

Doppler Sonography in the Evaluation of Testicular Torsion - An Institutional Experience

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ABSTRACT

BACKGROUND

Testicular torsion is one of many possible causes of acute scrotal pain, and is due to twisting of the spermatic cord which can result in strangulation of blood flow to and from the testicle. It most commonly affects boys and young adults. Testicular salvage rates are high if early intervention is done. Doppler sonography plays an important role in the diagnosis of torsion, both in complete, and partial variants. The purpose of this study was to evaluate the role of Doppler sonography in the evaluation of testicular torsion, both in complete and partial types.

METHODS

Doppler sonography was done in 42 patients using linear broadband phased array transducer (7 - 12 MHz) on an E-Saote MyLab 60 ultrasound colour Doppler system. First, gray scale ultrasonography of contents of entire scrotal sac was done. The size and echogenicity of bilateral testis and epididymis along with twisting of spermatic cord, reactive hydrocoele, and scrotal sac thickening were recorded. Later, Doppler study was performed to assess intratesticular flow along with vascularity in rest of scrotal sac.

RESULTS

The age group ranged from 4 to 36 years with the mean age of 12.5 years. Most of the patients reported to emergency department between 6 - 12 hrs. after onset of symptoms. Out of 42 patients, 38 patients were diagnosed as complete torsion and 04 patients were diagnosed as partial torsion.

CONCLUSIONS

Doppler sonography is the gold standard for the evaluation of torsion of testis and helps in accurate diagnosis.

KEYWORDS

Doppler Sonography, Testis, Torsion

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BACKGROUND

Testicular torsion is one of many possible causes of acute scrotal pain. It is a twisting of the spermatic cord which can result in strangulation of blood flow to and from the testicle. Although it may occur at any age, it most commonly affects boys and young adults. Anatomically there are two types of torsion. First one is 'extra-vaginal' which is less common and seen in neonates. Second one is 'intra-vaginal' which is more common and is seen in adolescents and young adults, typically between the ages of 12 and 18 years.¹ Testicular torsion is not an all-or-none phenomenon. It can be of three types, complete, partial and intermittent.² The close differential diagnosis includes, torsion of the testicular appendages, epididymo-orchitis and trauma. The serious morbidity of testicular ischemia and the need to institute urgent and appropriate treatment warrants rapid distinguishing between these entities. When a testicle undergoes torsion, there are salvage rates of near 100% within the first 6 hours, 70% between 6 and 12 hours, and 20% between 12 and 24 hours.³ Salvage rates after 24 hrs. are less than 10%.⁴

Complete torsion occurs when the testis twists 360° or greater, usually leading to absence of intratesticular flow on colour Doppler exam making a sonographic diagnosis straightforward. However sometimes the flow is preserved or decreased. Intermittent torsion is defined as sudden onset of unilateral testicular pain of short duration with spontaneous resolution. In incomplete or partial torsion, there will be some residual perfusion to the testis as the degree of spermatic cord twist is less than 360°. However, there is no spontaneous resolution of pain.⁵ High resolution Ultrasonography along with colour Doppler exam is the gold standard for evaluation of torsion of testis. In complete torsion the sonographic findings are classical, but cases of partial torsion present a diagnostic challenge. Doppler sonography may be of help in diagnosing partial torsion.

The study was undertaken to define the role of Doppler sonography in the evaluation of testicular torsion, both in complete and partial types.

METHODS

A prospective longitudinal study was conducted in a tertiary care hospital in Department of Radiology, Hyderabad, India over a period of 4 years among 42 patients.

Inclusion Criteria

The study population included children and young adult male patients who were being evaluated for testicular torsion and were referred from Dept of Emergency Medicine.

Exclusion Criteria

Patients who were known cases of trauma or some other primary pathology in scrotum were excluded from this study.

Technique

The individual information, clinical history and findings of every patient were recorded in a prescribed format. Informed consent was taken from all patients. The examination was conducted in an atmosphere of privacy. All cases were done using a linear broadband phased array transducer (7-12 MHz) on an E-Saote MyLab 60 ultrasound colour Doppler system. First, in longitudinal and transverse axes, the size and echogenicity of each testicle and epididymis were compared with the contralateral side. Also search was done for presence of twisting of spermatic cord, reactive hydrocoele and scrotal skin thickening. Later, Doppler Ultrasonography was performed to assess vascularity in bilateral testis and epididymis and in surrounding scrotal structures. All the findings were recorded in proper format. The average time spent by the study group in the Ultrasonography room was 20-30 min.

Statistical Analysis

The results were presented in number for the data in tables. All the data was analysed using SPSS software version 22.0 (SPSS Inc., Armonk, NY, USA).

RESULTS

In this study, we did Doppler sonography in 42 patients with acute scrotum between the age group of 4-36 years with mean age of 12.5 years. Patients between age group of 10-20 years constitute the dominant group (90.5%) (Figure 1).

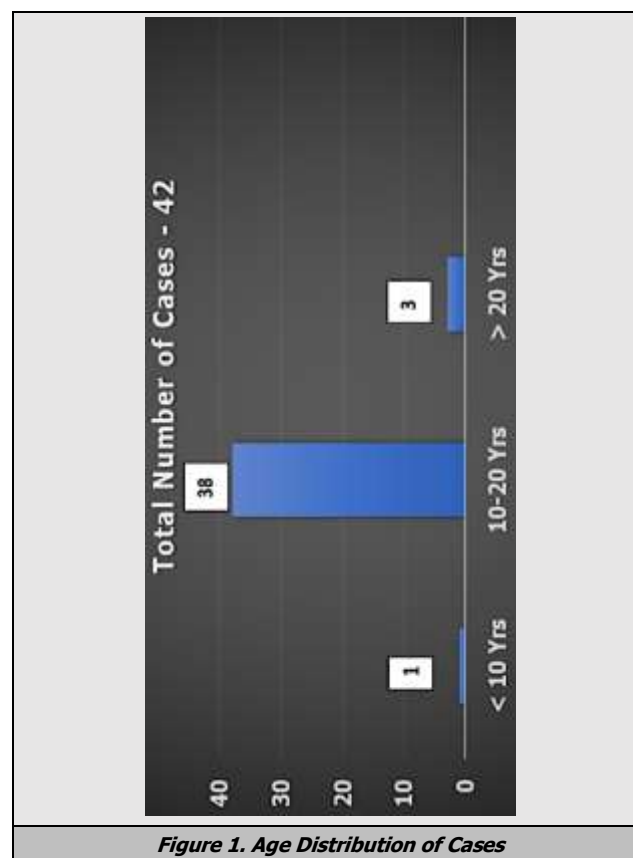
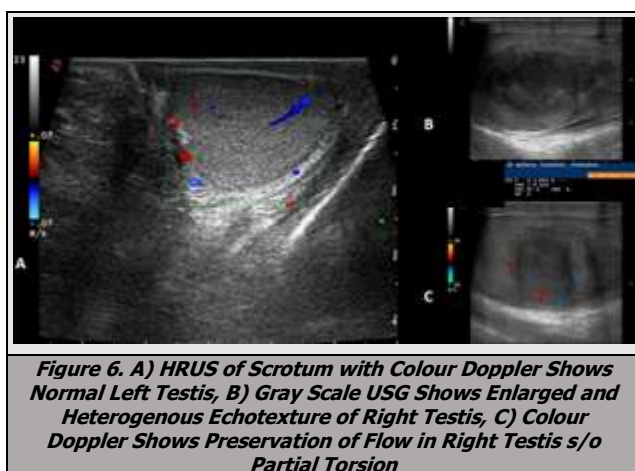
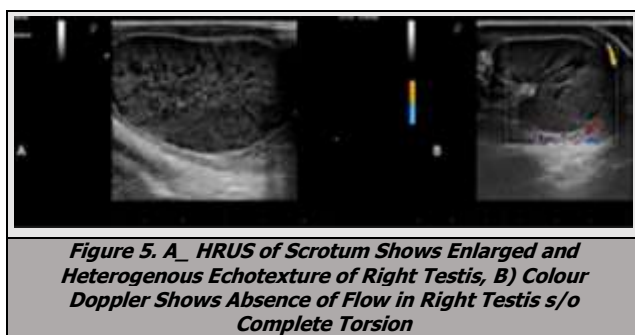
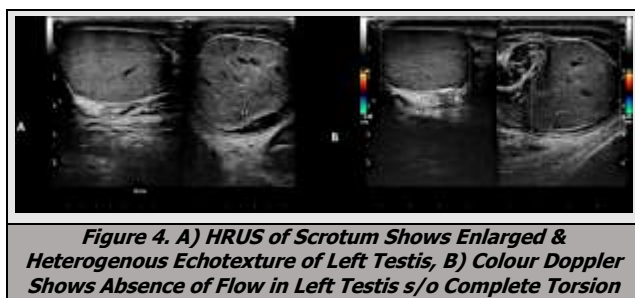
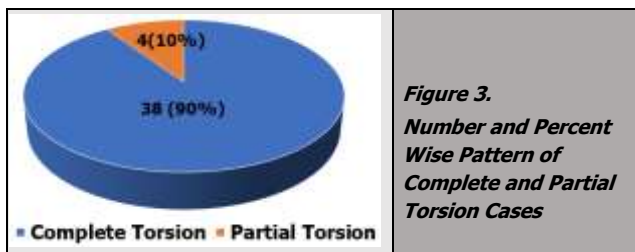
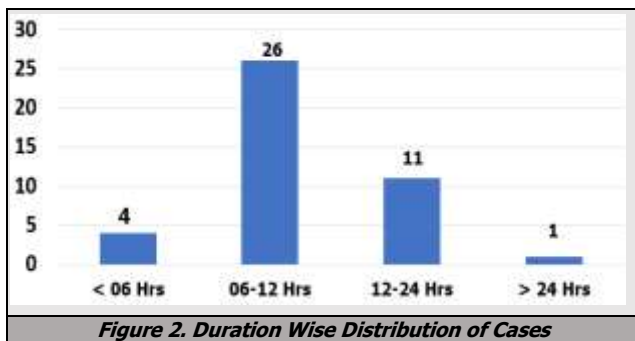


Figure 1. Age Distribution of Cases



Majority of patients (61.9%) presented to emergency department within 6-12 hrs. of onset of symptoms. 04 patients reported in less than 06 hrs, 11 patients reported in

between 12-24 hrs. and 01 patient came after 24 hrs. (Figure 2). 38 (90%) patients were diagnosed as having complete torsion and 4 (10%) patients were diagnosed as partial torsion. (Figure 3).

DISCUSSION

‘Testicular torsion’ is one of important causes of acute scrotum. It is due to twisting of a testicle on the spermatic cord resulting in occlusion of blood supply. It commonly affects boys and young adults and the most common symptom is acute testicular pain. Intravaginal torsion is the most common subtype, accounting for 90% of cases, and it typically occurs between the ages of 12 and 18 years.¹ The diagnosis is often made clinically, but an ultrasound is helpful in confirming the diagnosis. The clinical features that favour for testicular torsion include pain with duration of less than 24 hrs., nausea, vomiting, high position of the testis and abnormal cremasteric reflex.

The Testicular Workup for Ischaemia and Suspected Torsion (TWIST) score can be calculated to determine the need for ultrasound. It is a clinical decision tool that takes into consideration testicular swelling (two points), hard testes (two points), absent cremasteric reflex (one point), nausea or vomiting (one point) and high riding testicle (one point). A score of more than 2 warrants ultrasonogram.⁶

Doppler Ultrasonography is the modality of choice for evaluating suspected torsion testis. It can assess the size, echogenicity and vascularity simultaneously, all without subjecting the patients to ionising radiation. It is easily available, but is operator dependent. The most important part of the examination is the comparison of affected one with the normal side.

Gray scale sonography is used to display the testicular echogenicity which is reported as the best predictor of viability. Early on in testicular torsion, the testicular echogenicity may appear normal and homogeneous, but with developing infarction, it becomes hypoechoic.⁷ In torsion, the involvement of epididymis is inevitable. It increases in size and shows heterogenous echotexture with radiating hypoechoic bands.⁸ Sonography is also useful in assessing size of affected testis, twisting of spermatic cord (whirlpool sign), presence of reactive hydrocoele and reactive scrotal skin thickening.

Spectral duplex sonography is used to display flow and velocities in testis and surrounding structures. Power Doppler sonography is particularly useful in picking up low flow. Colour Doppler sonography is shown to have sensitivities from 78.6% to 89% and specificities of 77% to 100%.⁹ Intratesticular arteries characteristically have a low resistance pattern with a mean resistive index of 0.62 (range, 0.48–0.75).¹⁰

Complete torsion with absent flow in affected testis is usually diagnosed without difficulty by Doppler sonography. In late-phase torsion (greater than 24 hrs), in addition to lack of colour flow within the testis, a “halo sign” may be

seen. It consists of a rim of increased pudendal flow that surrounds the testis.¹¹

However, diagnosing partial testicular torsion is difficult both clinically and sonographically. Gray scale findings may be normal or subtle in cases of partial testicular torsion. A spectral Doppler analysis should be performed in the upper, mid, and lower poles of each testicle to cover all segments and should be recorded. The Doppler angle should be ideally 60° or less. In the presence of classic clinical history, subtle variations in the spectral Doppler waveform must be examined in detail paying particular attention to the symptomatic side. Decreased flow in affected testis as compared to normal side, to and fro flow, variability of flow in different regions within same testicle and increased RI (>0.75) suggests partial torsion.¹² Arce et al. showed that rotated cord structures were visualized with gray-scale ultrasound in all six of their patients with surgically proven testicular torsion, despite the presence of intratesticular colour flow, suggesting a diagnosis of incomplete testicular torsion.¹³

The third entity known as 'Intermittent testicular torsion', defined as the sudden onset of unilateral scrotal pain of short duration with spontaneous resolution. This condition is not easy to characterize clinically as symptoms are highly variable, ranging from asymptomatic to severe unilateral pain at the time of examination. Sonographic diagnosis of this condition is also equally difficult. It can show variable findings, including hyperaemia of the testicle that may mimic orchitis and hyperaemia of a swollen and inflamed epididymal complex that can be mistaken for epididymitis or the inflammatory process related to a torsed appendage. The diagnosis is of prime importance because it can precede impending complete torsion. Two sonographic parameters that can be significant in the diagnosis of intermittent testicular torsion are the 'whirlpool sign' of the twisted spermatic cord or a boggy cord and the 'pseudo mass' appearance just below the twist.

In this study, we did Doppler sonography of testis in 42 patients between 4-36 years of age with mean age of 12.5 years. Patients between age group of 10-20 years constitute the dominant group (90.5%). (Figure 1).

Majority of our patients (26) presented between 6-12 hrs of onset of symptoms. 04 patients reported in less than 06 hrs, 11 patients reported in between 12-24 hrs and 01 patient came after 24 hrs. (Figure 2).

Clinical features are suggestive of testicular torsion in 30 patients and equivocal in 12 patients. In all patients, Doppler sonography was performed in emergency Ultrasonogram room immediately.

Doppler sonography findings were suggestive of complete torsion in 38 patients. (Figure 3). Among these patients, Gray scale imaging showed heterogenous echotexture in 37 patients. One patient who underwent USG in less than 06 hrs showed homogenous echotexture. Increase in the size of affected testis was seen in 23 patients. Increase in the size of ipsilateral epididymis was seen in 20 patients. Twisting of spermatic cord was seen in

26 patients. In all these patients, colour Doppler showed complete absence of flow. (Figure 4 & Figure 5)

Sonographic findings were suggestive of partial torsion in 04 patients. (Figure 6). Two of them were less than 10 years of age and two were just more than 10 years. Gray scale imaging showed homogenous echotexture in 3 patients, whereas one patient showed heterogenous echotexture. Twisting of cord structures was noted in 02 patients. Other gray scale findings were normal in these patients. Colour Doppler showed reduced flow as compared to normal side and increased RI (>0.75) in all four patients. Variability in the flow pattern within the same testicle in different regions was seen in one patient.

All patients underwent surgical exploration and the diagnosis were confirmed in all patients suggestive of 100% technical success by Doppler sonography. However, in one patient who reported after 24 hrs, testis could not be salvaged. This highlights the importance of time both in early diagnosis and management.

CONCLUSIONS

Doppler sonography of testis including rest of the scrotal sac, is the modality of choice for the imaging evaluation of acute scrotal pain. In cases of complete torsion, the sonographic findings were straightforward. Presence of intratesticular flow does not exclude testicular torsion, and in these cases, high index of suspicion must be maintained for partial testicular torsion. In our study, reduced flow in affected testis as compared to normal one, variability of flow pattern within same testicle in different regions, and increased RI favoured the diagnosis of partial testicular torsion.

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