International Surgery Journal
Hamid I et al. Int Surg J. 2015 May;2(2):256-259
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902
DOI: 10.5455/2349-2902.isj20150525

Research Article

Role of Doppler ultrasonography in acute scrotum in children and young adults

Insha Hamid[1], Mudasir Hamid Buch[2], Hanief Mohamed Dar[2]*, Umar Younus[2], Biant Singh[2], Majid Jahangir[3]

[1]MBBS, Government Medical College, Srinagar, J&K, India
[2]Department of Surgery, Government Medical College, Srinagar, J&K, India
[3]Department of Radio-diagnosis, Government Medical College, Srinagar, J&K, India

Received: 15 April 2015
Accepted: 22 April 2015

***Correspondence:**
Dr. Hanief Mohamed Dar,
E-mail: drhaniefms@gmail.com

ABSTRACT

Background: Objective: To evaluate the efficacy of Doppler ultrasound in correctly diagnosing acute scrotal conditions in children and young adults.
Methods: Over a period of two years 50 patients with acute scrotum were admitted in general surgery department who underwent Doppler ultrasound scrotum and its efficacy in correctly diagnosing the pathology was analysed.
Results: 50 patients with age group ≤25 years were included in study. Scrotal pain was the most frequent presenting symptom of acute scrotum (98%) followed by Swelling of the hemiscrotum on the involved side present in 88% of the patients. Doppler ultrasound showed torsion of testis in 22 patients. On Scrotal exploration, torsion of spermatic cord was confirmed in 20 patients, one patient had torsion of appendix of testis and the other had Epididymo-orchitis. Thus the sensitivity and specificity of Doppler ultrasonography for testicular torsion was 86.9% and 92.6% respectively. Three patients with equivocal Doppler findings, but strong clinical suspicion of testicular torsion were explored, and testis was found to be torsed in all the three patients. Doppler ultrasonography showed Epididymo-orchitis in 20 patients, torsion of testicular appendage in 2 patients, Idiopathic scrotal edema in one, Incarcerated inguinal hernia in one, and a large hematocele in one patient. All twenty patients of epididymo-orchitis, two patients of torsion of testicular appendage, and one patient of idiopathic scrotal edema were managed conservatively. At three weeks follow up, all the patients were free of symptoms. One patient of scrotal trauma with Doppler showing a large hematocele, and the other one with obstructed inguinal hernia were explored and Doppler findings were confirmed. The sensitivity and specificity of Doppler ultrasonography for epididymo-orchitis was 95% and 100% respectively.
Conclusions: Doppler ultrasound scrotum is an important investigation in acute scrotum.

Keywords: Doppler ultrasonography, Torsion testis, Epididymo-orchitis

INTRODUCTION

Acute scrotum is undoubtedly the most common genitourinary tract emergency of childhood.[1] It is defined as a condition presenting with red, swollen and tender scrotum (unilateral or bilateral) associated with extreme pain.[2] Common causes of acute scrotum include, torsion testis or its appendages and epididymo-orchitis. Other causes are, testicular trauma, testicular tumors, testicular vasculitis, thrombosis of testicular vein, scrotitis and idiopathic scrotal wall edema.[1] Testicular torsion is the most commom cause of acute scrotum in children and young adults accounting for 73% of cases with two separate and distinct ages of maximum incidence, the first year of life and around puberty.[3] Even experienced paediatric surgeons and urologists may have sometimes

difficulties in differentiating an ischemic from an inflammatory etiology solely on the basis of clinical signs and symptoms. When the diagnosis is prompt and the surgery is timely, testicular salvage is the usual result. More recently, colour Doppler ultrasonography (CDUS) has often been used as an imaging modality for the evaluation of the acute scrotum with the purpose of detecting ischemia, thus reducing the need for explorative surgery.[4] The role of colour Doppler and power Doppler sonography in the diagnosis of acute testicular torsion is well established.[5] High frequency transducer utrasonography using gray scale along with pulsed and colour Doppler is being evaluated as the imaging modality of choice for patients with acute scrotal pain.[6]

METHODS

This study was a prospective study, carried over a period of two years in the Department of general surgery government medical college Srinagar from October 2009 to September 2011. All patients of age group of ≤25 years with acute scrotum were admitted and subjected to detailed history and physical examination with emphasis on pulse, temperature, general and local examination findings. Baseline investigations involving haemogram, urine routine examination, urine culture with sensitivity and KFT were carried out in all patients. All patients were subjected to immediate Doppler ultrasonography scrotum.

Scrotal Doppler ultraonography was performed with the patient lying in a supine position and the scrotum supported by a towel placed between the thighs. (Optimal results were obtained with 7 to 14 MHz high-frequency linear-array transducers). The testes were studied in two planes (along the longitudinal and transverse axes). The size and echogenicity of each testicle and the epididymis was compared with that on the opposite side. In patients being evaluated for an acute scrotum, the asymptomatic side was scanned initially to set the gray scale and colour Doppler gains to allow comparison with the affected side. Colour Doppler and pulsed Doppler were optimized to display low-flow velocities, and blood flow in the testis and surrounding scrotal structures was documented, including the Spectral Doppler recording of the intratesticular arterial flow in both testes. The patients were categorized into two groups. Group A comprised the patients who were on the basis of history, physical examination, laboratory investigations and Doppler ultrasonography (suggestive of testicular torsion) needed immediate surgical exploration. Group B comprised the patients who on the basis of history, physical examination, laboratory investigations and Doppler ultrasonography (suggestive of epididymo-orchitis, etc.) were managed conservatively.

In group A, on surgical exploration the findings were recorded and corroborated to Doppler USG findings.

The patients in group B were managed with antibiotics on the basis of culture and sensitivity tests of urine, anti-inflammatory drugs, rest, elevation of scrotum (scrotal support), proteolytic enzymes and follow up at weekly intervals for 1st two weeks and thereafter monthly for at least 3 months for any testicular atrophy. Records of patients not responding to conservative treatment or any complication during the conservative treatment and the intervention done were made. The data is tabulated and was subjected to appropriate Statistical tests.

RESULTS

50 patients of acute scrotum presented to surgical department who were ≤25 years, over a period of two years comprising 0.11% among 45260 total patients attended the surgery department. The age distribution of patients was as shown in Table 1.

Table 1: Age distribution of acute scrotum.

Age (years)	Number of patients	Percentage
0-5	3	6
6-10	7	14
11-15	17	34
16-20	16	32
21-25	7	14

Patients presented with clinical features of pain in scrotum, swelling of hemiscrotum, nausea vomiting, fever, urinary symptoms, abdominal pain and tender scrotum with erythema. Most common presentation was scrotal pain and scrotal swelling as shown in Table 2.

Table 2: Clinical presentation in acute scrotum (n=50).

	Number of patients	Percentage
Symptoms		
Scrotal pain	49	98
Scrotal swelling	44	88
Nausea/vomiting	17	34
Fever	12	24
Urinary symptoms	6	12
Abdominal pain	1	2
Signs		
Scrotal erythema(Redness)	39	78
Scrotal tenderness	47	94
Absent cremastric reflex	24	48
Lab. investigations		
Leucocytosis	24	48
Polymorphonuclear leucocytosis	23	46
Pyuria	6	12

All the fifty patients were subjected to Doppler ultrasound, the results of which are as under.

Table 3: Sonographic diagnosis and operative findings.

Diagnosis	Sonological diagnosis (DUS)	Final diagnosis (Operative findings / Follow up)
Torsion of testis	22*	23
Epididymo-orchitis	20**	21
Torsion of testicular appendages	2***	3
Idiopathic scrotal edema	1	1
Incarcerated Inguinal hernia	1	1
Scrotal trauma (Hematocele)	1	1
****Equivocal	3	

*True positive-20, False positive-2, True negative-25, False negative-3.

**True positive-20, False positive-0, True negative-29, False negative-1.

***True positive-2, False positive-0, True negative-47, False negative-1.

****Three patients with equivocal Doppler findings, but strong clinical suspicion of testicular torsion were explored, and testis was found to be torsed in all the three patients.

Table 4: Sensitivity and specificity of Doppler ultrasonography for testicular torsion.

Doppler ultrasonography result	Final diagnosis (Torsion testis)	Final diagnosis (No torsion testis)
Positive	20 (true positive)	2 (false positive)
Negative	3 (false negative)	25 (true negative)
Sensitivity	92.6%	
Specificity	86.95%	
Total	23	27

Table 5: Sensitivity and specificity of Doppler ultrasonography for Epididymo-orchitis.

Doppler ultrasonography result	Final diagnosis (Epididymo-orchitis)	Final diagnosis (No epididymo-orchitis)
Positive	20 (true positive)	0 (false positive)
Negative	1 (false negative)	29 (true negative)
Sensitivity	= 95.23%	
Specificity	100%.	
Total	21	29

DISCUSSION

The youngest patient in this study was an infant of 10 months age and the oldest was 24 years. Predominant age group in this study was 10-15 years comprising of 19 patients (38%). Total number of patients with acute scrotum in the age group of 1 day to <25 years visiting the department of Surgery in SMHS hospital Srinagar from Oct 2009 to Sep 2011 were 1.1/1000 of total patients. Department scrotal pain was the most frequent presenting symptom of acute scrotum (98%) followed by Swelling of the hemiscrotum on the involved side present in 88% of the patients. Tenderness of the involved hemiscrotum and testis was the most frequent clinical sign of acute scrotum (94%). Scrotal erythema was present in 39 patients (78%). These observations are in close agreement with the findings of Cavusoglu YH, et al. and Liu CC.[7,8] Doppler ultrasound showed torsion of testis in 22 patients. On scrotal exploration, torsion of spermatic cord was confirmed in 20 patients, one patient had torsion of appendix of testis and the other had Epididymo-orchitis. Three patients with equivocal Doppler findings, but strong clinical suspicion of testicular torsion were explored, and testis was found to be torsed in all the three patients. In all these three cases spermatic cord was found to have a partial twist (180^0). Thus the sensitivity and specificity of Doppler ultrasonography for testicular torsion was 86.9% and 92.6% respectively. This is in close agreement with the observations of Liu CC et al.,[8] who reviewed 87 patients in the age group of <25 years of age with presentation of acute scrotum. The sensitivity and specificity of Doppler ultrasound in their study was found to be 87.9% and 93.3% respectively.

Hod et al.[9] reported 86% sensitivity and 95% specificity of DUS for testicular torsion.

Preoperative Doppler ultrasonography showed Epididymo-orchitis in 20 patients, torsion of testicular appendage in 2 patients, Idiopathic scrotal edema in one, Incarcerated inguinal hernia in one, and a large hematocele in one patient.

All twenty patients of epididymo-orchitis, two patients of torsion of testicular appendage, and one patient of idiopathic scrotal edema were managed conservatively.

At three weeks follow up, all the patients were free of symptoms. One patient of scrotal trauma with Doppler showing a large hematocele, and the other one with obstructed inguinal hernia were explored and Doppler findings were confirmed.

The sensitivity and specificity of Doppler ultrasonography for epididymo-orchitis was 95% and 100% respectively.

Thus 23 patients were managed conservatively and were saved from unnecessary surgical exploration. We believe

that Doppler sonography is very helpful in evaluating acute scrotum both in children and young adults. The method is very rapid, non-invasive and has a diagnostic accuracy at least equal to that of nuclear scanning. It can semiquantitatively characterize blood flow and can distinguish intratesticular blood flow from scrotal wall flow. It can also access other pathologic conditions involving the scrotum. Most importantly, it could be used at bedside to immediately help evaluate the cause of acute scrotum when patients are brought to the emergency department as has been opinion of most of the authors. Although the results of color Doppler ultra-sonography in differentiating TT from other causes of acute scrotum were quite satisfactory, but there were three cases of incomplete testicular torsion which were missed on CDUS. Similar cases of missed testicular torsion have also been reported by some authors. The possible causes of missed diagnosis of TT by CDUS include technical factors in the performance of the study (i.e. operator dependence), experience of the radiologist in reading scrotal ultrasonography, the possibility that torsion is intermittent, and difficulties with detection in younger children. This has been the opinion of most authors.

CONCLUSION

Acute scrotum in children and young adults is a surgical emergency. Proper diagnosis and timely intervention can save testis and avoid unnecessary scrotal exploration. Color Doppler is an excellent modality of investigations which helps in correct diagnosis and timely intervention.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Ashraf M, Bari S, Shera A, Holder. Acute Scrotum in Children. Paediatr Surg.1993;50:595-601.
2. Moharib NH, Krahn HP. Acute scrotum in children with torsion of spermatic cord. J Urol. 1970;104:601-3.
3. Skoglund RW, McRoberts JW, Ragde H. Torsion of the spermatic cord: a review of the literature and an analysis of 70 new cases. J Urol. 1970;104(4):604-7.
4. Stehr M, Boehm R. Critical validation of Colour Doppler ultrasound in diagnostics of acute scrotum. Eur J Pediatr Surg. 2003;13(6):386-92.
5. Lerner RM, Mevorach RA, Hulbert WC, Rabinowitz R. Colour Doppler US in the evaluation of acute scrotal disease. Radiology. 1990;176:355-8.
6. Dogra Vikram, Bhatt Shewta. Acute painful scrotum. Radiol Clin N Am. 2004;42:349-63.
7. Cavusoglu YH, Karaman A, Karaman I, Erdogan D, Aslan MK, Varlikli O, et al. Acute Scrotum-etiology and management. Indian J Pediatr. 2005;72(3):201-3.
8. Liu CC, Huang SP, Chou YH, Li CC, Wu MT, Huang CH, et al. Clinical presentation of acute scrotum in young males. Kaohsiung J Med Sci. 2007;23(6):281-6.
9. Hod N, Maizlin Z, Strauss S, Home T. The relative merits of Doppler sonography in the evaluation of patients with clinically and scintigraphically suspected testicular torsion. Med Assoc J. 2004;6(1):13-5.

DOI: 10.5455/2349-2902.isj20150525
Cite this article as: Hamid I, Buch MH, Dar HM, Younus U, Singh B, Jahangir M. Role of Doppler ultrasonography in acute scrotum in children and young adults. Int Surg J 2015;2:256-9.