of choice in this setting and has replaced nuclear scintigraphy and magnetic resonance imaging (MRI) for imaging the scrotum in general. Technological advances in CDI have resulted in superior grayscale resolution and highly sensitive color Doppler, providing a high probability of detecting the cause of acute scrotal disorders.<sup>1-3</sup> In addition, CDI is usually readily available in most institutions, is painless, requires no radiation exposure or contrast administration, and has a reasonably low cost. Pain in the scrotum is the most common presenting complaint in patients with acute scrotal disorders, although acute swelling or a palpable mass may also be present. The diagnostic considerations depend on the clinical setting, such as the age of the patient, history of trauma, or physical signs of infection.4,5

High-resolution imaging of the scrotum is especially important for evaluating small scrotal structures which were previously difficult to differentiate with earlier platforms; an example is the tunic albuginea, where early detection of a focal defect can allow diagnosis of testicular rupture and will facilitate prompt surgical intervention resulting in improved testis salvage rates. The performance of scrotal sonogrpahy in the trauma setting is emphasized as the amount of soft tissue swelling, ecchymosis, and hematoma does not always correlate with the degree of testicular injury.<sup>6,7</sup> Hence; the present study was carried out for assessing sonographic diagnosis of acute scrotum.

# MATERIAL AND METHODS

The present study was carried out in the department of radio-diagnosis and it included assessment of sonographic diagnosis of acute scrotum. A total of 90 patients with presence of symptoms of scrotal pain of few months duration were enrolled. Complete demographic and clinical data of all the patients was toadied. Scrotal ultrasonography (US) was carried out in all the patients. The spectrum of clinical profile was recorded separately. Lower frequency transducer was used for assessing marked scrotal enlargement. Diagnostic analysis of both testes was performed in sagittal and transverse planes. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

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Diagnosis	Cases		Sonographic diagnosis		
	Number of patients	Percentage	Number of patients	Percentage	
Epididymitis	46	51.11	47	52.22	
Testicular torsion	13	14.45	13	14.45	
Testicular Infarct	12	13.33	12	13.33	
Funniculitis	10	11.11	9	10	
Orchitis	9	10	9	10	
Total	90	100	90	100	
Table1: Causes of acute scrotal pain					

Variable	Value		
Sensitivity	100%		
Specificity	97.78%		
Positive predictive value	97.87%		
Negative predictive value	100%		
Table-2: Accuracy of sonography in diagnosis of Epididymitis			
associated acute scrotal pain			

Variable	Value			
Sensitivity	90%			
Specificity	100%			
Positive predictive value	100%			
Negative predictive value	98.78%			
Table-3: Accuracy of sonography in diagnosis of Funniculitis				
associated acute scrotal pain				

Variable	Value
Sensitivity	100%
Specificity	100%
Positive predictive value	100%
Negative predictive value	100%

Table-4: Accuracy of sonography in diagnosis of Testiculartorsion, Testicular Infarct, and Orchitisassociated acute scrotalpain



**Figure-1:** Right epididymitis: Right epididymis appears bulky, echogenic and shows vascularity on doppler.

# RESULTS

Out of 90 patients enrolled in the present study, Epididymitis, Testicular torsion, Testicular Infarct, Funniculitis and



**Figure-2:** Torsion of testis - Right side spermatic cord appears bulky, echogenic and shows whirl pool sign with increase vascularity on doppler.



**Figure-3:** Right funniculitis - Right side spermatic cord appears bulky, echogenic and shows vascularity on doppler.

Orchitis was the final diagnosis in 51.11 percent, 14.45 percent, 13.33 percent, 11.11 percent and 10 percent of the patients respectively. On sonography analysis, Epididymitis, Testicular torsion, Testicular Infarct, Funniculitis and Orchitis was the final diagnosis in 52.22 percent, 14.45 percent, 13.33 percent, 10 percent and 10 percent of the patients respectively. In diagnosing Epididymitis associated acute scrotal pain, sensitivity and specificity of sonography was found to be 100% and 97.78% respectively. In diagnosing Funniculitis associated acute scrotal pain, sensitivity and specificity of sonography was found to be 90% and 100% respectively. In diagnosing Testicular torsion, Testicular Infarct, and Orchitis associated acute scrotal pain, sensitivity and specificity of sonography was found to be 100% each.

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**Figure-4:** Right side orchitis- Right testis appears bulky , echogenic and shows high flow vascularity on doppler.mild free fluid in right side tunica veginal sac.

## DISCUSSION

Acute scrotum is defined as an acute painful swelling of the scrotum or its contents, and is accompanied by local signs and general symptoms. Children with acute scrotal pain account for approximately 0.5% of total emergency department visits. The acute scrotum poses a diagnostic challenge becuase of its diverse etiologies. Moreover, the extreme tenderness over the affected area precludes a thorough clinical examination. The differential diagnosis of an acute scrotum includes spermatic cord torsion, torsion of testicular appendages, epididymo-orchitis, trauma, irreducible inguinal hernia and tumor. Among these conditions, the spermatic cord torsion is of major concern because it requires immediate surgical intervention to avoid testicular loss. Interestingly, environmental factors have been associated to the spermatic cord torsion and previous studies reported an increased incidence of this condition during winter.7-10 Hence; the present study was carried out for assessing sonographic diagnosis of acute scrotum.

In the present study, out of 90 patients enrolled in the present study, Epididymitis, Testicular torsion, Testicular Infarct, Funniculitis and Orchitis was the final diagnosis in 51.11 percent, 14.45 percent, 13.33 percent, 11.11 percent and 10 percent of the patients respectively. On sonography analysis, Epididymitis, Testicular torsion, Testicular Infarct, Funniculitis and Orchitis was the final diagnosis in 52.22 percent, 14.45 percent, 13.33 percent, 10 percent and 10 percent of the patients respectively. Doppler ultrasonography is the most appropriate imaging modality for evaluation of the acute scrotum when it does not delay definitive surgical consultation in cases of presumed torsion. The sensitivity of color Doppler ultrasound is reported to range between 96% to 100% with a specificity of between 84% to 95%. A body of literature exists which also supports the role of point-of-care ultrasound by the treatment provider for the evaluation of the acute scrotum.<sup>11</sup> D'AndreaA et al assessed 164 patients with scrotal symptoms, who underwent scrotal ultrasonography (US). The clinical presentation, outcome, and US results were analyzed. The presentation symptoms included scrotal pain, painless scrotal mass or swelling, and trauma. Of 164 patients,

125 (76%) presented with scrotal pain, 31 (19%) had painless scrotal mass or swelling and 8 (5%) had trauma. Of the 125 patients with scrotal pain, 72 had infection, 10 had testicular torsion, 8 had testicular trauma, 18 had varicocele, 20 had hydrocele, 5 had cryptorchidism, 5 had scrotal sac and groin metastases, and 2 had unremarkable results. In the 8 patients who had history of scrotal trauma, US detected testicular rupture in 1 patients, scrotal haematomas in 2 patients. Of the 19 patients who presented with painless scrotal mass or swelling, 1 6 had extra-testicular lesions and 3 had intratesticular lesions. All the extra-testicular lesions were benign. Of the 3 intra-testicular lesions, one was due to tuberculosis epididymo-orchitis, one was non-Hodgkin's lymphoma, and one was metastasis from liposarcoma US provides excellent anatomic detail; when color Doppler and Power Doppler imaging are added, testicular perfusion can be assessed.<sup>6</sup>

In the present study, figure 1 shows right epididymitis-Epididymis appears bulky, echogenic and shows vascularity on Doppler. Figure 2 shows Torsion of testis- right side spermatic cord appears bulky, echogenic and shows whirl pool sign with increase vascularity on Doppler. Figure 3 shows Right Funniculitis- right side spermatic cord appears bulky, echogenic and shows vascularity on doppler. Figure 4 Right side orchitis and infarct- right testis appears bulky, echogenic and shows high flow vascularity at lower pole on Doppler and hypoechoic non vascular area at upper pole. mild free fluid in right side tunica vaginal sac.

In diagnosing Epididymitis associated acute scrotal pain, sensitivity and specificity of sonography was found to be 100% and 97.78% respectively. In diagnosing Funniculitis associated acute scrotal pain, sensitivity and specificity of sonography was found to be 90% and 100% respectively. In diagnosing Testicular torsion, Testicular Infarct, and Orchitis associated acute scrotal pain, sensitivity and specificity of sonography was found to be 100% each.Agrawal AM analyzed 50 patients who were referred with history of acute scrotal pain. Color Doppler sonography yielded a positive and negative predictive value (PPV and NPV) of 100% each for torsion, whereas, 93.9 and 70.6% for epididymo-orchitis, respectively; a sensitivity and specificity of 100% for torsion, whereas, for epididymo-orchitis it was found to be 86.1 and 85.7%, respectively. In cases of incomplete or early torsion, some residual perfusion may be detected leading to falsenegative results. They therefore conclude that color Doppler sonography can reliably rule out testicular torsion and can thus help in avoiding unnecessary surgical explorations.<sup>12</sup>

## CONCLUSION

Sonographic analysis is extremely useful in diagnosing patients with acute scrotal pain.

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